COLLEGE OF ENGINEERING AND TECHNOLOGY,
BAMBHORI POST BOX NO. 94, JALGAON – 425001. (M.S.)

(With NBA Accredited Programmes)

Website : www.sscoetjalgaon.ac.in Email : sscoetjal@gmail.com

Mandatory Disclosure

Part-I

January 2018

Shrama Sadhana Bombay Trust's
COLLEGE OF ENGINEERING AND TECHNOLOGY
BAMBHORI, POST BOX NO. 94, JALGAON – 425001 (M.S.)
Included under section 2 (f) & 12 (B) of the UGC Act, 1956
Grade B ++ (2.91) NAAC Accredited

BAMBHORI,JALGAON
ISO 9001:2008

Website- www.sscoetjalgaon.ac.in
Email: sscoetjal@gmail.com
Principal: Dr. K.S.Wani
M. Tech., DBM, Ph.D.

Phone No. (0257) 2258393
Fax No. (0257) 2258392

Ref. No. COET/AICTE/MD/ / 18 **Date:**

C E R T I F I C A T E

Certified that all enclosures contained in PART-I , PART-II & PART-III bearing page no. to page no. are pertaining to our institution which are being submitted in two separate above mentioned bound booklets/box file of Mandatory Disclosure. All xerox copies may be treated as original.

PRINCIPAL

SSBT's College of Engineering & Technology, Bambhori, Jalgaon.

Mandatory Disclosure

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PART-I

MANDATORY DISCLOSURE

Mandatory Disclosure by Institutions running AICTE approved Engineering/Technology/Pharmacy programmes to be included in their respective Information Brochure, displayed on their website and to be submitted to AICTE every year latest by 30th April together with its URL

The following information is to be given in the Information Brochure besides being hosted on the Institution's official Website.

"The information has been provided by the concerned institution and the onus of authenticity lies with the institution and not on AICTE."

I. NAME OF THE INSTITUTION

Name	**SSBT's College of Engineering & Technology, Bambhori Jalgaon.**	
Address	Post Box No. 94 , Jalgaon (Maharashtra State)	
Pin Code	425 001	
Phone No.	(0257) 2258393	
Fax No.	(0257) 2258392	
Web site	www.sscoetjalgaon.ac.in	E-Mail: sscoetjal@gmail.com

II. NAME & ADDRESS OF THE DIRECTOR

Name	**Dr. Kishor Sopan Wani**
Designation	**Principal**
Address	31/2, Annapurna, Gandharva Colony, Jalgaon-425001
STD Code With Phone No.	0257 – 2252989 (R)
Fax No.	0257- 2258392 (O)
E-mail	wani.kishor@gmail.com

III. NAME OF THE AFFILIATING UNIVERSITY

Name	**North Maharashtra University, Jalgaon**		
Address	**Umavi Nagar, Post Box No.80, Jalgaon Dist. Jalgaon** **Pine Code :- 425 001.**		
Phone No.	**(0257) -2258428, 429**		
Fax No.	**(0257) 2258403, 2258406**	**E-Mail**	info@nmu.ac.in ,registrar@nmu.ac.in
		Web site	**www.nmu.ac.in**

IV] GOVERNANCE

* **Members of the Board and their brief background.**

Shram Sadhana Bombay Trust (Phone No. 022-26435608/24950888) is the promoting body of the College of Engineering and Technology, Bambhori, Jalgaon. The trust is a charitable organization registered with Charity Commissioner Bombay vide registration number E-6942 dated 12 Oct. 1978 and status of registration is current and valid. The trust strives to enhance human productivity through various welfare measures and is a leading light in educational research.

Brief background of the promoters are as follows :-

1.	Shri. Rajendrasing D. Shekhawat	Managing Trustee	Ex-M.L.A. .
2.	Mrs. Manjiri Shekhawat	Trustee	Social Worker
3.	Shrimati Lata Karamsot	Trustee	Social Worker

* Shram Sadhana Bombay Trust has entrusted the responsibility of running the college to the Board of Governors who are the apex decision making body. The members of the Board are as under.:-

1.	Shri. Raosaheb alias Rajendrasingh D. Shekhawat	Chairman
2.	Shri. Jayesh Rathore	Member
3.	Shri. S.R. Girase	Member
4.	Dr. Amit Dutta, Nominee of the AICTE- Regional Officer (Ex-officio)	Member
5.	An Industrialist/Technologist/Educationist from the region nominated by the regional committee as nominee of the Council, out of the panel approved by the Chairman of the Council	Member
6.	Dr. R.H. Gupta, Nominee of the Affiliating university	Member
7.	Prof. D.P. Nathe, Nominee of the State Government-DTE (Ex-officio)	Member
8.	Dr. K.B. Patil, An Industrialist from the region nominated by the State Govt.	Member

9.	Dr. K.S. Wani, Principal	Member Secretary
10.	Dr. S.P. Shekhawat, Professor	Faculty Member
11.	Shri. S.B. Pawar, Associate Professor	Faculty Member

* **Members of Academic Advisory Body.**

Academic Advisory Body is constituted of following members :-

1.	Dr. Kishor S. Wani	Chairman	Principal
2.	Dr. R.H. Gupta	Member	Academic planning
3.	Dr. M. Hussain	Member	Director, R.& D.
4.	Dr. S.R. Suralkar	Member	Director, Administration
5.	Dr. S.P. Shekhawat	Member	Director, Academics
6.	All Heads of Departments	Members	

*** Frequency of Board Meeting and Academic advisory Body.**

Governing Body meets once in six months and gives broad direction keeping in view the vision of the Trust which is to provide and promote an affordable, accessible quality higher education with emphasis on technology development .

Academic Advisory Body meets once in a quarter or earlier to check compliance of direction given by Governing Body and steer and resolve academic issues which come up during academic session.

* **Organisational Chart and Processes**

The style of management is integrative, participative and consultative at every decision making stage. Duties and responsibilities of various functionaries are well laid down. The organizational chart clearly depicts the flow of authority, responsibility and accountability. Hence the decision making process is transparent.

* **Nature and Involvement of faculty and Students in Academic Affairs and Improvements.**

Extent of faculty involvement in academic affairs is governed at three levels . Principal meets all Heads of Department every month to take stock of academic progress, course coverage activities. A more detailed interaction of faculty is held fortnightly under direction of Director Academics. Heads of Department are on daily contact with respective faculty, attend their class, offer guidance on teaching skill and methodology beside weekly meeting with all faculties on weekly academic performance, identifying deficiencies and suggesting means to improve upon the same.

Every student gives feedback on all relevant subjects with regard to syllabi, course content, degree of difficulty, if any, in assimilation of the subject and suggestion on improvement. Students have direct access to any faculty, heads of department, coordinator academics and Principal to make suggestion on academic subject.

* **Mechanism /Norms & Procedure for Democratic & Good Governance.**

As mentioned earlier, Apex decision making body is the Board of Governance who decides and give broad direction. Governing Body has nominated local committees i.e.

College Development Committee which meet once in a quarter or earlier to check compliance of direction given by Governing Body. Day to day operation of the college is managed by Principal and other appointed staff. Various Local Management Committees are well represented by both teaching and non teaching staff who effectively participate in the respective proceedings and help in observance of democratic and good governance practice of the college.

* **Student feedback on Institutional Governance/Faculty Performance**.

A committee of three Heads of Department under guidance of Director Academics and Principal meets students of all classes in each department and takes feedback on teaching methodology and performance of faculties as perceived by them. This process takes place twice in a semester. The feedback is scrutinized and analysed with a view to improve faculty performance.

* **Grievance Redressal Mechanism for Faculty, Staff and Students**.

Transparent management and administrative policy is by itself aids the redressal process in the college. The organizational chart gives out clear flow of authority and responsibility on both academic and administrative front. Faculty, Staff and Students are thus aware of the various processes and policies and can approach any functionary with any supposed difficulty which need to be resolved.

There are suggestion boxes placed at vantage points for all personnel to drop their ideas in confidence which are looked into with all seriousness.

* **Grievance Redressal Mechanism as per affiliating University.**

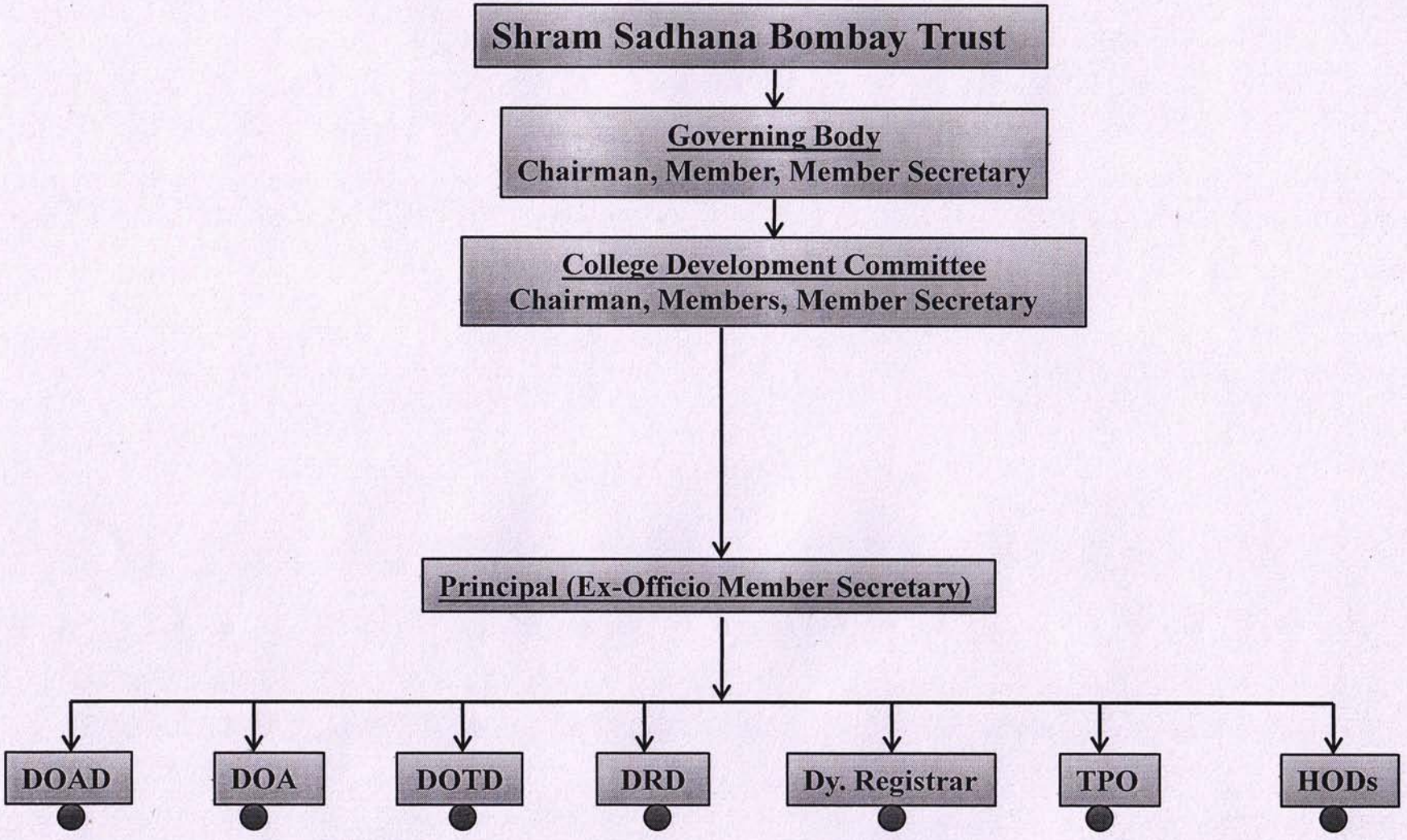
The vigilance committee is formed and which consists of Chairman

(Member of CDC). All HODs, Rectors and Students representative.

Also grievance cell is functioning in the college. The students grievances are looked into by the H.O.D. Concerned, Principal and if needed, they are referred to the management for appropriate decision. For Hostel the students approach the Rectors (Girls' Hostel and Boys' Hostel) and then they are referred to the Principal for appropriate decision.

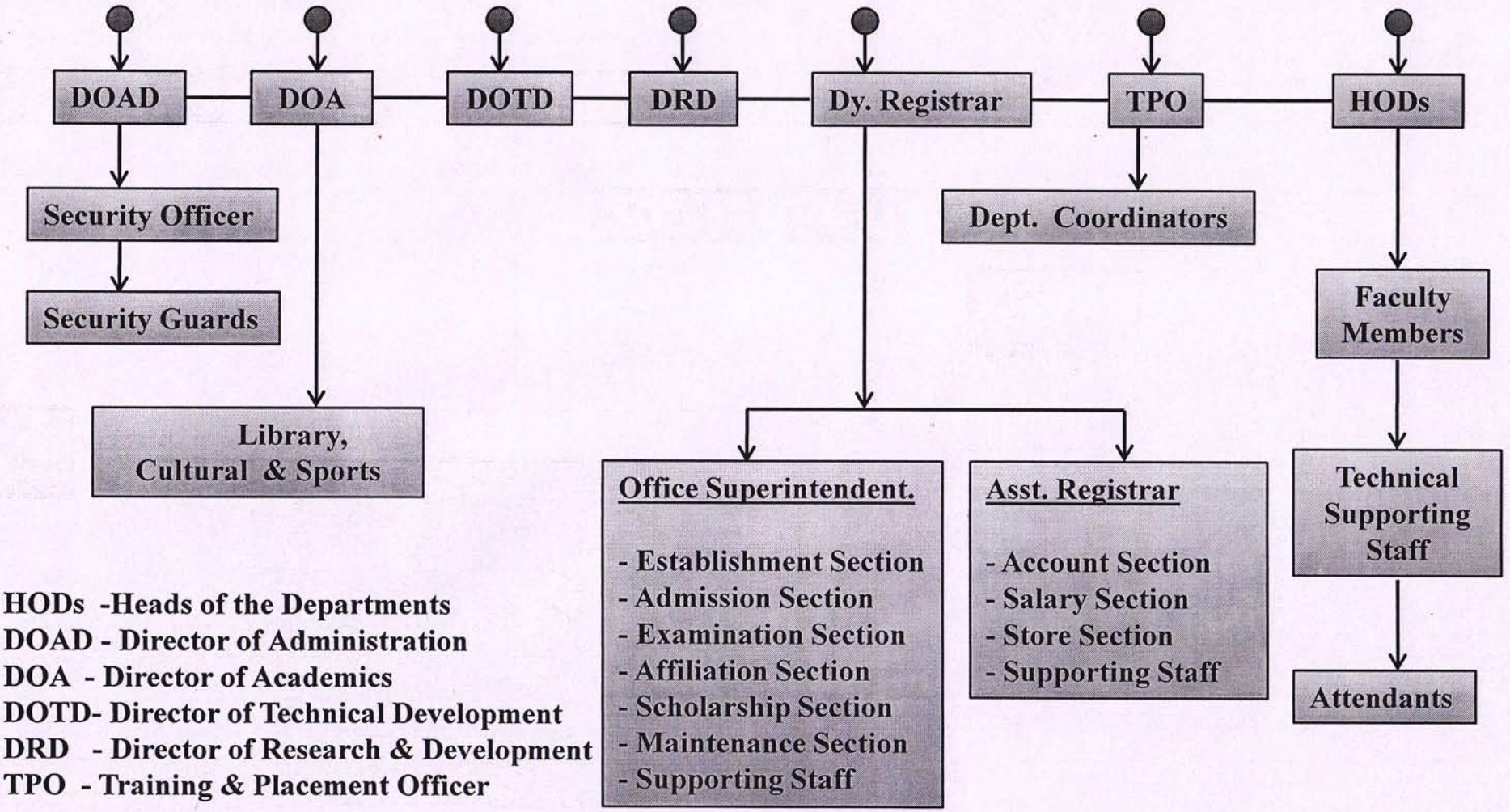
GOVERNANCE..

ORGANIZATION STRUCTURE



GOVERNANCE..

ORGANIZATION STRUCTURE..



HODs -Heads of the Departments
DOAD - Director of Administration
DOA - Director of Academics
DOTD- Director of Technical Development
DRD - Director of Research & Development
TPO - Training & Placement Officer

V. PROGRAMMES: ENGINEERING & TECHNOLOGY

A) Name of the Programmes approved by the AICTE 2016-17

Sr.	Course Name	Number of seats	Duration	Approved by AICTE
	UG Courses			
1	Civil Engineering	120	4 Years	Yes
2	Chemical Engineering	30	4 Years	Yes
3	Computer Engineering	120	4 Years	Yes
4	Mechanical Engineering	120	4 Years	Yes
5	Electrical Engg.	60	4 Years	Yes
6	Electronics and Tele-comm. Engg.	120	4 Years	Yes
7	Information Technology	60	4 Years	Yes
8	Bio-Technology	30	4 Years	Yes
	Total	**660**		
	PG Courses			
1	ME Civil (Environmental Engg.)	18	2 Years	Yes
2	ME Mechanical (Machine Design)	18	2 Years	Yes
3	ME E&TC (Digital Electronics)	18	2 Years	Yes
4	ME Computer Science & Engg.	18	2 Years	Yes
5	ME Electrical (Electrical Power Systems)	18	2 Years	Yes
	Total	**90**		
	Management course			
	MBA	60	2 Years	Yes
	Total	**60**		
	Total Intake	**810**		

B) Name of the Programmes Accredited by the National Assessment And Accreditation Council.
(NAAC), New Delhi (from 16/9/2016 to 15/9/2020)

1	Biotech Engineering	120	Yes	Accredited
2	Chemical Engineering	30	Yes	Accredited
3	Civil Engineering	120	Yes	Accredited
4	Computer Engineering	120	Yes	Accredited
5	Electrical Engineering	60	Yes	Accredited
6	E&TC Engineering	60	Yes	Accredited
7	Information Technology	60	Yes	Accredited
8	Mechanical Engineering	120	Yes	Accredited

C) Cut off mark/rank for admission during the last three years

Year 2014-2015

Sr.	Branch	Sanction Intake	Duration	Cut off Mark/rank	Tuition Fee
1	Chemical Engineering	30	4 years	40.00	Rs.63736
2	Civil Engineering	120	4 years	40.33	Rs. 63736
3	Computer Engineering	120	4 years	40.33	Rs. 63736
4	Mechanical Engineering	120	4 years	41.00	Rs. 63736
5	Electrical Engg.	60	4 years	40.33	Rs. 63736
6	E & TC Engg.	120	4 years	40.33	Rs. 63736
7	Information Technology	60	4 years	41.66	Rs. 63736
8	Bio-Technology	30	4 years	42.00	Rs. 63736
	PG Courses				
1	ME Civil (Environmental Engg.)	18	2 years	52.54	Rs. 63736
2	ME Mechanical (Machine Design)	18	2 years	61.00	Rs. 63736
3	ME E&TC (Digital Electronics)	18	2 years	58.00	Rs. 63736
4	ME Computer Science & Engg.	18	2 years	61.42	Rs. 63736
3	MBA	60	2 years	50.00	Rs. 63736

Year 2015-2016

Sr.	Branch	Sanction Intake	Duration	Cut off Mark/rank	Tuition Fee
1	Chemical Engineering	30	4 years	15.09	Rs. 64036
2	Civil Engineering	120	4 years	18.51	Rs. 64036
3	Computer Engineering	120	4 years	15.17	Rs. 64036
4	Mechanical Engineering	120	4 years	20.68	Rs. 64036
5	Electrical Engg.	60	4 years	15.77	Rs. 64036
6	E & TC Engg.	120	4 years	13.88	Rs. 64036
7	Information Technology	60	4 years	28.23	Rs. 64036
8	Bio-Technology	30	4 years	08.55	Rs. 64036

	PG Courses				
1	ME Civil (Environmental Engg.)	18	2 years		Rs. 64036
2	ME Mechanical (Machine Design)	18	2 years		Rs. 64036
3	ME E&TC (Digital Electronics)	18	2 years		Rs. 64036
4	ME Computer Science & Engg.	18	2 years		Rs. 64036
3	ME Electrical Power System	18	2 years		Rs. 64036
4	MBA	60	2 years		Rs. 64036

Year 2016-17

Sr.	Branch	Sanction Intake	Duration	Cut off Mark/rank	Tuition Fee
1	Chemical Engineering	30	4 years	42	Rs. 64036
2	Civil Engineering	120	4 years	14	Rs. 64036
3	Computer Engineering	120	4 years	43	Rs. 64036
4	Mechanical Engineering	120	4 years	43	Rs. 64036
5	Electrical Engg.	60	4 years	41	Rs. 64036
6	E & TC Engg.	120	4 years	13	Rs. 64036
7	Information Technology	60	4 years	47	Rs. 64036
8	Bio-Technology	30	4 years	44	Rs. 64036
	PG Courses				
1	ME Civil (Environmental Engg.)	18	2 years		Rs. 64036
2	ME Mechanical (Machine Design)	18	2 years		Rs. 64036
3	ME E&TC (Digital Electronics)	18	2 years		Rs. 64036
4	ME Computer Science & Engg.	18	2 years		Rs. 64036
3	ME Electrical Power System	18	2 years		Rs. 64036
4	MBA	60	2 years		Rs. 64036

DEPARTMENT OF BUSINESS ADMINISTRATION

Cut off mark/rank for admission during the last three years for MANDATORY DISCLOSURE (MBA)

Year	Branch	Sanction Intake	Duration	Cut off Mark/rank	Tuition Fee
Year 2013-2014	MBA	60	2	45.00	Rs. 61111
Year 2014-2015	MBA	60	2	50.00	Rs. 63736
Year 2015-2016	MBA	60	2	07.77	Rs. 64036
Year 2016-2017	MBA	60	2	39.00	Rs. 64036

H.O.D (MBA)

D) Placement Facilities

a) **Training & Placement Cell:** SSBT's C.O.E.T., Bambhori, Jalgaon has an independent T & P Cell devoted to cater to the needs of organizations in conducting campus interviews for placements. It is headed by Training & Placement Officer & Departmental coordinators lead a team of placement representatives from various courses of study assist the Cell.

The cell has the following facilities:

i) Separate Internet connection, computers, laser printer and Scanner for office automation.

ii) Separate lounge for industrialist and visitors.

iii) Newspaper, magazines, etc.

iv) All audio/video facilities for presentations, written test, group discussions and interviews.

b) T & P Activities:

i) Campus Interviews

ii) Industrial Training

iii) Industrial Visits (Students & TPC members)

iv) Expert Lectures

v) Industrial Meet

vi) Job-Oriented Courses

vii) Deputation of faculty members to various training programs.

viii) Mock competitive exams, Interviews, Group Discussions, etc.

ix) Personality development programme.

x) Alumni meet.

xi) Entrepreneurship development programme.

c) Campus placement in last three years with minimum salary, maximum salary and average salary

BRANCH/YEAR	Chemical	Biotech	Civil	Computer	Electrical	E&TC	IT	Mech	MBA	Other	Total
2015-16	19	06	07	39	22	66	18	07	24	12	220
2016-17	07	01	07	11	12	13	23	18	18	04	114
2017-18 (Till Date 19/01/18)	00	00	00	00	04	00	00	00	00	00	04

3. MINIMUM SALARY: Rs. 1, 08,000/-

4. MAXIMUM SALARY: Rs. 3,16,000/-

5. AVERAGE SALARY: Rs. 1,80,000/-

- Name and duration of programme(s) having affiliation/collaboration with Foreign University(s)/Institution(s) and being run in the same Campus along with status of their AICTE approval. If there is foreign collaboration, give the following details: Details of the Foreign Institution/University:

NA

- For each Collaborative/affiliated Programme give the following:

NA

- Whether the Collaborative Programme is approved by AICTE? If not whether the Domestic/Foreign Institution has applied to AICTE for approval as required under notification no. 37-3/Legal/2005 dated 16th May, 2005.

NA

Faculty List
2018-2019

(2017-18 as on 08/01/ 2018)

SHRAM SADHANA BOMBAY TRUST'S COLLEGE OF ENGG. & TECH., BAMBHORI, JALGAON.

Academic Year 2017-2018

Sr. No.	Name of staff	Date of Birth	Designation	Qualifi cation	Class	University	Year of Passing	Pay Scale	Date of Joining	University Approval No. & Date	Whether approved by University (Yes/No)	Category
01	Dr. K.S. Wani	24/09/1959	**Principal**	B.Sc.Tech . M. Tech . D.B.M. Ph.D.	I -Class I -Class I -Class --	Nagpur Nagpur Nagpur N.M.U.	1983 1985 1984 2006	**37400-67000**	-	NMU/18/J-4/621/03, Dt. 18.02.2003Wef-14.02.2002 NMU/18/552/08, Dt. 21-05-08 Wef-19.07.2006 NMU/18/1663/2011 Dt. 01-11-2011 Wef-13.10.2011 NMU/18/542/2012, Dt. 04-04-2012 Wef-26..03..2012	Yes, as Lecturer & A.P & Professor & As Principal	OBC OPEN OPEN

Name of the Department: Civil Engineering

Sr. No.	Name of staff	Date of Birth	Designation	Qualifi cation	Class	University	Year of Passing	Pay Scale	Date of Joining	University Approval No. & Date	Whether approved by University (Yes/No)	Category
01	Dr M. Husain	05/12/1969	**Professor & HOD**	B.E. Civil M.E. Civil (Environmental) Ph.D.	I-Class I-Class --	Indore Ujjain NMU	1991 1995 2004	**37400-67000**	15/07/1996	NMU/18/J-4/ 2079/03, Dt. 10-6-03 Wef-15.02.2002 NMU/18/553/8 Dt. 21-05-08 Wef-17.07.2006 NMU/18/1789/11 Dt. 13-12-2011 **Wef-14.02.2012**.	Yes, as Lecturer & Asst.Prof. & **Professor**	OPEN

Sr. No.	Name of staff	Date of Birth	Designation	Qualification	Class	University	Year of Passing	Pay Scale	Date of Joining	University Approval No. & Date	Whether approved by University (Yes/No)	Category
02	Dr.S.L. Patil	01/01/1962	**Professor**	B.Sc M.Sc. Tech. Ph.D. (Geology)	I-Class I-Class --	Aurangabad Nagpur NMU	1984 1987 2011	**37400-67000**	01/07/1988	CCO/421/1650/, Dt. 22-9-88 (Pune Un.) Wef-1.7.1988	Yes, as Lecturer	OPEN
03	Dr. S.B. Pawar	05/10/1966	**Professor**	B.E. Civil ME Civil (Const Tech.&Managment) Ph.D. (Civil)	I-Class I-Class --	Pune Vidisha NMU	1989 2006 2016	**37400-67000**	15/01/1991	NMU/92/97/1122, Dt. 03-02-92 Wef-03.02.92 NMU/18/1142, Dt. 03-12-08 Wef-28.08.08	Yes, as Lecturer & Asst.Prof.	OPEN
04	P.A. Shirule	07/06/1973	**Associate Prof.**	B.E. Civil Engg. M.E. Civil (Enviormental)	F.W.D. F.W.D.	N.M.U. N.M.U.	1997 2008	**37400-67000**	09/02/2004	NMU/18/J-4/6223/04, Dt. 24-12-04 Wef-9.2.04	Yes, as Lecturer	OBC
05	F.I. Chavan	13/05/1974	Asstt. Prof.	B.E. Civil Engg. M.E. Civil (Enviormental)	I-Class I-Class	Amarawati Amarawati	1997 2009	15600-39100	01/09/1998	NMU/18/1137/09, Dt.26.10.09 Wef-15.09.09	Yes, as Lecturer	OPEN
06	Ms. Sonali B. Patil	28/11/1979	Asstt. Prof.	B.E. Civil Engg. M.E. Civil (Environmental)	I-Class I-Class	N.M.U. N.M.U.	2004 2010	15600-39100	01/02/2008	NMU/18/1139/09, Dt.26.10.09 Wef-16.09.09	Yes, as Lecturer	OPEN
07	Ms.Jyoti R.Mali	23/04/1971	Asstt. Prof.	BE Civil Engg. M.E. Civil (Environmental)	II-Class I- Class	Pune NMU	2000 2009	15600-39100	01/07/2011	NMU/18/544/2016, Dt. 13.06.2016 .Wef-17.03.2016	Yes, as Asst.Prof.	OPEN
08	J.N. Kale	25/12/1965	Asstt. Prof.	B.E. Civil Engg. M.E. Civil (Const Tech.&Managment)	I-Class I-Class	Bangalore N.M.U.	1989 2012	15600-39100	01/01/2009	NMU/18/1140/09, Dt.26.10.09 Wef-16.09.09	Yes, as Lecturer	OBC
09	Pankaj Ramdas Punase	05/08/1991	Asstt. Prof.	B.E. Civil Engg. M.E. Civil (Structures)	I-Class I-Class	N.M.U. Pune	2015 2013	15600-39100	10.03.2016	--	No	OPEN
10	Ravinder Ram Murti Kohli	30/07/1970	Asstt. Prof.	BE Civil Engg. M.E. Civil (Environmental)	I-Class I-Class	Aurangabad N.M.U.	1994 2012	15600-39100	09.05.2016	NMU/18/545/2016, Dt. 13.06.2016. Wef-09.05.2016	Yes, as Asst.Prof.	OPEN

Sr. No.	Name of staff	Date of Birth	Designation	Qualifi cation	Class	University	Year of Passing	Pay Scale	Date of Joining	University Approval No. & Date	Whether approved by University (Yes/No)	Category
11	Prathamesh A. Wani	24/10/1993	Lecturer	B.E Civil Engg.	I-Class	Pune	2015	30000/- Con.	17.07.2017	--	No	OPEN
12	Surabh S.Naik	05/11/1992	Lecturer	B.E. Civil Engg M.E. Geotech. Engg	F.W.D. I-Class	N.M.U. Pune	2013 2017	30000/- Con.	18.07.2017	--	No	OPEN
13	Ms. Reshma S. Chaudhari	01/06/1995	Lecturer	B.E. Civil Engg	I-Class	N.M.U.	2017	30000/- Con.	24.07.2017	--	No	OBC
14	Ms. Reshma A. Chaudhari	29/06/1993	Lecturer	B.E. Civil Engg	I-Class	N.M.U.	2017	30000/- Con.	24.07.2017	--	No	OBC
15	Ms. Sapana Devidas Patil	24/11/1995	Lecturer	B.E. Civil Engg	I-Class	N.M.U.	2017	30000/- Con.	24.07.2017	--	No	OBC
16	Ms. Ankita Sanjeev Sarode	24/05/1996	Lecturer	B.E. Civil Engg	I-Class	N.M.U.	2017	30000/- Con.	24.07.2017	--	No	OBC
17	Ms. Poonam Rajendra Baviskar	19/12/1995	Lecturer	B.E. Civil Engg	I-Class	N.M.U.	2017	30000/- Con.	24.07.2017	--	No	SBC
18	Ms. Pratiksha S. Kandare	21/03/1996	Lecturer	B.E. Civil Engg	I-Class	N.M.U.	2017	30000/- Con.	24.07.2017	--	No	NT-B
19	Shivam Pritamsing Sisodiya	30/05/1991	Lecturer	B.E. Civil Engg	FWD	N.M.U.	2015	30000/- Con.	24.07.2017	--	No	OPEN
20	Bhupendra Hansraj Patil	30/09/1995	Lecturer	B.E. Civil Engg	I-Class	N.M.U.	2017	30000/- Con.	24.07.2017	--	No	OBC
21	Ms. Dipika Purushottam Mali	07/10/1995	Lecturer	B.E. Civil Engg	FWD	Pune	2017	30000/- Con.	27.07.2017	--	No	OBC
22	Ms. Kavita Sudhir Chaudhari	27/06/1995	Lecturer	B.E. Civil Engg	I-Class 8.11-CGPA	N.M.U.	2017	30000/- Con.	27.07.2017	--	No	OBC
23	C.G.Sapkale	09.03.1992	Lecturer	B.E. Civil Engg	I-Class	N.M.U.	2015	12000/- Con.	27.12.2017	--	No	SC
24	Mahesh P. Koli	04.07.1992	Lecturer	B.E. Civil Engg	I-Class	N.M.U.	2015	12000/- Con.	01.01.2018	--	No	SBC
25	Ms.Yashsvini V. Jadhav	05.09.1995	Lecturer	B.E. Civil Engg	I-Class	N.M.U.	2017	12000/- Con.	04.01.2018	--	No	OPEN
26	Abhishek C.Bhat	05.04.2018	Lecturer	B.E. Civil Engg	I-Class 7.2-CGPA	N.M.U.	2017	12000/- Con.	05.01.2018	--	No	OPEN

SHRAM SADHANA BOMBAY TRUST'S COLLEGE OF ENGG. & TECH., BAMBHORI, JALGAON.

Name of the Department: Computer Engineering **Academic Year 2017-2018**

Sr. No	Name of staff	Date of Birth	Designation	Qualification	Class	University	Year of Passing	Pay Scale	Date of Joining	University Approval No. & Date	Whether approved by University (Yes/No)	Category
01	Dr.Girish Kumar Patnaik	09/10/1969	**Professor &HOD**	B.E (C.S.&E.) M.E. (C.S.&E.) Ph.D (C.S.&E.)	I-Class I-Class --	Aurangabad Alahabad Alahabad	1990 2001 2012	**37400-67000**	17/06/2013	NMU/18/548/2016, Dt. 13.06.2016.Wef-21.03.2016	Yes, as Professor	OPEN
02	Dr .K.P. Adhiya	07/12/1968	**Professor**	B.E. Comp. Engg. M.E. (C.S.&E.) Ph.D. (C.S.& E.)	I-Class I-Class --	Amaravati Alahabad NMU	1990 1996 2016	**37400-67000**	26/08/1991	NMU/18/j-4/621/03,dt-18.02.03 Wef-15.02.02 NMU/18/1119/8, Dt. 27-11-08 Wef-28.08.08	Yes, as Lecturer & Assistant Prof.	OPEN
03	Dr. Manoj E Patil	06/10/1975	**Associate Prof.**	B.E.Comp. Engg. M.Tech.(C.S.&E.) Ph.D. (C.S.& E.)	I-Class I-Class --	N.M.U. R.G.P.V. BHOPAL J.N.U. Jodhpur	2000 2008 2017	**37400-67000**	02/12/2002	NMU/18/J-4/4298/04, Dt. 02-09-04 Wef-17.2.04 NMU/18/1065/2009 Dt.30.9.09 Wef 1.7.09	Yes, as Lecturer & Assistant Prof.	OBC
04	Ashish T.Bhole	12/09/1976	**Associate Prof.**	B.E. Comp. Engg. M.Tech (C.S.&E.)	I-Class I-Class	N.M.U. R.G.P.V. BHOPAL	1999 2008	**37400-67000**	27/11/2007	NMU/18/1067/2009, dt. 30/09/2009 Wef- 01.07.2009	Yes, as Lecturer	OPEN
05	Sandip S. Patil	20/01/1980	**Associate Prof.**	B.E. Comp. Engg. MTech. (C.S.& E.)	I-Class I-Class	N.M.U. R.G.P.V. BHOPAL	2001 2009	**37400-67000**	12/02/2004	NMU/18/J-4/4297/04, Dt. 02-09-04 Wef-12.2.04 NMU/18/1066/2009 Dt.30.9.09 Wef 18.7.09	Yes, Approved as Lecturer & Assistant Prof.	OPEN
06	Ms. Shital A. Patil	12/10/1982	Asstt. Prof.	B.E. Comp. Engg. M.E. (C.S.&E.)	I-Class I-Class	N.M.U. N.M.U.	2004 2012	15600-39100	02/01/2006	NMU/18/554/07 Dt. 28/03/07 Wef-17.07.06	Yes, as Lecturer	OPEN
07	Ms. Nilima Patil	21/10/1981	Asstt. Prof	B.E. Comp. Engg. M.E. (C.S.&E.)	I-Class I-Class	Amravati N.M.U.	2005 2012	15600-39100	14/08/2007	NMU/18/327/10 Dt. 10.03.2010 Wef- 15.09.2009	Yes,as Lecturer	SC
08	Nitin Y. Suryawanshi	27/01/1981	Asstt. Prof	B.E. Comp. Engg. M.E. (C.S.&E.)	I-Class I-Class	Aurangabad N.M.U.	2005 2012	15600-39100	20/12/2008	NMU/18/1068/2009 Dt.30.9.09 Wef 1.7.09	Yes, as Lecturer	OPEN

Sr. No	Name of staff	Date of Birth	Designation	Qualification	Class	University	Year of Passing	Pay Scale	Date of Joining	University Approval No. & Date	Whether approved by University (Yes/No)	Category
\09	Puri Dinesh Dagadu	15/04/1982	Asstt. Prof	B.E. Comp. Engg. M.Tech. Comp..	I-Class I-Class	Kolhapur Lonere	2004 2010	15600-39100	01/12/2012	NMU/18/550/2016, Dt. 13.06.2016.Wef-17.03.2016	Yes, as Asst.Prof.	NT-2
10	Ms.Yogeshwari S. Borse	01/06/1979	Asstt. Prof.	B.E.Comp. Engg. M.Tech (C.S.&E.)	F.W.D. F.W.D.	N.M.U. R.G.P.V. BHOPAL	2009 2012	15600-39100	21/07/ 2009	NMU/18/329/10 Dt. 10.03.2010 Wef- 15.09.2009	Yes,as Lecturer	OBC
11	Ms. Priti R. Sharma	18/06/1982	Asstt. Prof.	B.E.Comp. Engg. M.E. (C.S.&E.)	I-Class I-Class	N.M.U. N.M.U.	2007 2014	15600-39100	14/02/2008	NMU/18/868/10 Dt. 22.05.2010 Wef- 15.09.2009	Yes,as Lecturer	OPEN
12	Dipak D.Bage	01/02/1982	Asstt. Prof.	B.E.Computer Engg. M.E.Computer (CS&E)	I-Class F.W.D.	N.M.U. N.M.U.	2008 2013	15600-39100	01/07/2009	NMU/18/866/10 Dt. 22.05.2010 Wef- 15.09.2009	Yes,as Lecturer	NT
13	Satpalsing D.Rajput	06/07/1985	Asstt. Prof.	B.E.Computer Engg. M.E. (CS&E)	I-Class I-Class	N.M.U. N.M.U.	2008 2013	15600-39100	01/07/2011	NMU/18/549/2016, Dt. 13.06.2016. Wef-17.03.2016	Yes, as Asst.Prof.	OPEN
14	Akash D.Waghmare	08/06/1982	Asstt. Prof.	B.E.Computer Engg. M.E. (CS&E)	I-Class I-Class	Amravati Amravati	2011 2005	15600-39100	16/12/2013	NMU/18/555/2016, Dt. 13.06.2016Wef-17.03.2016	Yes, as Asst.Prof.	S.C.
15	Sushant S.Bahekar	14/06/1990	Asstt. Prof.	B.E.Comp. Engg. M.Tech. (CS&E)	F.W.D CGPA-8.87	N.M.U. R.G.P.V. BHOPAL	2011 2014	15600-39100	06/07/2015	NMU/18/556/2016, Dt. 13.06.2016Wef-17.03.2016	Yes, as Asst.Prof.	OBC
16	Ms.Sweta R.Pandey	30/09/1990	Asstt. Prof.	B. Tech. I.T M.Tech. I.T	I-Class I-Class	MDUniversity, Rohak Banasthali University	2010 2013	15600-39100	13/07/2015	NMU/18/552/2016, Dt. 13.06.2016. Wef-17.03.2016	Yes, as Asst.Prof.	OPEN
17	Ms.Dhanashree Shashikant Tayade	19/10/1985	Asstt. Prof.	B.E.Com. Engg. M.E. (CS&E)	I-Class I-Class	PUNE N.M.U.	2010 2014	15600-39100	06/07/2015	NMU/18/553/2016, Dt. 13.06.2016 Wef-17.03.2016	Yes, as Asst.Prof.	SBC
18	Ms.Archana Raosaheb Shinde	29/06/1990	Asstt. Prof.	B.E.Comp. Engg. M.E.Computer	I-Class I-Class	N.M.U. PUNE	2011 2015	15600-39100	16/03/2016	NMU/18/554/2016, Dt. 13.06.2016 Wef-16.03.2016	Yes, as Asst.Prof.	OPEN
19	Harshal R. Kotwal	23/05/1986	Asstt. Prof.	B.E. (I.T) M.E. (I.T)	I-Class I-Class	Mumbai University Pune University	2009 2013	15600-39100	06/07/2015	NMU/18/558/2016, Dt. 13.06.2016 .Wef-17.03.2016	Yes,as Asst. Prof.	OBC

Sr. No	Name of staff	Date of Birth	Designation	Qualification	Class	University	Year of Passing	Pay Scale	Date of Joining	University Approval No. & Date	Whether approved by University (Yes/No)	Category
20	Pravin Keshav Patil	31/08/1991	Asstt. Prof.	B.E. Comp. M. E. (CS&E)	I-Class I-Class	N.M.U. N.M.U.	2013 2015	15600-39100	06/07/2015	NMU/18/557/2016, Dt. 13.06.2016 .Wef-17.03.2016	Yes,as Asst. Prof.	OBC
21	Paresh D. Sharma	09/02/1985	Asstt. Prof.	B.E.Computer Engg. M.Tech. Computer	I-Class I-Class	N.M.U. R.G.P.V. BHOPAL	2008 2014	30000/- Con.	17/07/2017	--	No	OPEN
22	Narsesh D.Kale	21/07/1991	Asstt. Prof.	B.E.I.T. M.E.Computer (CSE)	I-Class I-Class	Amravati Aurangabad	2013 2015	30000/- Con.	17/07/2017	--	No	OPEN
23	Ms.Priyanka A. Sonawane	30/05/1993	Asstt. Prof.	B.E.Comp. Engg. M.E.Computer (CSE)	I-Class I-Class	N.M.U. N.M.U.	2014 2016	30000/- Con.	17/07/2017	--	No	OBC
24	Ms.Pooja V.Shinde	06/11/1988	Asstt. Prof.	B.E .(CSE) M.Tech. (CSE)	I-Class I-Class	R.G.P.V. BHOPAL N.M.U.	2010 2016	30000/- Con.	17/07/2017	--	No	OBC
25	Pramod R.Patil	13.12.1990	Asstt. Prof.	B.E.Comp. Engg. M.E.Computer (CSE)	I-Class I-Class	N.M.U. Aurangabad	2015 2017	15600/- Con.	27/12/2017	--	No	OBC
26	Hemant J. Chaudhari	25.03.1991	Asstt. Prof.	B.E .(CSE) M.Tech. (CSE)	I-Class I-Class	Kolhapur Nanded	2015 2017	15600/- Con.	27/12/2017	--	No	VJNT

SHRAM SADHANA BOMBAY TRUST'S COLLEGE OF ENGG. & TECH., BAMBHORI, JALGAON.

Name of the Department: Information Technolgy **Academic Year 2017-2018**

Sr. No	Name of staff	Date of Birth	Designation	Qualification	Class	University	Year of Passing	Pay Scale	Date of Joining	University Approval No. & Date	Whether approved by University (Yes/No)	Category
1	Dr.Umesh S. Bhadade	16/08/1971	**Professor & HOD**	B.E. Electronics M.E.Electronics Ph.D. Electrical	I-Class I-Class --	Pune Amravati M.S.U., Baroda	1993 2002 2012	37400-67000	20/07/2013	NMU/18/532/2016, Dt. 13.06.2016. Wef-26.03.2016	Yes,as Associate Prof.	OPEN
2	Mrs.Archana K. Bhavsar	22/02/1977	**Associate Prof.**	B.E. Computer M.Tech.(CS&E)	I-Class I-Class	N.M.U. Nirma Uni.	2003 2006	37400-67000	17/03/2008	NMU/18/1120/08 Dt. 27/11/08 Wef-28.08.08	Yes,as Lecturer	OPEN
3	Sandeep J. Patil	16/09/1980	**Asst. Prof.**	B.E. (I.T.) M. E. (CS&E)	I-Class I-Class	N.M.U. N.M.U.	2004 2012	15600-39100	17/07/2006	NMU/18/552/07 Dt. 28/03/07 Wef-17.07.06	Yes,as Lecturer	OPEN
4	Nitin P. Jagtap	31/05/1980	Asstt. Prof.	B.E. (I.T.) M. E. (CS&E)	I-Class I-Class	Aurangabad N.M.U.	2004 2012	15600-39100	02/07/2007	NMU/18/870/10 Dt. 22.05.2010 Wef- 15.09.2009	Yes,as Lecturer	OBC
5	Rajput S. H.	26/10/1984	Asstt. Prof.	B.E. Comp. M. E. (CS&E)	I-Class I-Class	N.M.U. N.M.U.	2007 2012	15600-39100	20/02/2008	NMU/18/347/10 Dt. 10.03.2010 Wef- 15.09.2009	Yes,as Lecturer	OPEN
6	Sangore Rohidas B.	18/09/1985	Asstt. Prof.	B.E. I.T. M.Tech. (I.T)	I-Class I-Class	N.M.U. R.G.P.V. BHOPAL	2008 2014	15600-39100	17/07/2009	NMU/18/346/10 Dt. 10.03.2010 Wef- 15.09.2009	Yes,as Lecturer	NT
7	Shambhu kumar R.Singh	14/09/1990	Asstt. Prof.	B.E. (I.T) M. E. (CS&E)	I-Class I-Class	N.M.U. N.M.U.	2012 2015	15600-39100	06/07/2015	NMU/18/539/2016, Dt. 13.06.2016 .Wef-17.03.2016	Yes,as Asst. Prof.	OPEN
8	Ms.Tejashri A. Patil	22/09/1993	Lecturer	B.E. Comp.	I-Class	N.M.U.	2014	30000/- Con.	17/07/2017	--	No	OPEN
9	Ms.Priyanka B.Gaikwad	23/12/1989	Asstt. Prof.	B.E (Com) M. E. (Com)	I-Class I-Class	Pune Pune	2012 2016	12000/- Cons.	27.12.2017	--	No	SC

SHRAM SADHANA BOMBAY TRUST'S COLLEGE OF ENGG. & TECH., BAMBHORI, JALGAON.

Name of the Department: Electrical Engineering **Academic Year 2017-2018**

Sr. No	Name of staff	Date of Birth	Designation	Qualification	Class	University	Year of Passing	Pay Scale	Date of Joining	University Approval No. & Date	Whether approved by University (Yes/No)	Category
01	Dr. P.J. Shah	11/08/1967	**Professor & HOD**	B.E. (Ind.Electronics) M.E. (Power Electronices) Ph.D	I-Class I- Class --	Amaravati Indore Bhopal	1989 1997 2014	**37400-67000**	01/08/1995	NMU/18/J-4/644/06, Dt-20-3-2006 Wef –9.2.2004 NMU/18/1074/2009 Dt.30.9.09 Wef 22.6.09	Yes, as Lecturer & Assistant Prof.	OPEN
02	Dr. P. V. Thakre	19/07/1970	**Professor**	B. E. M.Tech. Ph.D	I-Class I- Class --	Nagpur MANIT Bhopal	1996 2006 2015	**37400-67000**	16/07/2007	NMU/18/352/10 Dt. 10.03.2010 Wef- 15.09.2009	Yes,as Lecturer	OPEN
03	V.S. Pawar	08/04/1971	**Associate Prof.**	B.E. Electrical M.E. Electrical (EPS)	I-Class I- Class	Amaravati Amaravati	1994 2001	37400-67000	16/08/1999	NMU/18/J-4/621/03, Dt.18.02.03 Wef-15.02.2002 NMU/18/1118/08 Dt. 27-11-08 Wef-28.08.2008	Yes, as Lecturer & Assistant Prof.	OPEN
04	M.M. Aansari	11/10/1973	Asstt. Prof.	B.E. Electrical M.E. Electrical (EPS)	I-Class I- Class	Amaravati Amaravati	1996 2009	15600-39100	05/07/2001	NMU/18/J-4/581/06, Dt. 06/03/06 Wef-09.02.2004	Yes, as Lecturer	OPEN
05	Suhas M. Shembekar	31/08/1976	Asstt. Prof.	B.E.Electrical M.E. Electrical (EPS)	I-Class I- Class	Amravati Aurangabd	1999 2011	15600-39100	01/01/2009	NMU/18/363/10 Dt. 10.03.2010 Wef- 15.09.2009	Yes,as Lecturer	OPEN
06	Nilesh S.Mahajan	17/05/1986	Asstt. Prof.	B.E.Electrical M.E. Electrical (EPS)	I- Class F.W.D.	N.M.U. A,Bad.	2009 2012	15600-39100	15/07/2013	NMU/18/546/2016, Dt. 13.06.2016. Wef-17.03.2016	Yes, as Asstt. Prof.	OPEN

Sr. No	Name of staff	Date of Birth	Designation	Qualification	Class	University	Year of Passing	Pay Scale	Date of Joining	University Approval No. & Date	Whether approved by University (Yes/No)	Category
07	Mr. Dhanesh S. Patil	23/07/1983	Asstt. Prof.	B.E. Electrical M.E. Electrical (EPS)	I-Class I- Class	N.M.U. N.M.U.	2007 2017	15600-39100	11/12/2007	NMU/18/364/10 Dt. 10.03.2010 Wef- 15.09.2009	Yes,as Lecturer	OPEN
08	Ms. Abhilasha N.Salunkhe	04/10/1993	Lecturer	B.E. Electrical	F.W.D.	N.M.U.	2015	30000/- Con.	17/07/2017	--	No	OBC
09	Ms.Manisha Shivaji Thakare	01/03/1994	Lecturer	B.E.Electrical	I- Class	N.M.U.	2013	30000/- Con.	17/07/2017	--	No	OBC
10	Ms. Dipali Bhagwan Pawar	01/08/1995	Lecturer	B.E.Electrical	I- Class	N.M.U.	2017	30000/- Con.	17/07/2017	--	No	OBC
11	Ms. Nidhi D. Solanki	01/01/1995	Lecturer	B.E.Electrical	I- Class	RGPV Bhopal	2016	30000/- Con.	17/07/2017	--	No	OPEN
12	Ms.Ashwini Kishor Khairnar	07/12/1992	Lecturer	B.E.Electrical	I- Class	SGBU Amarawati	2014	30000/- Con.	17/07/2017	--	No	OBC
13	Bharat Dhanraj Patil	17/08/1994	Lecturer	B.E.Electrical	I- Class	N.M.U.	2016	30000/- Con.	17/07/2017	--	No	OBC
14	Prashant Rajendra Patil	01/06/1994	Lecturer	B.E.Electrical	I- Class	N.M.U.	2016	30000/- Con.	20/07/2017	--	No	OBC

SHRAM SADHANA BOMBAY TRUST'S COLLEGE OF ENGG. & TECH., BAMBHORI, JALGAON.

Name of the Department: Electronics & Telecommunication Engg. **Academic Year 2017-2018**

Sr. No	Name of staff	Date of Birth	Designation	Qualification	Class	University	Year of passing	Pay Scale	Date of Joining	University Approval No. & Date	Whether approved by University (Yes/No)	Category
01	Dr.S.R. Suralkar	28/10/1966	**Professor & HOD**	B.E. Electronics M.E. Control & Inst Ph.D.(E&TC)	I-Class I- Class --	Amaravati Alahabad N.M.U.	1989 1998 2015	**37400-67000**	17/08/1991	NMU/95/5/APP/4013, Dt.5.5.95 Wef-05.05.1995. NMU/18/J-4/580 /06, Dt. 06-03-06 Wef-09.02.2004 NMU/18/619 /16, Dt. 29-06-2016 Wef-21.03.2016	Yes, as Lecturer & Assistant Prof. & Professor	OPEN
02	Dr. M.P. Deshmukh	20/06/1966	**Professor**	B.E. Electronics M.E.Control Inst. Ph.D.(E&TC)	I-Class I- Class --	Amaravati Alahabad N.M.U.	1989 1997 2014	**37400-67000**	01/07/1996	NMU/95/97/618, Dt.16.1.92 Wef-16.1.92 NMU/18/1117/08 Dt. 27-11-08 Wef 28.08.08	Yes, as Lecturer & Assistant Prof.	OPEN
03	Dr. V.M. Deshmukh	17/06/1965	**Associate Prof.**	B.E. Electronics M.E. Control Inst. Ph.D. (Electronics Engg.)	I-Class I- Class --	Amaravati Kolhapur N.M.U.	1990 1996 2017	**37400-67000**	01/08/1998	NMU/18/J-4/579/06, Dt. 06-03-06 Wef –9.2.2004 NMU/18/1075/2009 Dt.30.9.09 Wef 1.7.09	Yes, as Lecturer & Assistant Prof.	OPEN
04	D.U.Adokar	31/03/1965	**Associate Prof.**	BE Electronics ME Electronics	I-Class I- Class	Nagpur Amaravati	1987 2001	37400-67000	01/07/2009	NMU/18/1564/2010, dt. 06/10/10 Wef- 17.07.2010	Yes, as Asstt. Prof.	OPEN
05	N.M. Kazi	22/06/1972	Asstt. Prof.	B.E. Electronics M.E. E&TC	I-Class I- Class	N.M.U. Aurangabad	1995 2008	15600-39100	01/08/2002	NMU/18/J-4/4708/5 Dt. 07-06-05 Wef 1.2.2004	Yes, as Lecturer	OPEN

Sr. No	Name of staff	Date of Birth	Designation	Qualification	Class	University	Year of passing	Pay Scale	Date of Joining	University Approval No. & Date	Whether approved by University (Yes/No)	Category
06	Dr.Pankaj H. Zope	24/06/1975	Asstt. Prof.	B.E. Ind Elec. M.E.(Digital Electronices) Ph.D	I-Class I- Class --	Aurangabad Amaravati Jodhapur	1999 2007 2012	15600-39100	01/07/2003	NMU/18/557/2007,dt. 28/03/2007 Wef-17.07.2006	Yes, as Lecturer	OPEN
07	Atul H. Karode	01/06/1976	Asstt. Prof.	B.E. Electronics M.E.E&TC	I-Class I- Class	N.M.U. Amaravati	1999 2011	15600-39100	02/07/2003	NMU/18/556/2007,dt. 28/03/2007 Wef-17.07.2006	Yes, as Lecturer	OPEN
08	Amol C. Wani	30/07/1976	Asstt. Prof.	B.E. Electronics M.E. E&TC	I-Class I- Class	N.M.U. Aurangabad	1999 2008	15600-39100	09/06/2003	NMU/18/ 558/2007 Dt 28/03/07 Wef 17.07.06	Yes, as Lecturer	OPEN
09	Surendra Ramteke	31/03/1979	Asstt. Prof.	B.E. E&TC M.E. (Digital Electronices)	I-Class I- Class	Amaravati Amaravati	2003 2010	15600-39100	13/02/2004	NMU/18/J-4/4307/04, Dt. 02-09-04 Wef 13.2.2004	Yes, as Lecturer	SC
10	Hingonekar Shailendra A.	06/03/1969	Asstt. Prof.	B.E. E &TC M.E. (Elect. Design Tech.)	I-Class I- Class	Aurangabad Aurangabad	1991 2001	15600-39100	21/07/2010	--	**No**	OBC
11	Mrs. Mayuri Deshmukh	23/09/1984	Asstt. Prof.	B.E. E.& TC. M.E.(Digital Electronics)	I-Class I- Class	N.M.U. N.M.U.	2006 2012	15600-39100	02/07/2007	NMU/18/353/10 Dt. 10.03.2010 Wef- 15.09.2009	Yes,as Lecturer	OPEN
12	Ashish R. Bari	26/04/1981	Asstt. Prof.	B.E. Electronics M.E.(Digital Electronics)	I-Class I- Class	NMU Amaravati	2004 2011	15600-39100	04/08/2007	NMU/18/351/10 Dt. 10.03.2010 Wef- 15.09.2009	Yes,as Lecturer	OBC
13	Mrs.Deepika R. Patil	25/06/1981	Asstt. Prof.	B.E. E&TC M.E.(Digital Electronics)	I-Class I- Class	N.M.U. N.M.U.	2003 2012	15600-39100	01/07/2009	NMU/18/354/10 Dt. 10.03.2010 Wef- 15.09.2009	Yes,as Lecturer	OPEN
14	Sunil K.Khode	01/01/1979	Asstt. Prof.	B.E. E&TC M.E.(Digital Electronics)	I-Class I- Class	Amaravati Amaravati	2003 2012	15600-39100	01/06/2007	NMU/18/349/10 Dt. 10.03.2010 Wef- 15.09.2009	Yes,as Lecturer	SC
15	Ms.Priyanka M. Shanbhag	30/04/1988	Asstt. Prof.	B.E. E.& TC. M.E .Digital Elect.	I-Class I-Class	N.M.U. N.M.U.	2009 2013	15600-39100	21/07/2009	NMU/18/358/10 Dt. 10.03.2010 Wef- 16.09.2009	Yes,as Lecturer	OPEN

Sr. No	Name of staff	Date of Birth	Designation	Qualification	Class	University	Year of passing	Pay Scale	Date of Joining	University Approval No. & Date	Whether approved by University (Yes/No)	Category
16	Yogesh S. Santwani	04/05/1988	Asstt. Prof.	B. E. E &TC M. E. Digital	I-Class I-Class	N.M.U. N.M.U.	2009 2014	15600-39100	06/07/2015	NMU/18/534/2016 Dt. 13.06.2016 Wef-17.03.2016	Yes, as Asstt. Prof.	OPEN
17	Ms.Sweta Ravindra Patil	30/12/1991	Asstt. Prof.	B. E. E &TC M. E. E &TC	FWD FWD	N.M.U. N.M.U.	2013 2016	30000/- Con.	17/07/2017	--	**No**	OPEN
18	Ms.Harshal A.Dahake	18/09/1980	Asstt. Prof.	B. E. E &TC M. E. E &TC	I-Class I-Class	N.M.U. N.M.U.	2004 2016	30000/- Con.	17/07/2017	--	**No**	OPEN
19	Ms.Mitali Vijay Shewale	20/05/1994	Lecturer	B. E. E &TC	I-Class	N.M.U.	2016	30000/- Con.	17/07/2017	--	**No**	OPEN
20	Ms. Kalpana Uttam Rathod	26/12/1992	Asstt. Prof.	B.E. E.& TC. M. Tech. Digital Elect.	I-Class I-Class	N.M.U. N.M.U.	2014 2016	30000/- Con.	17/07/2017	--	No	VJ-A
21	Ms.Priyanka D.Girase	16/04/1991	Asstt. Prof.	B. E. E &TC M. E. Digital	F.W.D. I-Class	N.M.U. N.M.U.	2013 2016	30000/- Con.	17/07/2017	--	**No**	OPEN

SHRAM SADHANA BOMBAY TRUST'S COLLEGE OF ENGG. & TECH., BAMBHORI, JALGAON.

Name of the Department: Mechanical Engg. **Academic Year 2017-2018**

Sr. No	Name of staff	Date of Birth	Designation	Qualification	Class	University	Year of Passing	Pay Scale	Date of Joining	University Approval No. & Date	Whether approved by University (Yes/No)	Category
01	Dr.S.P. Shekhawat	03/05/1974	Professor& HOD	B.E. Mechanical M.E. M/c Design. Ph.D.in Mech.	I-Class I-Class --	Amaravati N.M.U. N.M.U.	1997 2008 2014	37400-67000	15/07/1999	NMU/18/J-4/621/03, Dt. 18-02-03 Wef 15.02.2002 NMU/18/540/2016, Dt. 13.06.2016 . Wef-21.03.2016	Yes, as Lecturer & Professor	OPEN
02	N.K. Patil	23/09/1969	Associate Prof.	B.E. Production M.Tech. Energy Mangment M.E. M/c Design.	I-Class I-Class I-Class	Pune Indore NMU	1991 1995 2008	37400-67000	08/01/1997	NMU/18/1003/2006 Dt.25.05.06 Wef 09.02.2004 NMU/18/321/2010 Dt.10.03.2010 Wef 15.09.2009	Yes as Lecturer & Assistant Prof.	OBC
03	K.Shrivastav	07/11/1973	Associate Prof.	B.E. Mechanical M.E. (Thermal Power)	I-Class I-Class	Amaravati N.M.U.	1997 2008	37400-67000	08/01/1998	NMU/18/J-4/4313/04, Dt. 01-09-04 Wef – 09.02.2004	Yes, as Lecturer	OPEN
04	Dr. P.G. Damle	08/10/1973	Associate Prof.	B.E. Mechanical M.E. M/c Design. Ph. D.	I-Class I-Class --	Amaravati N.M.U. N.M.U.	1996 2008 2017	37400-67000	15/02/2002	NMU/18/J-4/621/03, Dt. 18.2.2002 Wef –15.02.2002 NMU/18/1071/2009 Dt.30.9.09 Wef –22.6.09	Yes, as Lecturer & as AP	SC
05	Mahesh V. Rawlani	07/06/1970	Associate Prof.	B.E. Production M.E. (A.P.S.)	I-Class I-Class	Amravati Bhopal	1993 2005	37400-67000	01/07/2006	NMU/18/1139/08, dated 03-12-08 Wef –29.08.2008	Yes, as a Lecturer	OPEN
06	Prashant N.Ulhe	09/03/1974	Asstt. Prof.	B.E. Production M.E. M/c Design.	I-Class I-Class	Amaravati N.M.U.	1996 2008	15600-39100	02/06/2003	NMU/18/1073/2009, dt. 30/09/2009 Wef- 25.06.2009	Yes, as a Lecturer	OPEN

Sr. No	Name of staff	Date of Birth	Designation	Qualification	Class	University	Year of Passing	Pay Scale	Date of Joining	University Approval No. & Date	Whether approved by University (Yes/No)	Category
07	Devendra B. Sadaphale	01/07/1976	Asstt. Prof.	B.E. Mechanical M.E M/c Design	I-Class I-Class	Amaravati N.M.U.	1998 2008	15600-39100	20/02/2002	NMU/18/J-4/621/03, Dt. 18-02-03 Wef –20.02.2002	Yes, as Lecturer	SBC
08	P. M. Solanki	06/10/1981	Asstt. Prof.	B.E. Production M.E. CAD/CAM	I-Class I-Class	N.M.U. Amravati	2004 2006	15600-39100	08/08/2006	NMU/18/1140/08, dated 03-12-08 Wef –29.08.2008	Yes, as a Lecturer	OPEN
09	Patil Pravin D.	30/03/1980	Asstt. Prof.	B.E. Mechanical M.E. CAD/CAM	I-Class I-Class	NMU Amravati	2004 2007	15600-39100	25/08/2008	NMU/18/1141/2008 Dated 03-12-08 Wef- 29.08.2008	Yes as Lecturer	OPEN
10	Mahesh V. Kulkarni	23/07/1979	Asstt. Prof.	B.E. Mechanical M.E. (HPE)	I-Class I-Class	RGPVV COEP Pune	2002 2005	15600-39100	01/12/2012	NMU/18/620/2016 Dt. 29.06.2016 Wef-17.03.2016	Yes, as Asstt. Prof.	OPEN
11	Ajay Bhardwaj	05/07/1968	Asstt.Prof	B. E. Production M.E. M/c Design	I-Class I-Class	Pune N.M.U.	1999 2012	15600-39100	01/08/2007	NMU/18/326/10 Dt. 10.03.2010 Wef- 19.09.2009	Yes,as Lecturer	OPEN
12	Dipak C. Talele	19/06/1987	Asstt. Prof.	B.Tech. Mechanical M.Tech. CAD//CAM	II- Class I- Class	Pune Vellore, Tamilnadu	2009 2012	15600-39100	15/07/2013	NMU/18/541/2016 Dt. 13.06.2016 Wef-17.3.2016	Yes, as Asstt. Prof.	OBC
13	Chandan K. Mukherjee	09/03/1963	Asstt. Prof.	B. Sc.Mechanical M.B.A. M.E. M/c Design	I-Class II- Class I-Class	Ranchi University B.I.T. Meshra N.M.U.	1985 1987	15600-39100	25/08/2008	NMU/18/863/10 Dt. 22.05.2010 Wef- 15.09.2009	Yes,as Lecturer	OPEN
14	Dr. Prashant P.Bornare	01/06/1979	Asstt. Prof.	B.E. Mechanical MBA MarketingPh.D	I-Class I-Class	N.M.U. N.M.U.	2000 2005	15600-39100	15/01/2007	NMU/18/324/10 Dt. 10.03.2010 Wef- 15.09.2009	Yes,as Lecturer	OBC
15	Ms. Jagruti R. Surange	20/11/1982	Asstt. Prof.	B. E. Production M.E. M/c Design.	F.W.D. I-Class	Pune N.M.U.	2005 2014	15600-39100	06/07/2015	NMU/18/542/2016 Dt. 13.06.2016 Wef-17.03.2016	Yes,as Asstt. Prof.	OBC
16	Akhilesh V.Rajput	06/01/1989	Asstt. Prof.	B.E. Mechanical M.E. M/c Design.	I-Class I-Class	N.M.U. N.M.U.	2011 2015	15600-39100	06/07/2015	NMU/18/542/2016 Dt. 29.06.2016 Wef-17.03.2016	Yes,as Asstt. Prof.	OPEN
17	Ajay Janakrao Puri	11/03/1990	Asstt. Prof.	B.E. Mechanical M.E. Production	I-Class FWD	DBA, A,Bad DBA, A,Bad	2011 2016	15600-39100	16/03/2016	NMU/18/617/2016 Dt. 29.06.2016 Wef-16.03.2016	Yes,as Asstt. Prof.	NT(B)1

Sr. No	Name of staff	Date of Birth	Designation	Qualification	Class	University	Year of Passing	Pay Scale	Date of Joining	University Approval No. & Date	Whether approved by University (Yes/No)	Category
18	Tejas Galu Patil	19/08/1988	Asstt. Prof.	B. E. Mech M.E.(TM)	I-Class I-Class	Pune N.M.U.	2011 2014	15600-39100	16/03/2016	--	**No**	OPEN
19	Smit Manohar Arbat	26/07/1988	Asstt. Prof.	B. E. Mech ME CAD/CAM.	I-Class I-Class	SGBU Amarawati	2012	30000/- Con.	24/07/2017	--	**No**	OBC
20	Ms.Chetan Sunil Chopade	16/06/1993	Lecturer	B.E. Mechanical M.E. M/c Design.	F.W.D. F.W.D.	N.M.U. N.M.U.	2015 2017	30000/- Con.	17/07/2017	--	**No**	OBC
21	Mayur Murlidhar Gosavi	11/07/1994	Lecturer	B. E. Mech.	F.W.D.	Pune	2016	30000/- Con.	17/07/2017	--	**No**	NT-B
22	Sameer Ahmad Abdul Farooque	01/08/1995	Lecturer	B. E. Mech.	F.W.D.	SGBU Amarawati	2016	30000/- Con.	17/07/2017	--	**No**	OPEN
23	Ashwin P. Thakkar	01/02/1996	Lecturer	B. E. Mech.	I-Class	N.M.U.	2017	30000/- Con.	24/07/2017	--	**No**	OPEN
24	Jayesh A. Gosavi	02/10/1995	Lecturer	B. E. Mech.	I-Class	Pune	2017	30000/- Con.	24/07/2017	--	**No**	NT-B
25	Mahesh A.Marathe	10/09/1996	Lecturer	B. E. Mech.	I-Class	SGBU Amarawati	2013	30000/- Con.	24/07/2017	--	**No**	OPEN

SHRAM SADHANA BOMBAY TRUST'S COLLEGE OF ENGG. & TECH., BAMBHORI, JALGAON.

Name of the Department: Chemical Engineering **Academic Year 2017-2018**

Sr. No	Name of staff	Date of Birth	Designation	Qualification	Class	University	Year of passing	Pay Scale	Date of Joining	University Approval No. & Date	Whether approved by University (Yes/No)	Category
01	Dr. K.S. Wani	24/09/1959	**Principal**	B.Sc.Tech. M.Tech. D.B.M. Ph.D.	I -Class I -Class I -Class --	Nagpur Nagpur Nagpur N.M.U.	1983 1985 1984 2006	**37400-67000**	14/07/1997	NMU/18/J-4/621/03, Dt. 18.02.2003Wef-14.02.2002 NMU/18/552/08, Dt. 21-05-08 Wef-19.07.2006 NMU/18/1663/2011 Dt. 01-11-2011 Wef- 13.10.2011 NMU/18/542/2012, Dt. 04-04-2012 Wef-26..03..2012	Yes, as Lecturer & A.P & Professor & As Principal	OBC OPEN OPEN
02	Dr. Vijay R. Diware	10/10/1965	Associate Prof. & I/C HOD	B.Tech. Chemical Ph.D.(Chem.Tech.)	I -Class --	Amaravati N.M.U.	1988 2008	37400-67000	23/08/1999	NMU/18/ 555/07 Dt. 28/03/07 Wef-17.07.2006	Yes, as Lecturer	OPEN
03	Dr.S.A. Thakur	17/09/1968	Asstt. Prof.	B.Tech. Chemical M.B.A. M.Tech. (Chem.) Ph D.	I -Class I -Class 8.31 --	Amaravati Nagpur Amaravati NMU	1989 1992 2014 2012	15600-39100	03/08/1998	NMU/18/ J-4/ 4290/04 Dt. 2.9.2004 Wef- 11.2.2004	Yes, as Lecturer	OPEN
04	V. P. Sangore	29/12/1972	Asstt. Prof.	B.Sc Chem M.Sc. Poly.Chem	I -Class Pass Class	N.M.U. N.M.U.	1993 1996	15600-39100	16/08/1999	NMU/18/871/10 Dt. 22.05.2010 Wef- 15.09.2009	Yes,as Lecturer	VJNT
05	Dr. N.Y. Ghare	14/01/1968	Asstt. Prof.	B.Tech.Chemical M.E. Chemical Engg. Ph.D. Chemical Engg.	I-Class AGrade --	Nagpur Nagpur N.M.U.	1990 1996 2017	15600-39100	10/07/2008	NMU/18/365/10 Dt. 10.03.2010 Wef- 15.09.2009	Yes,as Lecturer	OPEN
06	Ms.Shubhangi R. Deshmukh	10/10/1986	Asstt. Prof.	B.Tech.Chemical M.Tech.Chemical	I -Class 8.16 CGPA	Amaravati Amaravati	2009 2012	30000/- Con.	17/07/2017	--	No	OPEN

SHRAM SADHANA BOMBAY TRUST'S COLLEGE OF ENGG. & TECH., BAMBHORI, JALGAON.

Name of Department: Biotechnology Engg. **Academic Year 2017-2018**

Sr. No	Name of staff	Date of Birth	Designation	Qualification	Class	University	Year of Passing	Pay Scale	Date of Joining	University Approval No. & Date	Whether approved by University (Yes/No)	Category
01	Dr.I.D. Patil	01/06/1972	Professor & HOD	B.Sc (Chemestry) M.Sc. (Chem.Tech.) Ph.D. (Chem.Tech.)	II-Class I-Class I-Class ---	N.M.U. N.M.U. N.M.U.	1994 1996 2004	37400-67000	01/10/1999	NMU/18/ 1717/06 Dt. 18/12/2006 Wef- 14.02.2002 NMU/18/ 289/09 Dt. 18/03/2009 Wef- 28.08.2008 NMU/18/864/10 Dt. 22.05.2010 Wef- 15.09.2009 Wef-17.07.2006 NMU/18/1791/11 Dt. 13-12-11 Wef- 1.3.2012	Yes, as Lecturer in Chem.Engg & Asst.Prof in Chem.Engg. & Asst.Prof in Bio-Tech. & Professor Bio-Tech.	OPEN
03	Jayant P. Parpalliwar	22/07/1986	Asstt. Prof.	B. Tech. Bio-Tech	I-Class	N.M.U.	2008	15600-39100	01/07/2009	NMU/18/865/10 Dt. 22.05.2010 Wef- 15.09.2009	Yes,as Lecturer	OPEN
02	Mrs. Sarika S. Pawar	15/01/1982	Asstt.Prof	B Tech. Chemical M.Tech Chemical	I-Class I-Class	N.M.U. N.M.U.	2004 2009	15600-39100	01/07/2011	NMU/18/535/2016 Dt.13.06.2016. Wef- 18.03.0216	Yes,as Asst. Prof.	OPEN
04	Gaurav Dilip Khodpe	04/02/1988	Asstt. Prof.	B.Tech. Biotech M.Tech. Biotech	I-Class I-Class	D.D.Patil University, Mubai. Aurangabad	2010 2012	15600-39100	06/07/2015	NMU/18/536/2016 Dt.13.06.2016 Wef- 18.03.0216	Yes,as Asst. Prof.	OPEN
05	Ms.Komal D.Patil	26.10.1994	Lecturer	B.E. Bio-Tech	I-Class	N.M.U.	2016	30000/- Con.	17/07/2017	--	No	OPEN

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SHRAM SADHANA BOMBAY TRUST'S COLLEGE OF ENGG. & TECH., BAMBHORI, JALGAON.

Name of department: Applied Science Department **Academic Year 2017-2018**

Sr. No	Name of staff	Date of Birth	Designation	Qualification	Class	University	Year of Passing	Pay Scale	Date of Joining	University Approval No. & Date	Whether approved by University (Yes/No)	Category
01	Dr.K. S. Patil	14/05/1974	**Asstt.Prof**	M. Sc. (Physics) Ph.D.	I-Class - -	N.M.U Jodhpur National University	1996 2012	15600-39100	07/07/2000	NMU/18/J-4/621/03, Dt. 18-02-03 Wef-15.02.2002	Yes, as Lecturer	OPEN
02	Y. K. Chitte	01/06/1969	**Asstt.Prof**	M.A. (English)	Higher II- Class	Pune	1997	15600-39100	06/07/2000	--	No	OPEN
03	Dr. Sunita S. Patil	12/05/1975	**Asstt.Prof**	M.Sc.Maths M. Phil Ph.D.	I-Class II-Class --	N.M.U. Alagppa N.M.U.	1998 2010 2016	15600-39100	14/09/2001	NMU/18/J-4/621/03, Dt. 18-02-03 Wef-15.02.2002	Yes, as Lecturer	OPEN
04	C.U. Nikam	05/06/1973	**Asstt.Prof**	M.Sc. (Physics)	I-Class	A'bad	2001	15600-39100	25/08/2008	NMU/18/1145/2008, dt. 03/12/08 Wef-26.08.2008	Yes as a Lecturer	SC
05	Ms. Deepmala I. Desai	10/10/1979	**Asstt.Prof**	M.Sc.(Chemistry) M.Phil	I-Class A-Grade	N.M.U. N.M.U.	2004 2009	15600-39100	26/08/2008	NMU/18/1144/2008, dt. 03/12/08 Wef-26.08.2008	Yes as a Lecturer	SC
06	Mahendra B. Patil	01/06/1985	**Asstt.Prof**	M.Sc. (Physics)	I-Class	N.M.U.	2009	15600-39100	27/07/2010	NMU/18/1563/2010, dt. 06/10/10 Wef-27.07.2010	Yes, as Asst.Prof.	OPEN
07	Ms. Meera V. Deshpande	10/06/1975	**Asstt.Prof**	M.Sc.Maths M.Phil	I-Class II-Class	N.M.U. Alagppa	1997 2008	15600-39100	01/07/2011	NMU/18/362/10 Dt. 10.03.2010 Wef- 15.09.2009	Yes,as Lecturer	OPEN
08	Nago Bhika Bhoi	22/06/1986	Asstt. Prof.	M.A. (English)	I-Class	N.M.U.	2010	15600-39100	06/07/2015	--	No	NT
09	Mali Anil Raju	17/10/1987	Asstt. Prof.	M.Sc. (Chemistry)	I-Class	N.M.U.	2010	15600-39100	06/07/2015	NMU/18/537/2016 Dt.13.06.2016 Wef-17.03.0216	Yes,as Asst. Prof.	OPEN
10	Ujawalsing T. Patil	10/07/1985	Asstt. Prof.	M.Sc. (Org.Chemistry)	I-Class	N.M.U.	2008	15600-39100	06/07/2015	NMU/18/538/2016 Dt.13.06.2016 Wef-17.03.0216	Yes,as Asst. Prof.	OPEN

Sr. No	Name of staff	Date of Birth	Designation	Qualification	Class	University	Year of Passing	Pay Scale	Date of Joining	University Approval No. & Date	Whether approved by University (Yes/No)	Category
11	Ms.Reema S.Adakmol	24/12/1989	Asstt. Prof.	M.A. (English)	I-Class	N.M.U.	2015	30000/- Con.	17/07/2017	--	No	SC
12	Ms.Pooja Rajesh Nichole	16/03/1993	Asstt. Prof.	M.A. (English)	F.W.D	N.M.U.	2016	30000/- Con.	17/07/2017	--	No	OBC
13	Ms. Tejashri Ashok Shinde	12/08/1994	Asstt. Prof.	M.Sc. (Maths)	I-Class	N.M.U.	2017	30000/- Con.	17/07/2017	--	No	OBC
14	Ms. Varsha J.Bagul	17/12/1994	Asstt. Prof.	M.Sc. (Maths)	I-Class	Pune	2017	30000/- Con.	26/07/2017	--	No	OBC
15	Chandramani R.Wagh	16/06/1994	Asstt. Prof.	M.Sc. (Maths)	I-Class	N.M.U.	2017	30000/- Con.	01/08/2017	--	No	SC

SHRAM SADHANA BOMBAY TRUST'S COLLEGE OF ENGG. & TECH., BAMBHORI, JALGAON.

Name of the Department: M.B.A. **Academic Year 2017-2018**

Sr No	Name of staff	Date of Birth	Designation	Qualification	Class	University	Year of Passing	Pay Scale	Date of Joining	University Approval No. & Date	Whether approved by University (Yes/No)	Category
01	Dr.Vishal Sunil Rana	15/12/1980	**Associate Prof. & I/C HOD**	M.B.A. (Marketing) M.Com Ph.D	I-Class I-Class --	NMU Aurangabad NMU	2005 2007 2014	37400-67000	01/07/2009	NMU/18/1070/2009 Dt.30.9.09 Wef 1.7.09 NMU/18/617/2010 Dt. 29.06.2016 Wef-22.03.2016	Yes, as Lecturer Associate Prof.	Open
02	Pankaj Kumar Anawade	05/07/1982	Asstt.Prof	M.B.A. Marketing	I-Class	NMU	2008	15600-39100	01/07/2009	NMU/18/1069/2009 Dt.30.9.09 Wef 1.7.09	Yes, as Lecturer	Open
03	Dr. Richa A. Modiyani	30/04/1987	Asstt.Prof	M.B.A. Finance Ph.D.(Sindhi Community)	I-Class -- 	NMU NMU	2009 2016	15600-39100	01/07/2011	NMU/18/547/2016 Dt.13.06.2016 Wef-17.03.0216	Yes,as Asst. Prof.	Open
04	Dr.Saroj B. Patil	28.05.1974	Asstt. Prof.	M.C.M. Ph.D. (Mgt.Studies)	I-Class --	NMU NMU	1998 2012	15600-39100	02.05.2014	--	No	Open
05	Ms.Faroza A. kazi	16/02/1975	Asstt. Prof.	M.B.A. (H.R) M P M (H.R.)	I-Class I-Class	NMU NMU	2012 2000	15600-39100	06/07/2015	--	No	Open
06	Mukesh B.Ahirrao	24/06/1984	Asstt. Prof.	M.B.A. Finance	I-Class	NMU	2009	15600-39100	06/07/2015	--	No	Open
07	Ms. Sanjiani B. Lokhande	30/05/1987	Asstt.Prof	B.Sc.Chemi. M.B.A.	I-Class I-Class	NMU NMU	2008 2010	15600-39100	17/03/2016	NMU/18/618 /2016 Dt.29.06.2016 Wef-17.03.0216	Yes,as Asst. Prof.	S.C.

SHRAM SADHANA BOMBAY TRUST'S COLLEGE OF ENGG. & TECH., BAMBHORI, JALGAON.

Name of department: Sports **Academic Year 2017-2018**

Sr No	Name of staff	Date of Birth	Designation	Qualification	Class	University	Year of Passing	Pay Scale	Date of Joining	University Approval No.&Datee	Whether approved by University (Yes/No)	Category
01	J.B. Sisodiya	01/06/1963	Phy.Director	B.A. BPEd MPEd	II-Class II-Class I-Class	Poona Poona NMU	1989 1992 2000	**37400 - 67000**	24/11/1994	NMU/18/1669/06, dated 09/12/06 Wef 09.02.2004	Yes as a Phy.Dir.	OPEN

Name of department: Library

Sr No	Name of staff	Date of Birth	Designation	Qualification	Class	University	Year of Passing	Pay Scale	Date of Joining	University Approval No.&Datee	Whether approved by University (Yes/No)	Category
01	Dr. Sudhir.S.Patil	01/06/1978	Librarian	M.Lib. Ph.D.	I-Class --	NMU NMU	2003 2017	15600 - 39100	01/07/2003	NMU/18/215/07, dated 08/02/07 Wef 17.07.2006	Yes as a Librarian	OPEN

SSBTS COLLEGE OF ENGG. & TECH., BAMBHORI, JALGAON.

Staticstical Information of Faculty, 2017-2018

As on 07.01. 2018

Sr. No.	Department	Professor	Associate Prof.	Asst. Prof.	Lecturer	Total
01	Civil Engineering	03	01	06	16	26
02	Computer Engineering	02	03	21	--	26
03	InformationTechnology	01	01	06	01	09
04	Electrical Engineering	02	01	04	07	14
05	E&TC	02	02	16	01	21
06	Mechanical Engineering	01	04	14	06	25
07	Chemical Engineering	01	01	04	--	(1+5) 06
08	Biotechnology Engineering	01	--	03	01	05
09	Applied Science	--	--	15	--	15
10	M.B.A.	--	01	06	--	07
Total		**13**	**14**	**95**	**32**	**154**

Total: - 154+02=156

Dr. Kishor Sopan Wani (Principal)

Address: (O): SSBT's College of Engineering & Technology, Bambhori, Jalgaon. P.Box No. 94. Jalgaon 425001
(R): 31/2, "Annapurna", Gandharva Colony, Jalgaon-425001.
Contact: Mob- +919423774254
Office: 0275 2258391/93
Email: wani.kishor@gmail.com

ACADEMIC QUALIFICATIONS:

Ph. D.(Biotechnology)
North Maharashtra University, Jalgaon.
M.Tech (Chemical Technology):
Laxminarayan Institute of Technology, Nagpur
D.B.M. : Bharati Vidya Bhavans Rajendra Prasad Institute of Management, Mumbai, (Nagpur Chapter)

PROFESSIONAL EXPERIENCE:

A. Teaching:

Total: 30 Years 9 months.
PG Teacher: 8 years.

B. Administration:

1. Principal, SMIT Polytechnic, Jalgaon.
2. Head, Chemical Engg. Department, SSBT's College of Engineering & Technology, Bambhori, Jalgaon
3. Principal since 14th October, 2011 till date, SSBT's College of Engineering & Technology, Bambhori, Jalgaon

C. General Administration

1. Chairman, Antiragging Committee
2. Chairman, Library Committee
3. Chairman, Vice Chairman &Co-ordinator, Admission Committee
4. Co ordinator: Academics & R&D
5. Member, Proctoral Board
6. Patron of International & National Conferences, Seminars , Workshops, Student Technical Paper Presentations (Milestone 2K Series), SSBT Fest., & other activities from Oct 2011.

RESEARCH & PUBLICATIONS:

RESEARCH:

- Ph.D. Guide in Chemical Engineering & Technology of N.M.U., Jalgaon
- Ph.D. Guide in Biotechnology of N.M.U., Jalgaon

1. No. of Ph.D.'s guided: 01
2. No. of students pursuing Ph.D.: 04
3. No. of M.E. Projects Guided: 06

Patent:

First & true inventor of the patent (dated 2/01/2006) on "A Method for production of orange colored aliphatic pigment by *Chryseobacterium Indologenes* (Patent No. 196509 of 16/12/2003, A-MU/0865).

Reviewer:

P.M.Patil and M. Husain, "Specific microbial degradation kinetics of food waste: a case study" in "Frontiers in Environmental Engineering (FIEE)" on 13 October 2013.

RESEARCH PUBLICATIONS:

A. International Publications

1. V.S.Patil, J.D.Dhake, **K.S.Wani.** "Development of Acetylation Technique for chemical modification of cellulose fiber using baggase, bamboo & pad pulps" , published in "Oriental Journal of Chemistry" ,Vol 19,No.3,2003,pp-681-684.Impact Factor: 0.479,ISSN No: 0970-020X.
2. **K.S.Wani**, B.S.Naphade, B.L.Chaudhari & S.B.Chincholkar. "Pigment Production" published in ,"Concise Encyclopedia of Bioresource Technology",Haworth press publication, New York , 1st April 2004, pp 645 - 652.
3. S.S.Sonawane, G.A.Usmani, V.R.Parate, V.S.Patil, **K.S.Wani.** "Mass transfer and kinetic studies of antacids in acetic acid and its modeling simulation", published in "Material Science and Research India". Vol.5(1), 2008, pp 101-106. ISSN No.online:2394-0565.Index Copernicus Value: 60.97.
4. S.S.Sonawane, G.A.Usmani, V.R.Parate, **K.S.Wani** and S.J.Wagh. "Study the kinetics of catalytic esterification reaction between n-Butanol and Acetic acid", published in "Material Science and Research India". Vol.5(1), 2008,pp135-138. ISSN

No.online:2394-0565. Index Copernicus Value: 60.97.

5. Priti N Chaudhari, **Kishor S Wani**, Bhushan L Chaudhari and Sudhir B Chincholkar " Characteristics of Sulfobacin A from a soil isolate *Chryseobacterium gleum*", published in "Applied Biochemistry and Biotechnology" DOI 10 1007/s12010-008-8417-7, Nov.2008.Impact Factor: 1.735. ISSN No. online: 1559-0291.
6. Sharanappa A., **K.S.Wani**, Pallavi Patil. "Bioprocessing of Food Industrial Waste for Alpha Amylase Production by Solid State Fermentation", published in "International Journal of Advanced Biotechnology and Research". Vol 2, Issue 4, 2011, pp 473-480. Impact Factor: 1.506.ISSN No. 0976-2612.
7. A.R.Lokhande, V.S.Patil, **Wani K.S.**"Preparation of greases from metal soaps of non traditional oil using waste lubricating oil", published in "International Journal of Chemical Engineering Research". Volume 4,Number 1 (2012), pp. 1-7. ISSN No: 0975-6442.
8. M. Husain, **K.S.Wani** and S.P.Pawar. "Pollution Control: A Techno-Spiritual Perspective", published in "Pratibha: International Journal of Science, Spirituality, Business and Technology", ISSN (Print) 2277-7261,Vol.1, No. 1, March 2012, pp.82-85.
9. Lokhande A.R., Patil V.S., **Wani K.S** " Study of Diethanolamide from Custard Apple Seed Oil (*Annona Squamosa L*)", published in " International Journal of Engineering and Technology (IJERT), ISSN No:2278-0181, Vol.2, Issue 9, September-2013 pp 448-452. Impact Factor: 1.76
10. Harshal Nagpure, Vikram Banakar, Rahul Dhanda and **K.S.Wani** " Degradation of Paper Mill Wastewater using Batch (Photocatalytic) Reactor", published in "International Journal of Green Chemistry and Bioprocess", ISSN No:2277-7199, 3(3), 2013, pp 24-29.
11. Abhang R. M., **Wani K.S,** Patil V. S., Pangarkar B. L., and Parjane S. B. "Nano-filtration for Recovery of Heavy Metal Ions from Wastewater- A Review", published in "International Journal of Research in Environmental Science and Technology", ISSN No.:2249-9695, 3(1), 2013, 29-34. Impact Factor: 1.844
12. Sakina Husain, Dr.M. Husain and **K.S.Wani**. "Role of Constitutional Ruling System", published in "Pratibha: International Journal of Science, Spirituality, Business and Technology", ISSN No. (Print) 2277-7261, Vol.1, No. 2, February 2013, pp.82-84.
13. R. M. Abhang, **K.S.Wani,** V.S.Patil and S.H.Sonawane. "Perspectives and Challenges of Hydrogen Storage by Metal-Organic Frameworks", published in "Pratibha: International Journal of Science, Spirituality, Business and Technology", Vol.2, No. 1, November 2013,ISSN No.(Print) 2277-7261, pp.18-24.
14. Anand D. Kulkarni and **Kishor S.Wani.**."Magnetic Field Conditioning: An Energy Efficient Method for Crude Oil Transportation", published in "Pratibha: International Journal of Science, Spirituality, Business and Technology", Vol.2, No. 1, November 2013,ISSN No. (Print) 2277-7261, pp.36-39.
15. N.Y.Ghare, **K.S.Wani** and V.S.Patil. "Recovery of Acids from Spent Pickle Liquor

of a Steel Industry By Ion Exchange Route", published in "International Journal of Emerging Trends in Engineering", ISSN No. 2249-6149 Vol.1, Issue 4, January, 2014, pp 318-326. Impact Factor:2.87

16. Rajendrakumar Abhang, **Kishor Wani** and Vilas Patil. "Advancement and Prospectives of MOF and ZIF as a Filler in Mixed Matrix Membrane for CO_2/N_2 Separation- A Review", published in "Cyber Times International Journal of Technology and Management", ISSN No. 2278-7518, Vol.7. Issue 2, April-September, 2014 ,pp 26-33.Impact Factor: 4.896
17. Anand Kulkarni and **Kishor Wani** "Effect of Magnetic Field on Viscosity and Ultraviolet Spectra of Hydrocarbons", published in "Cyber Times International Journal of Technology and Management", ISSN No. 2278-7518 Vol.7. Issue 2, April-September, 2014 pp 34-40. Impact Factor: 4.896
18. **Kishor S.Wani**, Mujahid Husain[2] and Vijay R Diware, "Detergent Removal from Sullage by Photo-catalytic Process", accepted for the publication in Pratibha: International Journal of Science, Spirituality, Business and Technology (IJSSBT) ISSN (Print) 2277-7261 IJSSBT, VOL. 3, No.1, Dec. 2014, Page No.1 -5,.
19. R.M.Abhang, **K.S.Wani** and V.S.Patil, "Synthesis and characterization of ZIF-8 filler for preparation of mixed matrix membrane", published in "International Journal of Scientific and Engineering Research", ISSN No. 2229-5518,Vol.6. Issue 8, August, 2015, pp 1276-1280.
20. Kulkarni A.D. and **Wani K.S "**Reducing Crude Oil Viscosity Using Diluents**",** Published inInternational Journal of Engineering Trends and Technology, ISSN No.: 2231-5381, Special Issue, ICGTETM Number-1, January 2016 Page No. 85 to 89. DOI: 10.14445/22315381/IJETT-ICGTETM-N1, Impact Factor: 1.795
21. Yogendra D. Thakare, Vijay R. Diware**, Kishor S. Wani "**Decolorization of Malachite Green Dye Using UV + H_2O_2 and Photo Fenton Processes**",** Published inInternational Journal of Engineering Trends and Technology, ISSN No: 2231-5381, Special Issue, ICGTETM Number-1, January 2016, Page No. 90 to 93.DOI: 10.14445/22315381/IJETT-ICGTETM-N1, Impact Factor: 1.795
22. R. M. Abhang, **K. S. Wani**, V. S. Patil, "Performance Studies of ZIF-8/PES Asymmetric Mixed MatrixMembrane for Permeation of CO_2/CH_4" Published inInternational Journal of Engineering Trends and Technology, ISSN No: 2231-5381, Special Issue, ICGTETM Number-2, January 2016 ,Page No. 183 to 187. DOI: 10.14445/22315381/IJETT-ICGTETM-N2, Impact Factor: 1.795
23. A.R.Lokhande, **Kishor Sopan Wani**, Mohd. Afsar S. Siddiqui, "Study of Pectin from Peels of Magnifera Indica andArtocarpus Hetrophyllus"published in International Journal of Engineering Trends and Technology, ISSN No: 2231-5381, Special Issue, ICGTETM Number-3, January 2016, Page No. 375 to 381. DOI: 10.14445/22315381/IJETT-ICGTETM-N3, Impact Factor: 1.795
24. Yogendra D. Thakare, Sunita M. Jadhav, **K.S.Wani**, "Acid Orange 7 Dye Degradation Using Combined Acoustic Cavitation with Fenton and Photo Fenton Processes," published in International Journal of Engineering Science and

Computing, ISSN 2321 3361, Volume 6, Issue 4, April 2016, page no.s 3379 to3386, Impact Factor: 3.868

B. National Publications:

i. National Journals

1. N.Y.Ghare, **K.S.Wani** and V.S.Patil. "A Review on Methods of Recovery of Acid(S) from Spent Pickle Liquor of Steel Industry", published in Journal of Environ. Science and Engg. Vol.55,No.2,April 2013, pp 253-266.ISSN No. 0367-827X.

ii. National Seminar

1. **K.S.Wani** "Microbial Pigments and its Applications". Published in National level Seminar on " Emerging Facets of Chemical Engineering & Biotechnology held on September 28-29,2005 at Laxminarayan Institute of Technology, Nagpur.
2. Sharanappa A, **K.S.Wani "**Molecular Dynamics Simulation: An Aid to Predict Nanobehavior of Biological System". Published in National level Seminar on "Nanotechnology" held on March 08, 2008 at S.S.B.T's, COET, Bambhori. Jalgaon.

C. International Conference / Symposiums

1. **Kishor S Wani**, Priti N Chaudhari, Bhushan L Chaudhari and Sudhir B Chincholkar. "Production of New Sulfonolipid and Some Important Enzymes by Alkaliphilic *Chryseobacterium sp.*" Published in International Conference on " New Horizons in Biotechnology and 4th BRSI Convention" held on November 26-29,2007, organized by The Biotech Research Society[BRSI] and National Institute for Interdisciplinary Science and Technology[NIIST], Trivandrum.
2. Sharanappa A., **K.S.Wani** and Pallavi Patil. " Bioprocessing of Food Industrial Waste for Value Added Product by Solid State Fermentation". Published in International Conference on "Innovative Science and Engineering and Technology (ICISET-2011)" held on 8th& 9thApril,2011, organized by V.V.P. Engineering College, Rajkot (Gujarat).
3. A.R.Lokhande, **K.S.Wani** and V.S.Patil. "Study of Lubricating Greases from Mahua Oil Fatty Acids using Waste Lubricating Oil". Published in "International Congress of Chemistry and Environment (ICCE-2011)" held on 27-29, May-2011 at Dickson, Malaysia.
4. R. M.Abhang, **K. S. Wani,** V.S.Patil and S.H.Sonawane. " Perspectives and Challenges of Hydrogen Storage by Metal-Organic Frameworks", published International Conference on "Advances in Energy Technology" organized by SSBT's College of Engineering and Technology, Bambhori, Jalgaon held on March 29th,2013, page no.101-107, Proceedings.
5. Anand D. Kulkarni and **Kishor S.Wani**."Magnetic Field Conditioning: An Energy Efficient Method for Crude Oil Transportation", published in International Conference on "Advances in Energy Technology" organized by SSBT's College of Engineering and

Technology, Bambhori, Jalgaon, held on March 29th, 2013, page no.89-92, Proceedings.

6. Lokhande A.R., Patil V.S. and **Wani K.S**."Advance Technology in Renewable Energy", published in International Conference on "Advances in Energy Technology" organized by SSBT's College of Engineering and Technology, Bambhori, Jalgaon, held on March 29th,2013, page no.114-117, Proceedings.
7. Lokhande A.R., **Wani K.S**. and Patil V.S. "Design Criterion for Extended Aeration System", published in International Conference on "Advances in Energy Technology" organized by SSBT's College of Engineering and Technology, Bambhori, Jalgaon, held on March 29th,2013, page no.127-131, Proceedings.
8. Kulkarni A.D., Mhaske V.S., Nandi S. and **Wani K.S**., 'Effect of Magnetic Field on the Viscosity of Individual Hydrocarbons" (Poster presentation) in "CHEMCON 2013", (66TH Annual Session of Indian Institute of Chemical Engineers), Joint Indo-North American Symposium, held at Institute of Chemical Technology Campus, Matunga, Mumbai, organized by Indian Institute of Chemical Engineers, Mumbai Regional Centre, in Association with Institute of Chemical Technology, Mumbai on December 27-30, 2013.
9. V.P. Sangore, S.A. Thakur, V.R. Diware, **K.S. Wani**, "Sustainable Development And Challenges Ahead of Chemical Engineering Industries" Published in proceedings of International Conference on "Sustainable Development" organized by SSBT's College of Engineering and Technology, Bambhori, Jalgaon held on February, 25-26th 2014, page no.18-21, Proceedings.
10. A.R. Lokhande, **K.S. Wani**, V.S. Patil, "Chemical Process Engineering for Sustainability" Published in proceedings of International Conference on "Sustainable Development" organized by SSBT's College of Engineering and Technology, Bambhori, Jalgaon held on February, 25-26th 2014, page no.400-404.

D. National Conferences:

1. V.P.Sangore, S.A.Thakur, V.R.Diware and **K.S.Wani**. " Impact of Global Economic Recession on Indian Chemical Industries", Published in U.G.C. Sponsored National Level Conference on " Global Economic Recession : An Opportunity to India" held on 16th and 17th December, 2009, organized by B.G.E. Society's Smt. Laxmibai Radhakisan Toshniwal College of Commerce, Akola.
2. Sharanappa A., **K.S.Wani** and Pallavi Patil. " Biotechnology of Solid State Fermentation", Published in National Conference on " Biochemical Engineering: Present Scenario and Future Perspective" held on 12th and 13th March, 2010, organized by Department of Chemical Engineering, G.H.Patel College of Engineering and Technology, Vallabh Vidyanagar, Gujarat.
3. V.P.Sangore, S.A.Thakur, V.R.Diware and **K.S.Wani**. " Recovery of Bisphenol-A through Depolymerization of Commercial Compact Disc Waste by Alkaline Methanolysis", Published in National Conference on " Emerging Trends in Engineering,

Technology and Management", held on 29th March 2010, organized by SSBT's C.O.E.T.,Bambhori, Jalgaon.

4. N.Y.Ghare, **K.S.Wani** and V.S.Patil. "Recovery of Hydrochloric Acid from Spent Pickle Liquor of Steel Industry", Published in National Conference on " Emerging Trends in Engineering, Technology and Management", held on 29th March 2010, organized by SSBT's C.O.E.T.,Bambhori, Jalgaon.
5. A.R.Lokhande, **K.S.Wani** and V.S.Patil. "Study of Metallic Soaps from Non-Traditional Oil and their Applications as Lubricating Greases and Drier in Paints", Published in National Conference on " Emerging Trends in Engineering, Technology and Management", held on 29th March 2010, organized by SSBT's C.O.E.T.,Bambhori, Jalgaon.
6. A.R.Lokhande, **K.S.Wani** and V.S.Patil. "Study of Lubricating Grease from Mahua Oil Fatty Acids", Published in National Conference on "Recent Innovations in Oil and Food Technology (RIOFT-2010)", held on August 23, 2010, organized by Division of Oils, Fats and Waxes Technology and Division of Food Technology, Department of Chemical Technology, North Maharashtra University, Jalgaon-425001.
7. N.Y.Ghare, V.S.Patil and **K.S.Wani**. "Analysis and Recovery of Sulfuric Acid from Spent Liquor of Electroplating Industry", Published in National Conference on "Environmental Innovations for Resource Sustainability (EIRS-2011)", held on 21st&22nd January 2011, organized by School of Environmental & Earth Sciences, North Maharashtra University, Jalgaon.
8. L. Mahajan and **K.S.Wani**." Study of Adsorption Capacity of Fly Ash for Removal of Lignin", Published in National Conference on "Recent Advances in Chemical Engineering (RACE-2012)",held on 4th February, 2012, organized by University Department of Chemical Technology, North Maharashtra University, Jalgaon.
9. Kishor B. Deshmukh, V.P.Sangore and **K.S.Wani**. "UASBR Technology for Treating Waste Water", Published in National Level Conference on "Green and Clean Technology", held on 11th March 2012, organized by SSBT's College of Engineering and Technology, Bambhori, Jalgaon.

PARTICIPATION IN WORKSHOPS, WINTER / SUMMER SCHOOL ETC:

1. National Symposium on "Recent Trends in Biotechnology of Yeast and Fungi" held at School of Life Sciences, N.M.U., Jalgaon during 13-14th March 1997.
2. Workshop on syllabus framing for S.E. to B.E. NMU Jalgaon conducted at COET , Bambhori, Jalgaon on 06/09/1998.
3. Seminar on "Quality Engineering Education" organised by SSBT's COET, Jalgaon, N.M.U., Jalgaon and Engineering Education Foundation, Pune on Dec. 26th Dec. 1998.
4. QIP short term course on "Recent Developments in Fermentation and Enzyme Technology", conducted at IIT, Bombay during May 8-12, 2000.
5. Workshop on "Paper Setting & Evaluation" conducted at J. T. Mahajan College of Engineering, Faizpur on Sept.22,2002.

6. “Workshop : Insight into Accreditation” conducted at Goa on April 16–17, 2003.
7. Five day SERC school on “Recent Advances In Design and Analysis of Biotechnological Processes” conducted at IIT Bombay during May 13-17,2003.
8. “Orientation Programme for Engineering College Teachers” jointly Organised by SSBT's COET, Jalgaon and Engineering Education Foundation, Pune at COET Bambhori on July 11-13,2003
9. Workshop on “Matlab & Simulink” conducted by India Soft & Cranes in July 2003 at SSBT’s COET , Bambhori, Jalgaon.
10. Workshop on “Intellectual Property Rights with special reference to Patents”. Sponsored by TIFAC, DST (Govt. of India) and S&T Cell (Govt. of Maharashtra)held on Jan 9,2004 at N.M.U. Jalgaon.
11. National symposium on “ Developments in Biotechnology: Emerging Trends and Challenges”. First BRSI Convention, held on November 25-27, 2004 at N.M.U. Jalgaon.
12. National seminar on “Low Cost Automation” held on April 21, 2007 at SSBT’s College of Engineering and Technology, Bambhori, Jalgaon.
13. National seminar on “NANOTECHNOLOGY” held on March, 8 , 2008 at SSBT’s College of Engineering and Technology, Bambhori, Jalgaon.
14. International workshop on "Digital Governance and Hotspot Geoinformatics" directed by Dr.G.P.Patil, Penn State University, U.S.A. and organised by K.C.E.Society's JalaSRI-Watershed Surveillance and Research Institute, Moolji Jaitha College, Jalgaon, during 5 - 7 June, 2009.
15. Three days teachers’ training workshop “SHRAM SADHANA”, held on 9th, 10th and 11th July, 2009, jointly organized by SSBT’s College of Engineering and Technology, Bambhori, Jalgaon and Deepstambh Foundation, Jalgaon.
16. In-plant Training Programme on “Disaster Management” held at the SSBT’s College of Engineering and Technology, Bambhori, Jalgaon, on 23rd January 2010, organized by “National Safety Council, Mumbai chapter.
17. National Level Workshop on “Research Methodology” , held at the SSBT’s College of Engineering and Technology, Bambhori, Jalgaon from 17th to 19th October 2011, jointly organized by Department of Mechanical Engineering and Department of Business Administration.
18. National conference on “Recent Advances in Chemical Engineering”, held at University Department of Chemical Technology, North Maharashtra University, Jalgaon on 4th Feb.2012 organized by U.D.C.T., N.M.U., Jalgaon.
19. International Conference on “Global Trends in Engineering, Technology and Management”, held at SSBT’s COET, Bambhori, Jalgaon. On 9th to 11th January 29, 2015.
20. Training on, “Industrial Automation” held on 12.3.2015 to 13.3.2015, conducted by Technocrat’s Academy of Automation and Control Technology (TAACT), Nashik.
21. International Conference on “Global Trends in Engineering, Technology and Management”, held at SSBT’s COET, Bambhori, Jalgaon. on 4th to 6th January 2016.

HONORS & ACHIEVEMENTS

1. Dean for Faculty of Engineering, Technology and Architecture for the 24th Convocation Ceremony of North Maharashtra University, Jalgaon on 6.6.2016
2. Member of BOS of Chemical Engineering & Technology, NMU, Jalgaon
3. Member of 32/(5) Committee, NMU, Jalgaon.
4. Chairman, Lab Recognition committee , 2016 of NMU, Jalgaon.
5. Invited member for BOE of NMU, Jalgaon.
6. Member of LIC Report Scrutiny Committee 2016.
7. Certificate of recognition for outstanding result in the subject Biochemical Engineering, Oct.2015 examination.
8. Chairman LIC committee (Permanent Affiliation) of NMU, Jalgaon.
9. Organised Jalgaon District Level "Avishkar 2015", NMU, Jalgoan.
10. Sanyojan Samiti Pramukh for "Yuvarang 2015",NMU Jalgaon
11. Vice Chancellor's Research Motivation Scheme (VCRMS)" 2015, Shipharas Samiti Pramukh, NMU, Jalgaon.
12. Letter of Appreciation from MKCL on the eve of Teachers Day, 5.9.2013

PROFESSIONAL MEMBERSHIP:

1. Member of Board of Studies of Chemical Engineering and Technology, North Maharashtra University, Jalgaon.
2. Life Member of ISTE.
3. Life Member of AFST.
4. Life Member of BRSI
5. Life Member of IIChE , India

Dr. K.S.Wani

DEPARTMENT OF APPLIED SCIENCE

For each Faculty give a page covering
Name: Dr. KIRAN SAHEBRAO PATIL

1. Date of Birth: 14^{tn} MAY 1974
2. Educational Qualification: M. Sc.(PHYSICS.) Ph.D.

3. Work Experience :
   - Teaching --19
   - Research ---06--
   - Industry -- --
   - Others -----
4. Area of Specializations: - Physics with Electronics
5. Subjects teaching at Under Graduate Level:
   i) Applied Physics-I ii) Applied Physics-II
   iii)Environmental Studies.
   Post Graduate Level: –
6. Research guidance: Not Applicable

	No. of papers published in
Master's	- National Journals
Ph.D.	-International Journals 06
	- Conferences 01

Projects Carried out :
Patents :

7. Technology Transfer : - -

8. Research Publications : --
   i) International Journals :

9.No. of Books published with details : --
11.Research Publications : --
   i) International Journals: 06

12.No. of Books published with details :

Signature

DEPARTMENT OF APPLIED SCIENCE

1.Name:SUNITA SAHEBRAO PATIL
2.Date of Birth : 12TH MAY 1975
3.Educational Qualification : M.Sc.(Maths.) B.Ed.M.Phil
Ph.D.

4.Work Experience :
- Teaching -- 17 years
- Research --06 yrs
- Industry
- Others --

5.Area of Specializations :
6.Subjects teaching at Under Graduate Level :
i) Engineering Maths-I ii) Engineering Maths-II
iii) Engineering Maths-III iv) NACM

Post Graduate Level : --
7.Research guidance : Not Applicable

Masters's
Ph.D.

No. of papers published in
- National Journals-Nil
-International Journals 08
- Conferences 05

8.Projects Carried out : - -
9.Patents : - -
10.Technology Transfer : - -
11.Research Publications : --
i) International Journals 08

12.No. of Books published with details : -

Signature

DEPARTMENT OF APPLIED SCIENCE

For each Faculty give a page covering

Name: CHANDRASHEKHAR. UTTAMRAO. NIKAM.

1 Date of Birth: 05/06/1973

2 Educational Qualification: M.Sc.(Physics), B.Ed,

3 Work Experience : 14Years

i) Teaching 14 Years
ii) Research -----
iii) Industry -- --
iv) Others-----

4 Area of Specializations: - Nuclear Physics

Subjects teaching at Under Graduate Level:- i) Applied Physics-I ii) Applied Physics-II iii)Environmental Studies. iv) Optics v) Quantum mech., vi)Mathematical Phy., vii) Nuclear Physics.

Post Graduate Level: - Nuclear Physics

6. Research guidance: Not Applicable

	No. of papers published in
Master's	- National Journals 02
	International
Ph.D.	- Journals01
	- Conferences 01

Projects Carried out :

Patents :

9 Technology Transfer : - -

10 Research Publications : --

i) International Journals :

9. No. of Books published with details : --

1. Research Publications : --

i) International Journals

2. No. of Books published with details : - -

Signature

DEPARTMENT OF APPLIED SCIENCE

1.Name:-Deshpande Meera Vilas
2.Date of Birth.:-10/06/1975
3.Educational Qualification :-M.Sc(Mathematics),
B.Ed,M.Phil.

4.Work Experience : 16
10 Teaching :- 16 years
11 Research :---
12 Industry : --
13 Others : --
5.Area of Specializations : ---
6.Subjects teaching at Under Graduate Level :
1) Engineering Math I 2)Engineering Math II 3)Engineering Math III
4)F.Y.Bsc I,II,III 5)S.Y.Bsc I,II,III
Post Graduate Level : --
7.Research guidance : Not Applicable

	No. of papers published in	
Masters's	-	National Journals
Ph.D.		-International Journals-02
		-Conferences-01

8.Projects Carried out : - -
9.Patents : - -
10.Technology Transfer : - -
11.Research Publications :
i) International Journals:--02

12.No. of Books published with details : - -

Signature

DEPARTMENT OF APPLIED SCIENCE

For each Faculty give a page covering Name:
Yeshwant Kondusing Chitte

1. Date of Birth: 2nd June 1969
2. Educational Qualification: M.A.(English),
   L.L.B., B.C.J.

3. Work Experience :
   Teaching --14 yrs
   Research -----
   Industry -- --
   Others-----
4. Area of Specializations: - English Literature
5. Subjects teaching at Under Graduate Level:
   - Professional Communication
   Post Graduate Level: --
4. Research guidance: Not Applicable

	No. of papers published in
Master's	- National Journals
Ph.D.	- International Journals
	- Conferences

Projects Carried out :
Patents :

7. Technology Transfer : - -

8. Research Publications : --
   International Journals :

No. of Books published with details : --
Research Publications : --
International Journals

11.No. of Books published with details : - -

Signature

DEPARTMENT OF APPLIED SCIENCE

For each Faculty give a page covering

Name: DEEPMALA ISHVARLAL DESAI

01. Date of Birth: 06th Oct 1979

02. Educational Qualification: M. Sc. (Chemistry)
M.Phil

03 Work Experience:
- i) Teaching --09 yrs
- ii) Research ---
- iii) Industry -- --
- iv) Others-----

04 Area of Specializations: -Inorganic Chemistry

05 Subjects teaching at Under Graduate Level:
Applied Chemistry-I ii) Applied Chemistry-II
iii)Environmental Studies.
Post Graduate Level: --

06 Research guidance: Not Applicable

Master's
Ph.D.

No. of papers published in
National Journals -01

International Journals- 03
Conferences-02

07 Projects carried out:
Patents :

08. Technology Transfer: - -

09 Research Publications: --
i) International Journals :

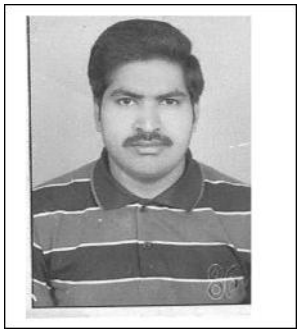
Research Publications : --
10. International Journals

11.No. of Books published with details : - -

Signature

DEPARTMENT OF APPLIED SCIENCE

For each Faculty give a page covering



Name: MAHENDRA BALU PATIL

01. Date of Birth: 01ST JUNE 1985

02. Educational Qualification: M. Sc. (PHYSICS.)

11. Work Experience:

i) Teaching --08 yrs

ii) Research ---03

iii) Industry -- --

iv) Others-----

- Area of Specializations: - ENERGY STUDIES
- Subjects teaching at Under Graduate Level:

Applied Physics-I ii) Applied Physics-II

iii)Environmental Studies.

Post Graduate Level: --

06. Research guidance: Not Applicable

	No. of papers published in
Master's	- National Journals
Ph.D.	-02 International Journals
	- Conferences

Projects carried out:

Patents :

07. Technology Transfer: - -

- Research Publications: --

i) International Journals : 02

9.No. of Books published with details : --

11 Research Publications : --

8. International Journals

11.No. of Books published with details : - -

Signature

DEPARTMENT OF APPLIED SCIENCE

For each Faculty give a page covering

Name: Ujwalsing Tryambak Patil

01. Date of Birth: 10th July 1985
02. Educational Qualification: M.Sc. (Chem.)

1. Work Experience:
   Teaching --4 yrs
   Research -----

- Area of Specializations: - Organic Chemistry
- Subjects teaching at Under Graduate Level:
  Applied Chemistry-I ii)Applied Chemistry -II
  iii)Environmental Studies.
  Post Graduate Level: --

06. Research guidance: Not Applicable

	No. of papers published in
Master's	- National Journals
Ph.D.	- International Journals
	- Conferences

Projects carried out:
Patents :

07. Technology Transfer: - -

1. Research Publications: --
   i) International Journals :

9.No. of Books published with details : --

4. Research Publications : --
   - International Journals

11.No. of Books published with details : - -

Signature

DEPARTMENT OF APPLIED SCIENCE
For each Faculty give a page covering

Name: Anil Raju Mali

01. Date of Birth: 17th Oct 1987
02. Educational Qualification: M.Sc. (Chem.) NET,SET

1 Work Experience:
- (i) Teaching --6.3 yrs
- (ii) Research -----
- (iii) Industry -- --
- (iv) Others-----

7. Area of Specializations: - Organic Chemistry
8. Subjects teaching at Under Graduate Level:
i Applied Chemistry-I ii) Applied Chemistry -II
iii)Environmental Studies.
Post Graduate Level: --
06. Research guidance: Not Applicable

	No. of papers published in
Master's	- National Journals--02
Ph.D.	- International Journals--04
	- Conferences-01

Projects carried out:
Patents :

07. Technology Transfer: - -

8. Research Publications: --
i) International Journals :

9.No. of Books published with details : --
1. Research Publications : --
- International Journals

11.No. of Books published with details : - -

Signature

DEPARTMENT OF APPLIED SCIENCE

For each Faculty give a page covering
Name: Nago Bhika Bhoi.

1 Date of Birth: 22nd June 1986
2 Educational Qualification: M.A. English

3 Work Experience :
- i) Teaching --7 yrs
- ii) Research -----
- iii) Industry -- --
- iv) Others-----

4 Area of Specializations: - English Literature
5 Subjects teaching at Under Graduate Level:
i Communicative English
ii Post Graduate Level: --
1 Research guidance: Not Applicable

		No. of papers published in
Master's	-	National Journals
Ph.D.	-	International Journals-03
	-	Conferences

Projects Carried out :
Patents :

7. Technology Transfer : - -

10. Research Publications : --
International Journals :

12. No. of Books published with details : --
13. Research Publications : --
International Journals-03

11.No. of Books published with details : - -

Signature

DEPARTMENT OF APPLIED SCIENCE

For each Faculty give a page covering
Name: Reema Suresh Adakmol

1 Date of Birth: 24th Dec 1989
2 Educational Qualification: M.A. English

3 Work Experience :
   a. Teaching --2 yrs
   b. Research -----
   c. Industry -- --
   d. Others-----

3 Area of Specializations: - English Literature
4 Subjects teaching at Under Graduate Level:
   iii Communicative English
   iv Post Graduate Level: --
5 Research guidance: Not Applicable

Master's
Ph.D.

No. of papers published in
- National Journals
- International Journals
- Conferences

Projects Carried out :
Patents :

7. Technology Transfer : - -

11. Research Publications : --
International Journals :

12. No. of Books published with details : --
13. Research Publications : --
International Journals

11.No. of Books published with details : - -

Signature

DEPARTMENT OF APPLIED SCIENCE

For each Faculty give a page covering

Name: Pooja Rajesh Nichole

1. Date of Birth: 16th Mar. 1993
2. Educational Qualification: M.A. English
3. Work Experience :

   a. Teaching --0.6
   b. Research -----
   c. Industry -- --
   d. Others-----

4 Area of Specializations: - English Literature

5 Subjects teaching at Under Graduate Level:

v Communicative English

vi Post Graduate Level: --

e. Research guidance: Not Applicable

Master's

Ph.D.

No. of papers published in

- National Journals
- International Journals
- Conferences -01

Projects Carried out :

Patents :

7 Technology Transfer : - -

8 Research Publications : --

International Journals :

No. of Books published with details : --

10 Research Publications : --

International Journals

11 No. of Books published with details : - -

Signature

DEPARTMENT OF APPLIED SCIENCE

1.Name:- Varsha Jaywant Bagul

2.Date of Birth.:-17th Dec.1994

3.Educational Qualification :-M.Sc(Mathematics),

4.Work Experience :

10 Teaching :- 0.6
11 Research :---
12 Industry : --
13 Others : --

5.Area of Specializations : ---

6.Subjects teaching at Under Graduate Level :

1) Applied Math I 2)Applied Math II 3)Applied Math III

Post Graduate Level : --

7.Research guidance : Not Applicable

No. of papers published in

Masters's - National Journals
Ph.D. -International Journals
-Conferences

8.Projects Carried out : - -

9.Patents : - -

10.Technology Transfer : - -

11.Research Publications :

i) International Journals:--

12.No. of Books published with details : - -

Signature

DEPARTMENT OF APPLIED SCIENCE

1.Name:- Tejashri Askok Shinde

2.Date of Birth.:-12th Aug.1994

3.Educational Qualification :-M.Sc(Mathematics),

4.Work Experience :

10 Teaching :- 0.6
11 Research :---
12 Industry : --
13 Others : --

5.Area of Specializations : ---

6.Subjects teaching at Under Graduate Level :

1) Applied Math I 2)Applied Math II 3)Applied Math III

Post Graduate Level : --

7.Research guidance : Not Applicable

Masters's -
Ph.D. -

No. of papers published in
National Journals
-International Journals
-Conferences

8.Projects Carried out : - -

9.Patents : - -

10.Technology Transfer : - -

11.Research Publications :

i) International Journals:--

12.No. of Books published with details : - -

Signature

DEPARTMENT OF APPLIED SCIENCE

1.Name:- Chandramani R. Wagh
2.Date of Birth.:-16/06/1994
3.Educational Qualification :-M.Sc(Mathematics),

4.Work Experience :

10 Teaching :- 0.6
11 Research :---
12 Industry : --
13 Others : --

5.Area of Specializations : --computational mathematics

6.Subjects teaching at Under Graduate Level :

1) Applied Math I 2)Applied Math II 3)Applied Math III

Post Graduate Level : --

7.Research guidance : Not Applicable

No. of papers published in

Masters's - National Journals

Ph.D. -International Journals

-Conferences

8.Projects Carried out : - -

9.Patents : - -

10.Technology Transfer : - -

11.Research Publications :

i) International Journals:--

12.No. of Books published with details : - -

Signature

NAME OF THE DEPARTMENT :- APPLIED SCIENCE

S.No.	Name of the Laboratory	Total area	Major Equipment

	/Workshop Details	of Lab./w.s. in m^2	above 50,000/-
01	Physics Laboratory	153	Nil
02	Chemistry Laboratory	135	Nil
03	Language Laboratory	135	Nil
04	Environmental / Maths Laboratory	108	Nil

Item No.26

A) Facilities for conducting Practical in the Laboratories

Name of Course: - **Engineering** Class: - **FE Common** Subject: - **Engg. Chemistry**

Name of the Department / Section: -Applied Science Dept./ Chemistry Section. Subject wise & laboratory wise Lists of material, machinery, equipment & Instrument required to perform prescribed Practical (**Note: Minimum FIVE Experiments from the following**)

Subject: **EC -I**

Sr. No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt. can be Conducted
			Required	Available	
1	To measure total hardness of given water sample.	a. Burette (25ml) b. Pipette c. Measuring cylinder d. Titration Flask (250ml) e. Burette stand f. Beakers (500 ml)	10 10 10 10 10 10	24 24 12 30 15 12	Yes
2	Estimation of phenol volumetrically in given solution	a. Burette (25 ml) b. Pipette c. Measuring cylinder d. Titration Flask (250 ml e. Burette stand f. Beakers (250 ml)	10 10 10 10 10 10	24 24 12 30 15 12	Yes
3	Determination of chloride content in the given sample of water by Mohr's method	a. Burette (25 ml) b. Pipette d. Titration Flask. (250 ml) d. Beakers(250 ml) e. Burette stand	10 10 10 10 10	24 24 30 12 15	Yes
4	Determination of alkalinity of water sample.	a. Burette (25 ml) b. Pipette c. Measuring cylinder d. Titration Flask (250 ml) e. Burette stand f. Beakers (250 ml)	10 10 10 10 10 10	24 24 12 30 15 12	Yes
5	To Estimate Copper in brass idometrically.	a. Burette (25 ml) b. Pipette c. Measuring cylinder d. Titration Flask (250 ml) e. Burette stand f. Beakers (250 & 500 ml)	10 10 10 10 10 20	24 24 12 30 15 24	Yes

6	To Estimate zinc in brass idometrically.	a. Burette (25 ml) b. Pipette c. Measuring cylinder d. Titration Flask (250 ml) e. Burette stand f. Beakers	10 10 10 10 10 10	24 24 12 30 15 12	Yes
7	Preparation of phenol formaldehyde resin	Glass rod, Beaker(500 ml) glass funnel	10 10 10	20 12 12	Yes
8	To Determine percentage of calcium in cement.	water bath	05	00	NO
9	Preparation of polystyrene by Bulk polymerization	Round bottom flask, Condenser, Over head motor Thermostat	10 10 10 01	00 00 00 00	NO
10	Determination of DO in given water sample(Winklers method)	Burette (25ml) Pipette(25 ml) Titration Flask (250 ml glass bottles, Measuring Cylinder	10 10 10 10 10	24 24 30 20 12	Yes

Subject **: EC - II**(**Note: Minimum FIVE Experiments from the following**)

Sr. No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt. can be conducted
			Required	Available	
1	Determination of acid value of vegetable oils.	a. Burette (10ml) b. Pipette c. Measuring cylinder d. Titration Flask e. Burette stand f .Digital balance	10 10 10 10 10 02	12 24 12 36 24 02	Yes
2	Determination of amount of NaOH & Na_2CO_3 in given Alkali mixture	a. Burette (25 ml) b. Pipette c. Measuring cylinder d. Titration Flask (250ml) e. Burette stand f. Beakers	10 10 10 10 10 10	24 24 12 30 24 24	Yes
3	Determination of PH value of water by PH meter.	a pH-meter b. Beaker c. Glass electrode d. Stirrer e. Burette stand	02 06 02 06 02	02 24 02 10 24	Yes
4	Determination of percentage of moisture ash content coal sample.	a. Oven b. Muffle Furnace c. Desiccators d. Digital balance	01 01 01 01	01 01 01 02	Yes
5	Determine of partition coefficient of iodine bet^{n}.water and carbon tetra-chloride.	a. Burette (25 ml) b. Pipette c. Measuring cylinder d. Titration Flask e. Burette stand f. Beakers g. Stoppered Bottles h. Separating flasks	10 10 10 10 10 10 10 03	24 24 12 36 24 24 24 03	Yes
6	To determine the coefficient of viscosity of a given liquid using Ostwald viscometer.	a. Ostwald viscometer. b. Burette (25ml) c. Beakers d. Burette stand	10 10 10 10	15 24 24 24	Yes
7	Determination of Calorific value of Fuel sample by using Bomb calorimeter.	Bomb calorimeter**,**	01	00	No

8	Determination of Aniline Point of an Oil	Aniline Point thermometer, Aniline Point apparatus	10 10	00 00	No
9	Determination of Iodine value of given lubricating Oil by Wij`s method.	water bath	05	00	No
10	Determination of Saponification Value of an Oil.	Water Condenser, Water bath.	10 05	00 00	No

Item No.26

A) Facilities for conducting Practical in the Laboratories

Name of Course: - **Engineering** Class: - **FE Common** Subject: - **Engg. Physics**

Name of the Department / Section: -Applied Science Dept./ **Physics Section**.

Subject wise & laboratory wise Lists of material, machinery, equipment & Instrument required to perform prescribed Practical (**Note: Minimum FIVE Experiments from the following**)

Subject: **EP -I**

Sr. No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt. can be conducted
			Required	Available	
1	Semiconductor Diode characteristics	Diode characteristics kit	05	07	Yes
2	Forbidden gap in semiconductor	Forbidden gap kit	05	03	Yes
3	Four Probe Method	Four Probe Kit	05	05	Yes
4	Wavelength of He-Ne laser	He-Ne laser Diffraction grating	05	03	Yes
5	Fibre Optics Communication	Fibre Optics trainer kit	05	03	Yes
6	Hall Effect	Gauss meter, Electromagnets	05	05	Yes
7	Characteristics Of Solar Cell & Calculation Of Fill Factor	Solar Cell kit	5	7	Yes
8	Wavelength by Diffraction grating	Diffraction grating Spectrometer	5	4	Yes
9	Determination Of Wavelength Of Sodium Light By Michelson Interferometer	Michelson Interferometer Sodium Lamp	5 1	2 1	Yes
10	Brewster Law	Sodium source, Spectrometer	05	02	Yes
11	Law of Malus	Polarizer, Light source	05	02	Yes
12	Crystal Structure	Crystal Structure	05	05	Yes

Subject: **EP –II** (**Note: Minimum FIVE Experiments from the following**)

Sr. No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt. can Be conducted
			Required	Available	
1	Use Of Sound Level Meter	Sound Level Meter	5	3	Yes
2	Ultrasonic Interferrometer	Frequency Generator Measuring cell	5 5	2 2	No
3	Use Of Ultrasonic Detector	Frequency Generator	5	3	Repairing Required
4	Determination Of Specific Charge Of An Electron By Thomson Method	C.R.T. Power supply Magnetometer Stop Watch	5 5 5 5	5 5 5 5	Yes
5	B-H Curve	B-H Curve kit	05	05	Yes
6	Magnetic susceptibility measurement	Magnetic power supply Strong magnets	05	03	Repairing Required
7	Uses of CRO	CRO Function generator	05	02	Yes
8	Synthesis and Characterization of Nano Composites.	TEM, XRD	01	Nil	No

Item No.26

A) Facilities for conducting Practical in the Laboratories

Name of Course: **- Engineering** Class: - **FE Common** Subject: - **Soft Skills**

Name of the Department / Section: -Applied Science Dept./ **English Section**.

Subject wise & laboratory wise Lists of material, machinery, equipment & Instrument required to perform prescribed Practical

Subject: **SS -I**

Sr. No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt. can be Conducted
			Required	Available	
1	Communication Skills and Barriers to Communication	Computers Software Headphones	48 1 48	48 1 48	Yes
2	A Matter of Pronunciation	Computers Software Headphones	48 1 48	48 1 48	Yes
3	Speaking in Public	Computers Software Headphones	48 1 48	48 1 48	Yes
4	E-Presentations	Computers Software Headphones	48 1 48	48 1 48	Yes
5	Comprehension of Passages	Computers Software Headphones	48 1 48	48 1 48	Yes

Subject: **SS –II**

Sr. No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt. can Be conducted
			Required	Available	
1	Understanding of English Language	Computers Software Headphones	48 1 48	48 1 48	Yes
2	Resume and Curriculum Vitae Writing	Computers Software Headphones	48 1 48	48 1 48	No
3	Basics of Group Discussion	Computers Software Headphones	48 1 48	48 1 48	Yes
4	Strategies During the Interview	Computers Software Headphones	48 1 48	48 1 48	Yes
5	Principles of Team-Workmanship	Computers Software Headphones	48 1 48	48 1 48	Yes

B – BIOTECHNOLOGY

FACULTY PROFILE

1. **Name :** Dr. INDRASING DAGADU PATIL
2. **Date of Birth :** 1st June 1972
3. **Educational Qualification :** M.Sc. (Chem.Tech),

   Ph.D. (Chem. Tech.)

4.Work Experience :

1. Teaching 21 yrs
2. Research 13 yrs
3. Industry Nil
4. Others

5. Area of Specializations : Chemical Technology, Polymer Engineering, Bioprocess Engineering

6. Subjects teaching at Under Graduate Level : i) Bioprocess calculations ii) IPR & Entrepreneurship

7. Research guidance :

		No. of papers published in	
Masters's -		**National Journals:**	**00**
Ph.D.	01 Completed		
	03 ongoing	**International Journals: 34**	
		Conferences:	**28**

8.Projects Carried out : - 01 (IEDC from 2012-13 to 2016-17), 02 (RGS&TC 2014 to 2016)

9.Patents :- 00

10.Technology Transfer : - -

11.Research Publications: 33

FACULTY PROFILE

1. **Name :** Mr. Gaurav D. Khodape
2. **Date of Birth :** 05/02/1988
3. **Educational Qualification :** M. Tech. (Biotechnology)
4. **Work Experience :**
   1 Teaching 4 Year
   2 Research ---
   3 Industry -- --
   4 Others-----
5. **Area of Specialization:** Biotechnology
6. **Subjects teaching at**

Under Graduate Level:--i) Bioinformatics ii) Plant Tissue Culture iii) Bioprocess Industrial Economics &Management iv) Bioprocess Modelling and Simulation. v) Computer Application, Bioprocess Equipment Design, vii) Bioprocess Engineering

7. **Research guidance :** Not Applicable

		No. of papers published in
	Masters's: Nil	**National Journals:**
	Ph.D.:- Nil	**International Journals:-** 03
		Conferences: 03
	Projects carried out:	

8.Technology Transfer:
9.Research Publications: 03
10. No. of Books published with details: Nil

FACULTY PROFILE

1. **Name :** Mr. Jayant P.Parpalliwar
2. **Date of Birth :** 22nd July 1986
3. **Educational Qualification :** B.Tech . (Biotechnology) ME(Biotech & Biochem Engg) pursuing
4. **Work Experience :**
   - Teaching 9 Years
   - Research ---
   - Industry -- --
   - Others-----
5. **Area of Specialization:** Biotechnology
6. **Subjects teaching at**

   Under Graduate Level:--

   i)Enzyme Engineering, ii) Molecular Biology, iii) Genetic Engineering iv) Biotechnology of Waste Treatment, v) Pharmaceutical Biotechnology, vi) Bioprocess Industries vii) Downstream Processing
7. **Research guidance :**

		No. of papers published in
	Masters's: Nil	**National Journals: 00**
	Ph.D.:- Nil	**International Journals:- 07**
		Conferences: 12
	Projects carried out:01(IEDC 2013-14 to 2016-17) 02 (RGS&TC 2014 to 2016)	

8. **Technology Transfer:**
9. **Research Publications:** 07
10. **No. of Books published with details:** Nil

FACULTY PROFILE

Name : Ms. Komal D. Patil
Date of Birth : 26th October, 1994.
Educational Qualification : B.E.(Biotechnology)

4.**Work Experience :**

Teaching : 06 months
Research ---
Industry -- --
Others-----

1. Area of Specialization: Biotechnology

6.Subjects teaching at

Under Graduate Level:--i) Cell Biology ii) Soft Skill iii) Biochemistry iv) Bioprocess Instrumentation & Analysis v) Fermentation Technology vi) Biofuel & Alcohol Technology

7. Research guidance : Not Applicable

No. of papers published in

Masters's: Nil

Ph.D.:- Nil

FACULTY PROFILE

1. **Name :** Mrs. Sarika S. Pawar
2. **Date of Birth :** 15/01/1982
3. **Educational Qualification :** M. Tech. (Chemical Engineering)
4. **Work Experience :**
   1 Teaching 9 Year
   2 Research ---
   3 Industry -- --
   4 Others-----
5. **Area of Specialization:** Chemical Engineering
6. **Subjects teaching at**
   Under Graduate Level:--i) Chemical Reaction Engineering ii) Mass Transfer iii) Bioprocess Instrumentation & Analysis iv) Computer Application, v) Process Heat Transfer vi) Unit Operations – I & II

7. **Research guidance :** Not Applicable

		No. of papers published in
	Masters's: Nil	**National Journals:**
	Ph.D.:- Nil	**International Journals:-** 03
		Conferences: 03
	Projects carried out:	

8.Technology Transfer:
9.Research Publications: 03
10. No. of Books published with details: Nil

B – CHEMICAL ENGINEERING

FACULTY PROFILE

1.Name : DR.KISHOR SOPAN WANI

2.Date of Birth : 24th September 1959

3.Educational Qualification: M Tech. (Chemical Technology), D.B.M.,

Ph. D : Biotechnology

4.Work Experience

- Teaching 32 yrs
- Research 12 yrs
- Industry : --
- Others : --

5.Area of Specializations : Chemical Engineering &Technology ,Biotechnology.

6.Subjects teaching at Under Graduate Level :

i) Chemical Reaction Engineering – I ii) Petrochemical Technology

Post Graduate Level: --

7.Research guidance : Recognized Ph.D. guide in Chemical Engineering & Technology of N.M.U., Jalgaon

No. of Ph.D.'s guided: 02, No. of students pursuing Ph.D.: 03, No. of M.E. Projects Guided: 06

No. of papers published in

Masters's : - - - National Journals : 01

Ph.D.: - - -International Journals: 30

-Conferences: 21

8.Projects Carried out : 02

9.Patents : - 01

10.Technology Transfer : - -

11.Research Publications : 31

12.No. of Books published with details : -01, Chapter in Encyclopedia of Bioresorces Technology Published by Haworth Press Publication, New York

FACULTY PROFILE

1.Name : Dr. VIJAY RAMKRISHNA DIWARE

2.Date of Birth : 10th October 1965

3.Educational Qualification : B.Tech. (Chemical),

Ph.D (Chemical Technology)

PGDPM

4.Work Experience

- Teaching 20 yrs
- Research 0 6 yrs
- Industry 0 8 yrs
- Others

5.Area of Specializations : Chemical Technology

6.Subjects teaching at Under Graduate Level :

i) Chemical Reaction Engineering – II ii) Chemical Plant Design and Project Engineering iii) Industrial Pollution Control iv) Computer Aided Process Equipment Design, Modeling and Simulation v) Process Equipment Design– I and II vi) Process Heat Transfer

Post Graduate Level : --

7.Research guidance : Recognized Ph.D. guide in Chemical Engineering & Technology of N.M.U., Jalgaon

No. of students pursuing Ph.D.: 02

No. of papers published in

Masters's : - - - National Journals : ---

Ph.D.: - - -International Journals :25

-Conferences : 23

8.Projects Carried out : - 03

9.Patents : - -

10.Technology Transfer : - -

11.Research Publications : 25

12.No. of Books published with details : - -

FACULTY PROFILE

1.Name: Dr.SANDEEP AVINASH THAKUR

2.Date of Birth : 17th September 1968

3.Educational Qualification : M.Tech. (Chemical Engineering)

MBA, Ph.D (Management)

4.Work Experience :

- Teaching: 19 yrs
- Research 06 yrs
- Industry: 08 yrs
- Others -- -

5.Area of Specializations : Chemical Engineering and Management

6.Subjects teaching at Under Graduate Level :

i) Process Dynamics & Control ii) Mass Transfer – I iii) Process Engineering Economics & Costing iv) Plant Utility

Post Graduate Level : --

7. Research guidance : Not Applicable

No. of papers published in

Masters: - - - National Journals: 01

Ph.D: - - -International Journals: 13

-Conferences : 18

8.Projects Carried out : 02

9.Patents : - -

10.Technology Transfer : - -

11.Research Publications : 14

12.No. of Books published with details : -01

1. **Thakur S.A.** and Gupta R.H. (2011), "Customer Satisfaction and Role of Agents in Life Insurance Industry: A Special Reference to Jalgaon and Akola City of Maharashtra State", Nurturing Service Industry for Economic Development, Himalaya Publishing House, ISBN: 978-93-5024-768-6, Page 274-280.

FACULTY PROFILE

1.Name : VIJAY PRABHAKAR SANGORE

2.Date of Birth : 29th December 1972

3.Educational Qualification : M.Sc. (Poly. Chemistry)

4.Work Experience

- Teaching -20 yrs
- Research – 05 year
- Industry - ---
- Others -- --

5.Area of Specializations: Polymer Chemistry

6.Subjects teaching at Under Graduate Level :

i) Chemical Engineering Processes-I iii) Applied Organic Chemistry iv) Applied Inorganic Chemistry v) Applied Physical Chemistry

Post Graduate Level : - -

7.Research guidance : Not Applicable

No. of papers published in

Masters's : - - National Journals: - -

Ph.D.: - - International Journals: - 04

Conferences: 17

8.Projects Carried out : - - 01

9.Patents : - -

10.Technology Transfer : - -

11.Research Publications : 04

12.No. of Books published with details: - -

FACULTY PROFILE

1 Name : Dr. NIKHIL YESHWANT GHARE

2. Date of Birth : 14 January 1968

3. Educational Qualification : B.Tech. (Chem. Engg.)

M.E (Chem. Engg.)

Ph.D (Chem. Engg.)

4. Work Experience :

- Teaching: 13 yrs Research :06 yrs
- Industry :06 yrs Others : 02 yrs

5. Area of Specializations : Chemical Engineering, Waste Water Engineering

6 Subjects teaching at Under Graduate Level

i) Transport Phenomenon ii) Chemical Engineering Thermodynamics

iii) Mass Transfer-II iv) Process Calculation v) Chemical Engineering Materials vi) Energy Engineering

Post Graduate Level : - -

7. Research guidance : Not Applicable

No. of papers published in

Masters's: - - National Journals : 03

Ph.D: - - International Journals : 04

Conferences :05

8.Projects Carried out : 02

i) College Level : Recovery of Hydrochloric Acid from Pickling Waste Water

ii) IEI Sponsored : Recovery of Acids(Sulphuric/Nitric Acid) from Industrial Waste Water

9. Patents : -- --

10. Technology Transfer : - -

11. Research Publications: 07

12.No of Books published with details : - -

FACULTY PROFILE

1. Name : SHUBHANGI RAJENDRARAO DESHMUKH
2. Date of Birth : 10/10/1986
3. Educational Qualification :B.E.(Chemical Engineering)
   M. Tech (Chemical Engineering)

4.Work Experience:

- Teaching : 2 Years
- Research : 1 Year
- Industry : - - -
- Others : ----

5. Area of Specializations: Chemical Engineering
6. Subjects teaching at Under Graduate Level:

i) Chemical Engineering Material ii) Instrumentation & Instrumental Analysis iii) Industrial pollution & Control iv) Chemical Engineering Process-II v) Mechanical Operation

Post Graduate Level: - -

7. Research guidance: Not Applicable

	No. of papers published in
Bachelor	- National Journals: -- --
Masters's	- National Journals : -- --
Ph.D.	-International Journals : 01
	- Conferences : 03

8.Projects Carried out : - -

9.Patents :- -

10.Technology Transfer : - -

11.Research Publications :

i) International Journals : 01

ii) National Journals :

12.No of Books published with details : - -

SHRAM SADHANA BOMBAY TRUST'S COLLEGE OF ENGINEERING AND TECHNOLOGY, BAMBHORI, JALGAON.

CIVIL ENGINEERING DEPARTMENT

FACULTY PROFILE

1. Name – Dr. M.Husain
2. Date of Birth -5-12-1969
3. Educational Qualification - Ph.D.
4. Work Experience –

   Teaching - 21
   Research – Nil
   Industry – Six months
   Others - Nil

5. Area of Specialization – Environmental Engineering
6. Subject teaching at under graduate level –

1. Environmental Engg I
2. Environmental Engg II.
3. Introduction to Civil Engg and Engineering Mechanics.
4. Research guidance –

   Masters - 24
   Ph.D. - 10

8. Projects carried out –
   1. Project Titled Experimental Investigations on Salt Gradient Solar Pond costing 125000/- under Shram Sadhana Research Promotion Scheme
   2. IEDC – 1lakh -2013-14
   3. VCRMS – NMU, Jalgaon – 48000/- 2014-16
   4. Rajiv Gandhi Science and Technology Commission: 385000/- Rs 2014-16.
9. Patents – Nil

10. Technology Transfer – Nil
11. Research Publication –

    National Journals – Nil

    International Journals -16

    Conferences - 16
12. No. of books published with details - 1 (Everest publication Elements of Civil Engineering)

Signature

FACULTY PROFILE

1. Name – Shivraj L. Patil
2. Date of Birth –1-1-1962
3. Educational Qualification - M.Sc. (Tech)
   Ph. D.
4. Work Experience –

   Teaching - 29

   Industry – Nil

   Others - Nil
5. Area of Specialization – Applied Geology
6. Subject teaching at under graduate level –
   1. Engineering Geology
   2. Watershed management
   3. Introduction to Civil Engg and Engineering Mechanics
   4. Surveying I

7. Research guidance
   – Masters - 02
   Ph.D. - Nil
8. Projects carried out - Nil
9. Patents – Nil
10. Technology Transfer – Nil
11. Research Publication –
    National Journals - Nil
    International Journals - 08
    Conferences - 16
12. No. of books published with details - 1 (Everest Publication, Pune, Elements of Civil Engineering)

Signature

FACULTY PROFILE

1.Name - Sudhakar Bhika Pawar

1. Date of Birth – 5-10-1966
2. Educational Qualification – M.E. (Civil)
3. Work Experience

   Teaching – 27 Yrs.

   Research – 02

   Industry – 1.5 Yrs.

   Others - Nil
4. Area of Specialization – Civil (Construction)
5. Subject teaching at under graduate level –

   1. Surveying II
   2. Building Construction and Material

   At post graduate level – Nil

7. Research guidance –

8. Projects carried out – Nil
9. Patents – Nil
10. Technology Transfer – Nil
11. Research Publication – National Journals - Nil

    International Journals - 02

    Conferences - 03

12. No. of books published with details - Nil

Signature

FACULTY PROFILE

1. Name - Pravin Ashok Shirule.

2. Date of Birth – 07-6-1973

3. Educational Qualification - M .E. (Civil)

- Ph.D. Persuing

4. Work Experience –

Teaching – 20 Yrs.

Industrial: Nil

5. Area of Specialization – Environmental Engineering

6. Subject teaching at under graduate level –

1. Introduction to Civil Engineering and Engineering Mechanics
2. Strength of Materials
3. Advanced Structural Design

7. Research guidance –
M Tech: 10
Ph D: Nil

8. Projects carried out –

Sr No	Title of Project	Duration		Grants Received	Funding Agency
		From	To		
01	"An evolutionary approach to reuse	2013	2014	905000/-	MODROB AICTE,
	environmentally nuisance discarded tyre rubber as concrete aggregate"				New Delhi.
02	Seismic Response Analysis of Base Isolated Multistoried Building.	2013	2015	173000/-	UGC, New Delhi.
03	Investigation of Sound and Heat Insulation Properties of Rubberized Concrete.	2012	2013	100000/-	IEDC, DST New Delhi.
04	Steel Scrap Fiber Reinforced Concrete.	2013	2014	100000/-	IEDC, DST New Delhi.
05	"An evolutionary approach to reuse environmentally nuisance discarded tyre rubber as concrete aggregate"	2012	2014	152000/-	SSRP Scheme of SSBT's C. O. E. T., Bambhori, Jalgaon, (MS)

9. Patents – Nil

10. Technology Transfer – Nil

11. Research Publication –

National Journals - Nil

International Journal: 10

12. No. of books published with details – One ("Elements of Civil engineering and Engineering Mechanics)

Signature

FACULTY PROFILE

1. Name - Farooq I. Chavan
2. Date of Birth – 13-5-1974
3. Educational Qualification - M.E. (Civil)
4. Work Experience –

   Teaching: 19 years

   Industrial: Nil

   Research: Nil

5. Area of Specialization – Environmental Engineering, Structural Engineering
6. Subject teaching at under graduate level –
   1. Introduction to Civil Engineering and Engineering Mechanics
   2. Strength of materials
   3. Water resources engineering II
   4. Fluid Mechanics I
7. Research guidance –
   M Tech: 20
   Ph D: Nil
8. Projects carried out – Nil
9. Patents – Nil
10. Technology Transfer – Nil
11. Research Publication –

    National Journals - Nil

    International Journals - 08
    Conferences - 07

12. No. of books published with details - Nil

Signature

FACULTY PROFILE

1. Name – Jayant N.Kale
2. Date of Birth – 25th Dec 1965
3. Educational Qualification - B.E. (Civil Engineering)
   M E (Construction Technology)
4. Work Experience –
   Teaching – 10years.
   Research – Nil
   Industry – 15 yrs
   Others - Nil
5. Area of Specialization – Construction technology
6. Subject teaching at under graduate level –1. Building construction and material
   2. Construction Management
7. Research guidance –
   Masters - Nil
   Ph.D. - Nil
8. Projects carried out – Nil
9. Patents – Nil
10. Technology Transfer – Nil
11. Research Publication – National Journals - Nil
    International Journals - 03
    Conferences - 03
12. No. of books published with details - Nil

Signature

FACULTY PROFILE

1. Name – Sonali B Patil
2. Date of Birth – 28-11-1979
3. Educational Qualification - B.E. Civil
   M E (Environmental Engineering)
4. Work Experience –
   Teaching – 10 Yrs.
   Research – Nil
   Industry – Nil
   Others - Nil
5. Area of Specialization – Environmental Engineering
6. Subject teaching at under graduate level –
   1. Water Resources Engineering I 2. Fluid Mechanics II
   3. Fluid Mechanics I
7. Research guidance –
   M Tech 03
   Ph D Nil
8. Projects carried out – Nil
9. Patents – Nil
10. Technology Transfer – Nil
11. Research Publication – National Journals - Nil
    International Journals - 05
    Conferences – 03
12. No. of books published with details – Nil

Signature

FACULTY PROFILE

1. Name – Jyoti Raghunath Mali.
2. Date of Birth – 23-04-1971
3. Educational Qualification - M.E. Civil
4. Work Experience –

   Teaching: 10 years
   Industrial: Nil
   Research: Nil

5. Area of Specialization – Environmental engineering

6. Subject teaching at under graduate level –.
   1. Concrete technology
   2. Structural design and drawing I
   3. Building design and drawing

7. Research guidance – ME - 5, Ph D Nil
8. Projects carried out – Nil
9. Patents – Nil
10. Technology Transfer – Nil
11. Research Publication – National Journals - 07
    International Journals - 06
    Conferences - 05
12. No. of books published with details.

Signature

FACULTY PROFILE

1. Name – Mr. Ravinder Kohli
2. Date of Birth -30-07-1970
3. Educational Qualification - M.E. (Environmental Engineering)
4. Work Experience –

   Teaching: 12 years
   Industrial: 11 years

5. Area of Specialization – Environmental Engineering
6. Subject teaching at under graduate level –

1. Industrial Pollution Control
2. Water Resources engineering I

7. Research guidance –

   Masters - Nil

   Ph.D. - Nil

8. Projects carried out – Nil
9. Patents – Nil
10. Technology Transfer – Nil
11. Research Publication –

    National Journals – 03

    International Journals - 02

    Conferences - 12

12. No. of books published with details - Nil

Signature

FACULTY PROFILE

1. Name – Mr. Pankaj Ramdas Punase
2. Date of Birth – 05/08/1991
3. Educational Qualification - M.E. Structural Engineering
4. Work Experience –
   Industrial: Nil

   Teaching: 2 years
5. Area of Specialization – Structural Engineering
6. Subject teaching at under graduate level –
   1. Theory of Structures- II
   2. Structural Design -I and II
7. Research guidance –

   Masters - Nil

   Ph.D. - Nil
8. Projects carried out – Nil

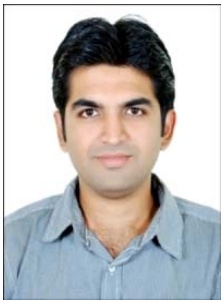
9. Patents – Nil
10. Technology Transfer – Nil
11. Research Publication –

    National Journals – Nil

    International Journals - 05

    Conferences - 03

FACULTY PROFILE



1. Name – Mr. Prathmesh Arvind Wani
2. Date of Birth – 24/10/1993
3. Educational Qualification - M.E. Geotechnical Engineering (pursuing)
4. Work Experience –

Industrial: 2 months

Teaching: 1.5 years

5. Area of Specialization – Geotechnical Engineering
6. Subject teaching at under graduate level –

Geotechnical engineering - I

Watershed management

7. Research guidance –

Masters - Nil

Ph.D. - Nil

8. Projects carried out –

Patents – Nil

Technology Transfer – Nil

Research Publication –

National Journals – 00

International Journals - 00

Conferences – 00

FACULTY PROFILE

1. Name – Miss.Sapana Devidas Patil.
2. Date of Birth – 24/11/1995
3. Educational Qualification - B.E. Civil Engineering
4. Work Experience –
    a. Industrial: Nil
    b. Teaching: 1 years
5. Area of Specialization –
6. Subject teaching at under graduate level –
    i. Strength Of Material
    ii. Construction Management-II
7. Research guidance –
    a. Masters - Nil
    b. Ph.D. - Nil
8. Projects carried out –
    Nil
9. Patents – Nil
10. Technology Transfer – Nil
11. Research Publication –
    a. National Journals – 00
    b. International Journals - 00
    c. Conferences – 00

FACULTY PROFILE

1. Name – Miss.Ankita Sanjeev Sarode.
2. Date of Birth – 24/05/1996
3. Educational Qualification - B.E. Civil Engineering
4. Work Experience –
    a. Industrial: Nil
    b. Teaching: 1 years
5. Area of Specialization –
6. Subject teaching at under graduate level –
    i. Surveying-II
7. Research guidance –
    a. Masters - Nil
    b. Ph.D. - Nil
8. Projects carried out – Nil
9. Patents – Nil
10. Technology Transfer – Nil
11. Research Publication –
    a. National Journals – 00
    b. International Journals - 00
    c. Conferences – 00

FACULTY PROFILE

1. Name – Miss.Reshma Sunil Chaudhari.
2. Date of Birth – 01/06/1995
3. Educational Qualification - B.E. Civil Engineering
4. Work Experience –
    a. Industrial: Nil
    b. Teaching: 1 years
5. Area of Specialization –
6. Subject teaching at under graduate level –
    i. Concrete Technology
    ii. Theory Of Structure II
7. Research guidance –
    a. Masters - Nil
    b. Ph.D. - Nil
8. Projects carried out –
    i.
9. Patents – Nil
10. Technology Transfer – Nil
11. Research Publication –
    a. National Journals – 00
    b. International Journals - 00
    c. Conferences – 00

FACULTY PROFILE

1. Name – MR. Bhupendra H. patil.
2. Date of Birth – 30/09/1995
3. Educational Qualification - B.E. Civil Engineering
4. Work Experience –
    a. Industrial: Nil
    b. Teaching: 1 years
5. Area of Specialization –
6. Subject teaching at under graduate level –
    i. Estimating and Costing
    ii. Water resource Engineering II
7. Research guidance –
    a. Masters - Nil
    b. Ph.D. - Nil
8. Projects carried out –
9. Patents – Nil
10. Technology Transfer – Nil
11. Research Publication –
    a. National Journals – 00
    b. International Journals - 00
    c. Conferences – 00

FACULTY PROFILE

1. Name –Miss Yashsvini V. Jadhav
2. Date of Birth – 03/09/1995
3. Educational Qualification - B.E. Civil Engineering
4. Work Experience –
    a. Industrial: Nil
    b. Teaching: Nil
5. Area of Specialization –
6. Subject teaching at under graduate level –
        i. Building Design And Drawing
7. Research guidance –
    a. Masters - Nil
    b. Ph.D. - Nil
8. Projects carried out – Nil
9. Patents – Nil
10. Technology Transfer – Nil
11. Research Publication –
        a. National Journals – 00
        b. International Journals – 01

FACULTY PROFILE

1. Name – Miss.Kavita Sudhir Chaudhari.
2. Date of Birth – 27/06/1995
3. Educational Qualification - B.E. Civil Engineering
4. Work Experience –
    a. Industrial: Nil
    b. Teaching: 1 years
5. Area of Specialization –
6. Subject teaching at under graduate level –
    i. Theory of structure I
7. Research guidance –
    a. Masters - Nil
    b. Ph.D. - Nil
8. Projects carried out –
    Nil
9. Patents – Nil
10. Technology Transfer – Nil
11. Research Publication –
    a. National Journals – 00
    b. International Journals - 00
    c. Conferences – 00

FACULTY PROFILE

1. Name – Miss.Poonam Rajendra Baviskar
2. Date of Birth – 19/12/1995
3. Educational Qualification - B.E. Civil Engineering
4. Work Experience –
    a. Industrial: Nil
    b. Teaching: 1 years
5. Area of Specialization –
6. Subject teaching at under graduate level –
    i. Concrete Technology
    ii. Theory of structure I
7. Research guidance –
    a. Masters - Nil
    b. Ph.D. - Nil
8. Projects carried out –
    Nil
9. Patents – Nil
10. Technology Transfer – Nil
11. Research Publication –
    a. National Journals – 00
    b. International Journals - 00
    c. Conferences – 00

FACULTY PROFILE

1. Name – Miss.Dipika Purushttam Mali.
2. Date of Birth – 07/10/1995
3. Educational Qualification - B.E. Civil Engineering
4. Work Experience –
    a. Industrial: Nil
    b. Teaching: 1 years
5. Area of Specialization –
6. Subject teaching at under graduate level –
    i. Surveying-II
    ii. Building Construction Techniques and Material
7. Research guidance –
    a. Masters - Nil
    b. Ph.D. - Nil
8. Projects carried out –
9. Patents – Nil
10. Technology Transfer – Nil
11. Research Publication –
    a. National Journals – 00
    b. International Journals – 01
    c. Conferences – 02

FACULTY PROFILE

1. Name – Mr.Mahesh Purushottam koli.
2. Date of Birth – 04/07/1992
3. Educational Qualification - M.E.(C.M and Construction Tech) App.
4. Work Experience –
    a. Industrial: Nil
    b. Teaching: 1.5 years
5. Area of Specialization – C.M and Construction Tech , G.T.E
6. Subject teaching at under graduate level –
    i. Geotechnical Engg 1
7. Research guidance –
    a. Masters - Nil
    b. Ph.D. - Nil
8. Projects carried out –
9. Patents – Nil
10. Technology Transfer – Nil
11. Research Publication –
    a. National Journals – 00
    b. International Journals – 00

FACULTY PROFILE

1. Name – Miss.Pratiksha Subhash Kandare.
2. Date of Birth – 21/03/1996
3. Educational Qualification - B.E. Civil Engineering
4. Work Experience –
    a. Industrial: Nil
    b. Teaching: 1 years
5. Area of Specialization –
6. Subject teaching at under graduate level –
    i. Construction Management-I
    ii. Infrastructure Engineering-II

7.Research guidance –

b. Masters - Nil

c. Ph.D. - Nil

8.Projects carried out –
Nil

9.Patents – Nil

10.Technology Transfer – Nil

11.Research Publication –

a. National Journals – 00
b. International Journals - 00.
c. Conferences – 00

FACULTY PROFILE

1. Name – Abhishek Chandrashekhar Bhat.

2. Date of Birth – 05/04/1992

3 Educational Qualification - B.E. Civil Engineering

4. Work Experience –

Industrial: 1.5 year

Teaching: 0 years

5 Area of Specialization –

6Subject teaching at under graduate level –

Computer Graphics
Structural Design II

7.Research guidance –

Masters - Nil

Ph.D. - Nil

2 Projects carried out –
Nil.

3 Patents – Nil

4 Technology Transfer – Nil

5 Research Publication –

National Journals – 00

International Journals - 00

Conferences – 00

FACULTY PROFILE

1. Name – Miss.Reshma Arun Chaudhari.
2. Date of Birth – 29/06/1993
3. Educational Qualification - B.E. Civil Engineering
4. Work Experience –
    a. Industrial: Nil
    b. Teaching: 1 years
5. Area of Specialization –
6. Subject teaching at under graduate level –
    i. Estimating and Costing
    ii. Theory Of Structure I
    iii. Infrastructural Engineering II
7. Research guidance –
    a. Masters - Nil
    b. Ph.D. - Nil
8. Projects carried out –
9. Patents – Nil
10. Technology Transfer – Nil
11. Research Publication –
    a. National Journals – 00
    b. International Journals - 00
    c. Conferences – 00

FACULTY PROFILE

10.Name – Mr. Shivam Pritamsing Sisodiya

11.Date of Birth – 30/05/1991

12. Educational Qualification-B.E Civil Engineering

13. Work Experience –
Industrial: Nil

Teaching: Nil

6. Area of Specialization – Structural Engineering

7. Subject teaching at under graduate level –

1. Theory of Structures- I
2. Strength of Material

8. Research guidance –

Masters - Nil

Ph.D. - Nil

8. Projects carried out –Nil

12.Patents – Nil

13. Technology Transfer – Nil

14. Research Publication –

National Journals – 00

International Journals - 00

Conferences - 00

FACULTY PROFILE

1. Name – Mr. Sapkale Chandraprakash Gautam
2. Date of Birth – 09/03/1992
3. Educational Qualification-B.E Civil Engineering
4. Work Experience –
   Industrial: Nil

   Teaching: Nil
5. Area of Specialization – Nil
   a. Subject teaching at under graduate level –
      i. Building Design and Drawing Lab
      ii. Testing of Materials Lab
      iii. Computer Graphics Th and Lab
9. Research guidance –

   Masters - Nil

   Ph.D. - Nil
8. Projects carried out –Nil
6. Patents – Nil
7. Technology Transfer – Nil
8. Research Publication –

   National Journals – 00

   International Journals - 00

   Conferences - 00

COMPUTER ENGINEERING DEPARTMENT
FACULTY PROFILE

1.	Name	: Dr. Girish Kumar Patnaik
2.	Date of Birth	: October 9th, 1969
3.	Educational Qualification	: Ph. D. M.E. (Computer Science & Engg.) B.E. (Computer Science & Engg.)
4.	Work Experience	:
	- Teaching	: 28 Years 06 Months
	- Research	: Nil
	- Industry	: Nil
5.	Area of Specialization	: Computer Engineering
6.	Subject Taught at P.G. level	: NIL
	Subject Taught at U.G. level	: Advanced Computer Network, Compiler Design
7.	Research guidance at	
	- Masters's level	: 06
	- Ph.D. level	: Nil
	No. of papers published in	
	- National Journals	: 01
	- International Journals	: 22
	- National Conferences	: NIL
	- International Conferences	: 06
8.	Projects carried out	: Nil
9.	Patents	: Nil
10.	Technology Transfer	: Nil
11.	Research publications	: 23
12.	No. of books published with details	: NIL

Signature

COMPUTER ENGINEERING DEPARTMENT
FACULTY PROFILE

1. Name : Krishnakant Prabhudas Adhiya.

2. Date Of Birth : 07-12-1968

3. Educational Qualification : Ph.D. (Computer Engineering)
M.E. (Computer Science. & Engg.)
B.E. (Computer Engineering)

4. Work Experience :
   - Teaching : 26 Years 05 Months
   - Research : Nil
   - Industry : Nil

5. Area of Specialization : Computer Engineering

6. Subject Taught at P.G. level : Distributed Systems, Parallel Computing
   Subject Taught at U.G. level :Advanced Unix programming, 8085 Microprocessor, Computer Fundamentals, Programming lab-I , Digital System Design, Computer Peripherals & Interfacing , Computer Organization, Microprocessor-I,Microprocessor-II, Operating System, Advanced Computer Architecture , Embedded System, Microprocessor and Microcontroller, Programming Lab-II

7. Research guidance at
   - Master's level : 10 Years
   - Ph.D. level : Nil

   No. of papers published in
   - National Journals : 01
   - International Journals : 30
   - National Conferences : 28
   - International Conferences : 07

8. Projects carried out : Nil
9. Patents : Nil
10. Technology Transfer : Nil
11. Research publications : 31
12. No. of books published with details : 06 (1. Software Engineering,
    2. Computer Organization
    3. Computer Network
    4. Embedded Systems
    5. Microprocessor-III
    6. Advanced Computer Architecture)

Signature

COMPUTER ENGINEERING DEPARTMENT
FACULTY PROFILE

1.	Name	: Manoj Eknath Patil
2.	Date Of Birth	: 06/10/1975
3.	Educational Qualification	: M.Tech. (Computer Science & Engineering) B. E. (Computer Engineering.)
4.	Work Experience	:
	- Teaching	: 15 Years
	- Research	: Nil
	- Industry	: 01 Year 10 Month
5.	Area of Specialization	: Computer Science and Engineering
6.	Subject Taught at P.G. level	: Software Project Management, STQA
	Subject Taught at U.G. level	: Instrumentation and Diagnostic Tools, System Programming, Software Engineering, Software Metrics and Quality Assurance, Embedded System, Mobile Computing
7.	Research guidance at	
	- Masters's level	: 15
	- Ph.D. level	: Nil
	No. of papers published in	
	- National Journals	: 02
	- International Journals	: 11
	- National Conferences	: 07
	- International Conferences	: 08
8.	Projects carried out	: Nil
9.	Patents	: Nil
10.	Technology Transfer	: Nil
11.	Research publications	: 28
12.	No. of books published with details	: 02 (Database Management Systems, Software Metrics and Quality Assurance)

Signature

COMPUTER ENGINEERING DEPARTMENT
FACULTY PROFILE

1. Name : Sandip Shankarrao Patil

2. Date of Birth : 20/01/1980

3. Educational Qualification : M. Tech. Computer Science & Engineering
   : B.E. Computer Engineering
   : Ph. D. (Pursuing)

4. Work Experience :
   - Teaching : 16Years
   - Research : 02 Years
   - Industry : Nil

5. Area of Specialization : Soft Computing

6. Subject Taught at P.G. level : Advanced Software Engineering, Soft Computing

   Subject Taught at U.G. level : Artificial Intelligence, Computer Networks, Advanced Computer Architecture, Data Structures

7. Research guidance at
   - Masters's level : 20 Students
   - Ph.D. level : Nil

   No. of papers published in
   - National Journals : Nil
   - International Journals : 32
   - National Conferences : 20
   - International Conferences : 08

8. Projects carried out : Nil

9. Patents : Nil

10. Technology Transfer : Nil

11. Research publications : 10

12. No. of books published with details : 06 (System Programming, Artificial Intelligence & Neural Networks,Software Matrices & Quality Assurance,Computer Programming, Advanced Computer Architecture, Data Structures)

Signature

COMPUTER ENGINEERING DEPARTMENT
FACULTY PROFILE

1.	Name	:	Ashish Tryambak Bhole
2.	Date Of Birth	:	12/09/1976
3.	Educational Qualification	:	B.E. in Computer Engineering, M. Tech. in CSE, Pursuing Ph.D. in CSE.
4.	Work Experience	:	
	- Teaching	:	15 Years
	- Research	:	08 Years
	- Industry	:	Nil
5.	Area of Specialization	:	Computer Science & Engineering
6.	Subject Taught at P.G. level	:	Network Centric Computing, Web Engg.
	Subject Taught at U.G. level	:	Software Engineering, Object Oriented Modeling & Design, Mobile Computing, Computer Networks, Advanced, Computer Networks, Software Metrics & Quality, Assurance, Microprocessor-III, Internet Security, E-Commerce, Advanced Computer Architecture, Microprocessor-II.
7.	Research guidance at		
	- Masters's level	:	18
	- Ph.D. level	:	Nil
	No. of papers published in		Google: Citation index 60, h-index 4, i10-index 2
	- National Journals	:	01
	- International Journals	:	24
	- National Conferences	:	11
	- International Conferences	:	13
8.	Projects carried out	:	Nil
9.	Patents	:	Nil
10.	Technology Transfer	:	Nil
11.	Research publications	:	25
12.	No. of books published with details	:	Nil

Signature

COMPUTER ENGINEERING DEPARTMENT
FACULTY PROFILE

1.	Name	: Miss. Nilima Prakash Patil
2.	Date Of Birth	: 21/10/1981
3.	Educational Qualification	: M.E.(Computer Science & Engineering)
4.	Work Experience	:
	- Teaching	: 9 years
	- Research	: Nil
	- Industry	: 1 year
5.	Area of Specialization	: B.E.Computer Engineering,
6.	Subject Taught at P.G. level	: Nil
	Subject Taught at U.G. level	: Computer Science-I, Computer Science-II. Programming Lab-I, Programming Lab-II, Microprocessor-I, Computer Graphics System Programming DWM,OOT,IME
7.	Research guidance at	
	- Masters's level	: 02
	- Ph.D. level	: Nil
	No. of papers published in	
	- National Journals	: Nil
	- International Journals	: 4
	- National Conferences	: 4
	- International Conferences	: Nil
8.	Projects carried out	: Nil
9.	Patents	: Nil
10.	Technology Transfer	: Nil
11.	Research publications	: 4
12.	No. of books published with details	: Nil

Signature

COMPUTER ENGINEERING DEPARTMENT
FACULTY PROFILE

1. Name : ShitalAbhimanyuPatil

2. Date Of Birth : 12/10/1982

3. Educational Qualification : B.E.Computer Engineering

4. Work Experience :
   - Teaching : 11 Years 04 Months
   - Research : Nil
   - Industry : Nil

5. Area of Specialization : ----

6. Subject Taught at P.G. level : Nil

   Subject Taught at U.G. level : System Programming,
   Advanced Computer Architecture,
   Computer Graphics,
   Data Structure & files,
   Discrete structure and graph theory,
   Application Development Tools Laboratory
   Programming Lab-I ,
   Programming Lab-II,
   Analysis and design of algorithm,
   Introduction to computing

7. Research guidance at
   - Masters's level : Nil
   - Ph.D. level : Nil

   No. of papers published in
   - National Journals : Nil
   - International Journals : 00
   - National Conferences : 02
   - International Conferences : Nil

8. Projects carried out : Nil

9. Patents : Nil

10. Technology Transfer : Nil

11. Research publications : 01

12. No. of books published with details : Nil

Signature

COMPUTER ENGINEERING DEPARTMENT
FACULTY PROFILE

1.	Name	: Mr. NitinYashwant Suryavanshi
2.	Date Of Birth	: 27/01/1981
3.	Educational Qualification	: M.E.(Computer Science & Engineering)
4.	Work Experience	:
	- Teaching	: 12 Years 5Months
	- Research	: Nil
	- Industry	: Nil
5.	Area of Specialization	: Computer Science And Engineering
6.	Subject Taught at P.G. level	:Nil
	Subject Taught at U.G. level	: Formal Language and Automata Theory, Analysis & Design of Algorithm
7.	Research guidance at	
	- Masters's level	: 04
	- Ph.D. level	: Nil
	No. of papers published in	
	- National Journals	: Nil
	- International Journals	: 05
	- National Conferences	: 03
	- International Conferences	: 01
8.	Projects carried out	: Nil
9.	Patents	: Nil
10.	Technology Transfer	: Nil
11.	Research publications	: 02
12.	No. of books published with details	: 01

Signature

COMPUTER ENGINEERING DEPARTMENT
FACULTY PROFILE

1. Name : Dinesh Dagadu Puri

2. Date Of Birth : 15/04/1982

3. Educational Qualification : M.Tech in Computer Engg.

4. Work Experience :
   - Teaching : 10Years and 6 Months
   - Research : Nil
   - Industry : NIL

5. Area of Specialization : Computer science and Engineering

6. Subject Taught at P.G. level : Software Architecture
   Parallel Computing
   Distributed system

   Subject Taught at P.G. level : Data Communication, Computer network, Distributed System, Mobile computing, Management and information system, System operation and Maintenance, Discrete structure, Computer graphics

7. Research guidance at
   - Masters's level : 03
   - Ph.D. level : Nil

   No. of papers published in
   - National Journals : 01
   - International Journals : 05
   - National Conferences : 02
   - International Conferences : 02

8. Projects carried out : Nil

9. Patents : Nil

10. Technology Transfer : Nil

11. Research publications : Nil

12. No. of books published with details : 01

Signature

COMPUTER ENGINEERING DEPARTMENT
FACULTY PROFILE

1.	Name	: Akash Dnyandeo Waghmare
2.	Date Of Birth	: 08/06/1982
3.	Educational Qualification	: M.E. in CSE, B.E. in CSE
4.	Work Experience	:
	- Teaching	: 11 Years 6 Months
	- Research	: Nil
	- Industry	: Nil
5.	Area of Specialization	: Computer Science & Engineering
6.	Subject Taught at P.G. level	: Advanced Database Management System
	Subject Taught at U.G. level	: Object Oriented Modeling and Design, Advanced Computer Architecture,Computer Network,Data Communication,Advanced Database Management System, Database Management System,Programming Programming Paradigm,Information Retrival
7.	Research guidance at	
	- Masters's level	: 04
	- Ph.D. level	: Nil
	No. of papers published in	
	- National Journals	: Nil
	- International Journals	: 03
	- National Conferences	: 07
	- International Conferences	: 04
8.	Projects carried out	: Nil
9.	Patents	: Nil
10.	Technology Transfer	: Nil
11.	Research publications	: 02
12.	No. of books published with details	: Nil

Signature

COMPUTER ENGINEERING DEPARTMENT
FACULTY PROFILE

1. Name : Dipak Devachand Bage

2. Date Of Birth : 01/02/1982

3. Educational Qualification : M.E. (Computer Science & Engg.)
   B.E. Computer Engineering,
   Diploma in Computer Technology

4. Work Experience :
   - Teaching : 9 year 5 months
   - Research : Nil
   - Industry : Nil

5. Area of Specialization : Image Processing, Embedded System and Operating System.

6. Subject Taught at P.G. level : Nil

   Subject Taught at U.G. level : Microprocessor-II, Microprocessor-III, Microprocessor and Microcontroller Interfacing, Computer Programming, Operating System, Embedded Systems.

7. Research guidance at
   - Masters's level : 01
   - Ph.D. level : Nil

   No. of papers published in
   - National Journals : Nil
   - International Journals : 02
   - National Conferences : 07
   - International Conferences : 02

8. Projects carried out : Nil

9. Patents : Nil

10. Technology Transfer : Nil

11. Research publications : Nil

12. No. of books published with details : 02 (Microprocessor-III, Embedded Systems.)

Signature

COMPUTER ENGINEERING DEPARTMENT
FACULTY PROFILE

1. Name :Miss Priti R.Sharma

2. Date Of Birth : 18/06/82

3. Educational Qualification : M.E. (Computer Science & Engineering)
   B.E. Computer Engineering

4. Work Experience :
   - Teaching : 7 Years
   - Research : Nil
   - Industry : Nil

5. Area of Specialization : Computer science and Engineering

6. Subject Taught at P.G. level : Nil

   Subject Taught at U.G. level :,Discreate structure & Files, Microprocessor -1, Theory of computer Science,Digital System & Microprocessor, Advanced Development Tool Laboratory, Computer Graphics,Operating System,Software Engineering ,Data Warehouse & Mining, Advanced Computer Architecture, Embedded System, Computer Programming.

7. Research guidance at
   - Masters's level : Nil
   - Ph.D. level : Nil

   No. of papers published in
   - National Journals : Nil
   - International Journals : 01
   - National Conferences :02
   - International Conferences : Nil

8. Projects carried out : Nil

9. Patents : Nil

10. Technology Transfer : Nil

11. Research publications : Nil

12. No. of books published with details : Nil

Signature

COMPUTER ENGINEERING DEPARTMENT
FACULTY PROFILE

1.	Name	: Satpalsing D. Rajput
2.	Date Of Birth	: 06/07/1985
3.	Educational Qualification	: M.E (CSE) B.E (Computer Engineering)
4.	Work Experience	:
	- Teaching	: 8 Years
	- Research	: Nil
	- Industry	: 1 Year 2 months
5.	Area of Specialization	: Computer Science & Engineering
6.	Subject Taught at P.G. level	: Nil
	Subject Taught at U.G. level	: Software Engineering(Th+pr), Data Communication(Th+Pr), Introduction to "C" Programming(Th+Pr), Object oriented Technology(Th+Pr), Digital System Design(Th), Computer Graphics(PR), Introduction to Computing(Th+PR)
7.	Research guidance at	
	- Masters's level	: 02
	- Ph.D. level	: Nil
	No. of papers published in	
	- National Journals	: Nil
	- International Journals	: 04
	- National Conferences	: 05
	- International Conferences	: 04
8.	Projects carried out	: Nil
9.	Patents	: Nil
10.	Technology Transfer	: Nil
11.	Research publications	: 04
12.	No. of books published with details	: Nil

Signature

COMPUTER ENGINEERING DEPARTMENT
FACULTY PROFILE

1. Name : Smt.Yogeshwari S. Borse

2. Date Of Birth : 01/06/1979

3. Educational Qualification : M.Tech CSE

4. Work Experience :
   - Teaching : 9 Years
   - Research : Nil
   - Industry : Nil

5. Area of Specialization : Computer Engineering

6. Subject Taught at P.G. level : Nil

   Subject Taught at U.G. level : Computer Network,
   Programming Lab-II,
   Introduction to computing,
   Database Management System
   Computer Programming
   Software metrics and Quality assurance
   Management Information System
   Advanced Unix Programming

7. Research guidance at
   - Masters's level : 03
   - Ph.D. level : Nil

   No. of papers published in
   - National Journals : Nil
   - International Journals : 05
   - National Conferences : 05
   - International Conferences : 02

8. Projects carried out : Nil

9. Patents : Nil

10. Technology Transfer : Nil

11. Research publications : 02

12. No. of books published with details : Nil

Signature

COMPUTER ENGINEERING DEPARTMENT
FACULTY PROFILE

1. Name : Sushant Sudhakar Bahekar

2. Date of Birth : 14-06-1990

3. Educational Qualification : B.E. (Computer), M.Tech. (CSE)

4. Work Experience :
   - Teaching : 3 Year 7 Months
   - Research : Nil
   - Industry : Nil

5. Area of Specialization : Artificial Intelligence, Network Security

6. Subject Taught at P.G. level : Nil
   Subject Taught at U.G. level : Artificial Intelligence, Operating System, Computer Programming, Analysis and Design of Algorithm

7. Research guidance at
   - Master's level : Nil
   - Ph.D. level : Nil

8. No. of papers published in
   - National Journals : 02
   - International Journals : 02
   - National Conferences : 02
   - International Conferences : Nil

9. Projects carried out : Nil

10. Patents : Nil

11. Technology Transfer : Nil

12. Research publications : Nil

13. No. of books published with details : 05 (Computer Programming, Embedded System, Computer Graphics, Computer Organization, Data structure and files)

Signature

COMPUTER ENGINEERING DEPARTMENT
FACULTY PROFILE

1. Name : Dhanashree S. Tayade

2. Date Of Birth : 19-10-1985

3. Educational Qualification : M.E. (Computer Science & Engg.)
   B.E. (Computer Engineering)

4. Work Experience :
   - Teaching : 5.6 years
   - Research : Nil
   - Industry : Nil

5. Area of Specialization : Computer Science and Engineering

6. Subject Taught at P.G. level : Nil

   Subject Taught at U.G. level : Advanced Unix programming(Th+Pr),
   Data Warehousing and Mining(Th+Pr),
   Computer Programming Lab(Pr), Linux Lab(Pr),
   Application Development Lab(Pr),
   Introduction to C Programming(Th+Pr).

7. Research guidance at
   - Masters's level : 01
   - Ph.D. level : Nil

8. No. of papers published in
   - National Journals : 00
   - International Journals : 03
   - National Conferences : 01
   - International Conferences : 01

8. Projects carried out : Nil

9. Patents : Nil

10. Technology Transfer : Nil

11. Research publications : 05

12. No. of books published with details: Nil

Signature

COMPUTER ENGINEERING DEPARTMENT
FACULTY PROFILE

1. Name : Sweta Pandey

2. Date Of Birth : 30/09/1990

3. Educational Qualification : Ph.D (Pursuing)
   M. Tech. (Information Technology)
   B.E. (Information Technology)

4. Work Experience :
   - Teaching : 4 Years 1 month
   - Research : Nil
   - Industry : Nil

5. Area of Specialization : Information Technology

6. Subject Taught at P.G. level : Nil
   Subject Taught at U.G. level : Computer Programming
   Data Structure
   Software Engineering & Project Management
   Discrete Structure & Graph Theory
   Artificial Intelligence & Neural Network
   JAVA
   Advance Development Language
   Management Information System
   E commerce

7. Research guidance at
   - Masters's level : Nil
   - Ph.D. level : Nil

   No. of papers published in
   - National Journals : 00
   - International Journals : 07
   - National Conferences : 00
   - International Conferences : 02

8. Projects carried out : Nil

9. Patents : Nil

10. Technology Transfer : Nil

11. Research publications : 09

12. No. of books published with details : Nil

Signature

COMPUTER ENGINEERING DEPARTMENT
FACULTY PROFILE

1. Name : Mr. Paresh Dharmshil Sharma

2. Date of Birth : February 9th, 1985

3. Educational Qualification : M.Tech. (Software Systems)

   B.E. (Computer Engineering)

4. Work Experience :
   - Teaching : 06 Years 10 Months
   - Research : Nil
   - Industry : Nil

5. Area of Specialization : Computer Engineering
6. Subject Taught at P.G. level : NIL

   Subject Taught at U.G. level : NIL
7. Research guidance at
   - Masters's level : Nil
   - Ph.D. level : Nil

   No. of papers published in
   - National Journals : 03
   - International Journals : 06
   - National Conferences : 04
   - International Conferences : 05

8. Projects carried out : Nil

9. Patents : Nil

10. Technology Transfer : Nil

11. Research publications : Nil

12. No. of books published with details : NIL

Signature

COMPUTER ENGINEERING DEPARTMENT
FACULTY PROFILE

1. Name : Naresh Dnyaneshwar Kale

2. Date of Birth : July 21th, 1991

3. Educational Qualification : M.E. (Computer Science & Engg.)

   B.E. (Information Technology)

4. Work Experience :
   - Teaching : 1.11 Months
   - Research : Nil
   - Industry : Nil

5. Area of Specialization : Computer Engineering
6. Subject Taught at P.G. level : NIL

   Subject Taught at U.G. level : Database Management System, Computer Graphics, MIS,SEPM,AIES.
7. Research guidance at
   - Masters's level : Nil
   - Ph.D. level : Nil

   No. of papers published in
   - National Journals : Nil
   - International Journals : 01
   - National Conferences : Nil
   - International Conferences : Nil

8. Projects carried out : Nil

9. Patents : Nil

10. Technology Transfer : Nil

11. Research publications : 02
12. No. of books published with details : Nil

Signature

COMPUTER ENGINEERING DEPARTMENT
FACULTY PROFILE

1. Name : Archana Raosaheb Shinde

2. Date Of Birth : 25-06-1990

3. Educational Qualification : M.E. (Computer Engineering)

: B.E. (Computer Engineering)

4. Work Experience
   - Teaching : 1.10 Years
   - Research : Nil
   - Industry : 1.8 Years

5. Area of Specialization : Computer Engineering

6. Subject Taught at P.G. level : Nil

   Subject Taught at U.G. level :Artificial Intelligence and Expert System(TH), Object-Oriented Modeling and Design(TH+PR) , Java Programming(TH+PR), C Programming(PR), Advance Development Language Lab, Linux Lab, Principles Of Management.

7. Research guidance at
   - Masters's level : Nil
   - Ph.D. level : Nil

   No. of papers published in

   International Journals : 03
   National Conference : 01

8. Projects carried out : Nil

9. Patents : Nil

10. Technology Transfer : Nil

11. Research publications : 02

12. No. of books published with details : Nil

Signature

COMPUTER ENGINEERING DEPARTMENT
FACULTY PROFILE

1.	Name	: Pooja Vilas Shinde
2.	Date Of Birth	: 06/11/1988
	3. Educational Qualification	: M.Tech(Computer Engineering)
4.	Work Experience	:
	- Teaching	: 3 Years
	- Research	: Nil
	- Industry	: Nil
5.	Area of Specialization	: Computer Engineering
6.	Subject Taught at P.G. level	: Nil
	Subject Taught at U.G. level	: Computer Network,Data Structures, Object Oriented Technology,Computer Organisation
7.	Research guidance at	
	- Masters's level	: Nil
	- Ph.D. level	: Nil
	No. of papers published in	
	- National Journals	: Nil
	- International Journals	: 2
	- National Conferences	: Nil
	- International Conferences	: Nil
8.	Projects carried out	: Nil
9.	Patents	: Nil
10.	Technology Transfer	: Nil
11.	Research publications	: 2
12.	No. of books published with details	: Nil

Signature

COMPUTER ENGINEERING DEPARTMENT
FACULTY PROFILE

1.	Name	: Priyanka Ashok Sonawane
2.	Date Of Birth	: 30/05/1993
	3. Educational Qualification	: M.E(Computer Science & Engineering) B.E(Computer Engineering)
4.	Work Experience	:
	- Teaching	: 9.5 Months
	- Research	: Nil
	- Industry	: Nil
5.	Area of Specialization	: Computer Engineering
6.	Subject Taught at P.G. level	: Nil
	Subject Taught at U.G. level	:Data Structures(PR),Computer Graphics(PR),Computer Network(PR),Software Engineering(PR),
7.	Research guidance at	
	- Masters's level	: Nil
	- Ph.D. level	: Nil
	No. of papers published in	
	- National Journals	: Nil
	- International Journals	: 1
	- National Conferences	: Nil
	- International Conferences	: 1
8.	Projects carried out	: Nil
9.	Patents	: Nil
10.	Technology Transfer	: Nil
11.	Research publications	: Nil
12.	No. of books published with details	: Nil

Signature

COMPUTER ENGINEERING DEPARTMENT
FACULTY PROFILE

1. Name : Pravin Keshav Patil

2. Date Of Birth : 31-08-1991

3. Educational Qualification : M.E. (Computer Computer Science and Engg.)

: B.E. (Computer Engineering)

4. Work Experience
   - Teaching : 4 Years
   - Research : Nil
   - Industry : NIL

5. Area of Specialization : Computer Engineering

6. Subject Taught at P.G. level : Nil

   Subject Taught at U.G. level :MPMC (TH +PR), MPMCI (TH +PR), CO(TH), DSM (TH + PR), E Commerce, ADL(TH+PR), ES(PR), CNS(PR)

7. Research guidance at
   - Masters's level : Nil
   - Ph.D. level : Nil

   No. of papers published in

   International Journals : 07
   National Conference : NIL

8. Projects carried out : Nil

9. Patents : Nil

10. Technology Transfer : Nil

11. Research publications : 07

12. No. of books published with details : Nil

Signature

COMPUTER ENGINEERING DEPARTMENT
FACULTY PROFILE

1. Name : Pramod Ravindra Patil

2. Date of Birth : December 13th, 1990

3. Educational Qualification : M.E. (CSE)
   B.E. (Computer Engg.)

4. Work Experience :
   - Teaching : 2 Years 01 Months
   - Research : Nil
   - Industry : Nil

5. Area of Specialization : Computer Engineering
6. Subject Taught at P.G. level : NIL

   Subject Taught at U.G. level : Image Processing, Operating System, Basic Computer and Information Technology.

7. Research guidance at
   - Masters level : Nil
   - Ph.D. level : Nil

   No. of papers published in
   - National Journals : 00
   - International Journals : 00
   - National Conferences : 00
   - International Conferences : 01

8. Projects carried out : Nil

9. Patents : Nil

10. Technology Transfer : Nil

11. Research publications : 01

12. No. of books published with details : NIL

Signature

COMPUTER ENGINEERING DEPARTMENT
FACULTY PROFILE

1. Name : Mr. Hemant Jagannath Chaudhari

2. Date of Birth : Mar 25th, 1991

3. Educational Qualification Information : M.Tech (Computer Network and Security.)
B.E. (Computer Science & Engg.)

4. Work Experience :
   - Teaching : 2 Years
   - Industry : 1.3 Years(Wipro,HB)

5. Area of Specialization : Computer Engineering
6. Subject Taught at P.G. level : NIL

   Subject Taught at U.G. level : TCP/IP, Web Development Lab, Adhoc Network, C

7. Research guidance at
   - Master's level : Nil
   - Ph.D. level : Nil

   No. of papers published in
   - National Journals : Nil
   - International Journals : 02
   - National Conferences : Nil
   - International Conferences : Nil

8. Projects carried out : Nil

9. Patents : Nil

10. Technology Transfer : Nil

11. Research publications : 02

12. No. of books published with details : NIL

Signature

FACULTY PROFILE

1. NAME : Dr.**Suralkar S. R.**

2. Date Of Birth : 28/10/1966

3. Educational Qualification : BE (Electronics)
   ME (Control & Instru.)
   Ph.D

4. Work Experience (Years) :
   - Teaching : 27Yrs
   - Research : 08 Yrs.
   - Industry : -
   - Others : -

5. Area Of Specializations : Image processing and pattern recognition.

6. Subject Teaching At
   - Under graduation Level : Electronics Measurement, Digital Tech. and App.
   - Post Graduate Level : Advanced Instrumentation System, IP&PR

7. Research Guidance :
   - ❖ Master's : 11
   - ❖ Ph.D. : -
   - No. of paper published in :-
     - ❖ National Journals : --
     - ❖ International Journals : 24
     - ❖ Conference : 16

8. Projects Carried Out : 01

9. Patents : -

10. Technology Transfer : -

11. Research Publications : 24

12. No. Of Books Published - With Details : -

Signature

FACULTY PROFILE

1. NAME : **Deshmukh M.P.**

2. Date Of Birth : 20/06/1966.

3.Educational Qualification : BE (Electronics),
ME (Control & Instru.)
Ph.D (E&TC)

4. Work Experience (Years) :
   - Teaching : 28Yrs
   - Research : -
   - Industry : -
   - Others : Patent Filed

5. Area Of Specializations : E&TC

6. Subject Teaching At
   - Under graduation Level : AE, ECD, EEE,ECM,SDC,ECA
   - Post Graduate Level : -

7. Research Guidance :
   - ❖ Master's : 04
   - ❖ Ph.D. : -
   - No. of paper published in :-
     - ❖ National Journals : -
     - ❖ International Journals : 5
     - ❖ Conference : 3

8. Projects Carried Out : -

9. Patents : One filed

10.Technology Transfer : -

11. Research Publications : 05

12. No. Of Books Published -
With Details : -

Signature

FACULTY PROFILE

1. NAME : Adokar D. U.

2. Date Of Birth : 31/03/1965.

3.Educational Qualification : BE (Electronics),
ME (Electronics)
Ph.D (Pursuing)

4. Work Experience (Years) :
- Teaching : 29Yrs
- Research : -
- Industry : -
- Others : -

5. Area Of Specializations : Multimedia Processing, Compression

6. Subject Teaching At
- Under graduation Level : DTA, MP, MPI, EEEE, Analog Electronics
- Post Graduate Level : DSD, MPMC

7. Research Guidance :
- ❖ Master's : 03
- ❖ Ph.D. : -
- No. of paper published in :-
  - ❖ National Journals : -
  - ❖ International Journals : 5
  - ❖ Conference : 3

8. Projects Carried Out : 04 ongoing and 09 completed at UG level, one IEDC Project

9. Patents : -

10.Technology Transfer : one project of final year B.E student

11. Research Publications : Under Progress

12. No. Of Books Published -
With Details : -

Signature

FACULTY PROFILE

1. NAME : **DESHMUKH V. M.**

2. Date Of Birth : 17/06/1965

3. Educational Qualification : B.E.(Electronics),
   M.E.(Control Systems)
   Ph.D(Electronics)

4. Work Experience (Years) :
   - Teaching : - 27Yrs
   - Research : -
   - Industry : -
   - Others : - 7 Yrs (Visiting lecturer)

5. Area Of Specializations : Electromagnetic & signal system

6. Subject Teaching At
   a. Under graduation Level : EME,NAS, EEE
   b. Post Graduate Level :

7. Research Guidance :
   - ❖ Master's : 04
   - ❖ Ph.D. : -
   - No. of paper published in :-
     - ❖ National Journals : - 02
     - ❖ International Journals : - 07
     - ❖ Conference : - 14

8. Projects Carried Out : -

9. Patents : -

10. Technology Transfer : -

11. Research Publications : 03

12. No. Of Books Published -
    With Details :

Signature

FACULTY PROFILE

1. NAME : **Kazi Nafees Ahmad M**.

2. Date Of Birth : 22/06/1972

3. Educational Qualification : B.E(Electronics),
   ME (Electronics)
   Ph.D (Pursuing)

4. Work Experience (Years) :
   - Teaching : 20Yrs
   - Research : -
   - Industry : 3Yrs
   - Others : -

5. Area Of Specializations : T.V. Engg, Computer networks

6. Subject Teaching At
   - Under graduation Level : CCN, TNM

Post Graduate Level : Advanced Computer Network

7. Research Guidance :
   - ❖ Master's : 05
   - ❖ Ph.D. : -

   No. of paper published in :-
   - ❖ National Journals : -
   - ❖ International Journals : 05
   - ❖ Conference : 14

8. Projects Carried Out : -

9. Patents : -

10. Technology Transfer : -

11. Research Publications : -

12. No. Of Books Published - 03 i) CCN ii)AICA
    With Details :

Signature

FACULTY PROFILE

1. NAME : **Wani Amol C.**

2. Date Of Birth : 30/07/1976

3. Educational Qualification : B.E.(Electronics),
M.E. (Electronics)

4. Work Experience (Years) :
   - Teaching : 17 Yrs
   - Research : -
   - Industry : -
   - Others : -

5. Area Of Specializations : Basic Electronics, Circuit Design and Communication.

6. Subject Teaching At
   - Under graduation Level : SSDC I, SSDC II, EEEE, ECD etc.
   - Post Graduate Level : Microelectronics Circuit Design

7. Research Guidance :
   - ❖ Master's : 03
   - ❖ Ph.D. : -

   No. of paper published in :-
   - ❖ National Journals : -
   - ❖ International Journals : 03
   - ❖ Conference : 06

8. Projects Carried Out : -

9. Patents : -

10. Technology Transfer : -

11. Research Publications : 03

12. No. Of Books Published 02

    With Details : Elements of Electrical Electronics Engineering. Prakash Publication
    Electronics Circuit Design – Prakash Publication

Signature

FACULTY PROFILE

1. NAME : **Karode Atul H.**

2. Date Of Birth : 01/06/1976

3 Educational Qualification : M.E (Digital Electronics),

4. Work Experience (Years) :
   - Teaching : 15 Yrs
   - Research : -
   - Industry : 2Yrs
   - Others : -

5. Area Of Specializations : - Image processing and pattern rec.

6 Subject Teaching At
   - Under graduation Level : Digital Electronics& Application, CDIT
   - , EM, Industrial Management.
   - Post Graduate Level : Advanced Instrumentation System, IP&PR, Advance digital communication

7. Research Guidance :
   - ❖ Master's : 14
   - ❖ Ph.D. : -
   - No. of paper published in :-
     - ❖ National Journals : -
     - ❖ International Journals : 16
     - ❖ Conference : 10

8. Projects Carried Out : -

9. Patents : -

10.Technology Transfer : -

11. Research Publications : 14

12. No. Of Books Published - With Details :

Signature

FACULTY PROFILE

1. NAME : **Dr.Zope Pankaj H.**

2. Date Of Birth : 24/06/1975

3. Educational Qualification : Ph.D (E&TC)
   ME (Digital Electronics),
   B.E(Indust. Electronics),
   C-DAC

4. Work Experience (Years) :
   - Teaching : 17
   - Research :
   - Industry : 01
   - Others : -

5. Area Of Specializations : Electronics and Nano Electronics and Nano Technology

6 Subject Teaching At
   - Under graduation Level : Microprocessor and Microcontroller, Embedded System
   - Post Graduate Level : VLSI-D,ADSP

7. Research Guidance :
   - ❖ Master's : - 15
   - ❖ Ph.D. : -

   No. of paper published in :-
   - ❖ National Journals : -
   - ❖ International Journals : 40
   - ❖ Conference : 24

8. Projects Carried Out : 06

9. Patents : -

10. Technology Transfer : -

11. Research Publications : 40

12. No. Of Books Published With Details : 01

Signature

FACULTY PROFILE

1. NAME : Surendra P.Ramteke.

2. Date of Birth : 31.03.1979

3. Educational Qualification: M.E (Digital Electronics)
BE E&TC, PhD (Pursuing)

4. Work Experience (Years) :
   - Teaching : 14 Yrs
   - Research : -
   - Industry : -
   - Others : -

5. Area Of Specializations : Digital Image processing, Pattern Recognition

6 Subjects Teaching At
   - Under graduation Level : Radiation&Microwave Techniques,Analog Communication,Digital Electronics,digital Image Processing , Microprocessor, Communication System I
   - Post Graduate Level: Advanced Digital Communication, Digital Systrem Design

7. Research Guidance :
   - ❖ Master's : 09
   - ❖ Ph.D. : -

No. of paper published in :-
   - ❖ National Journals : -
   - ❖ International Journals : 10
   - ❖ Conference : 13

8. Projects Carried Out : 01

9. Patents : -

10.Technology Transfer : -

11. Research Publications : 10

12. No. Of Books Published - 01
With Details :

Signature

FACULTY PROFILE

1. NAME : Sunil K. Khode

2. Date Of Birth : 01.01.1979

3. Educational Qualification :
M.E(Digital Electronics.)

4. Work Experience (Years) :
- Teaching : 12.5 Yrs
- Research : -
- Industry : -
- Others : -

5. Area Of Specializations : Digital Electronics

6 Subject Teaching At
Under graduation Level : Analog & Digital Electronics,IED,Digital Communication,Information Theory & Coding Tech.,NL,PE , EEEE , DSP

- Post Graduate Level : -

7. Research Guidance :
- ❖ Master's : -
- ❖ Ph.D. : -

No. of paper published in :-
- ❖ National Journals : -
- ❖ International Journals : 03
- ❖ Conference : 08

8. Projects Carried Out : -

9. Patents : -

10.Technology Transfer : -

11. Research Publications : -

12. No. Of Books Published With Details :

Signature

FACULTY PROFILE

1. NAME : Deshmukh Mayuri T.

2. Date Of Birth : 23-09-84

3. Educational Qualification : M.E E&TC (Digital electronics)

4. Work Experience (Years) :
   - Teaching : 10.5Yrs.
   - Research : -
   - Industry : -
   - Others : -
   -

5. Area Of Specializations :- - Digital Electronics

6.Subject Teaching At
   - Under graduation Level : Telematics,EEE,DC, LIC, CS-1,IM
   - Post Graduate Level : -

7. Research Guidance : -
   - ❖ Master's : -
   - ❖ Ph.D. : -

No. of paper published in :-
- ❖ National Journals : Nil
- ❖ International Journals : 03
- ❖ Conference : 02

8. Projects Carried Out : -

9. Patents : -

10.Technology Transfer : -

11. Research Publications : 03

12. No. Of Books Published With Details : -

Signature

FACULTY PROFILE

1. NAME : Mr.Ashish R Bari

2. Date Of Birth : 26-04-81

3. Educational Qualification : M.E(Digital Electronics)

4 Work Experience (Years) :

- Teaching : 10.5Yrs
- Research : -
- Industry : -
- Others : -
-

5. Area Of Specializations :- -

6.Subject Teaching At

- Under graduation Level : EEE , ECM ,AICA , LIC, CSII, ADE , EEEE, AVE
- Post Graduate Level :

7. Research Guidance :

- ❖ Master's :
- ❖ Ph.D. :

No. of paper published in :-

- ❖ National Journals : -
- ❖ International Journals : -
- ❖ Conference : 04

8. Projects Carried Out : -

9. Patents : -

10.Technology Transfer : -

11. Research Publications : 04

12. No. Of Books Published -
With Details :

Signature

FACULTY PROFILE

1. NAME : Dipeeka R. Patil

2. Date Of Birth : 25-06-1981

3. Educational Qualification : M.E(Digital Electronics)

4. Work Experience (Years) :
   - Teaching : 11.5years
   - Research : -
   - Industry : 1.5 years
   - Others : -

5. Area Of Specializations : Digital Electronics

6.Subject Teaching At
   Under graduation Level : FCS, EEEE, NAS, AC
   - Post Graduate Level : -

7. Research Guidance :
   - ❖ Master's : -
   - ❖ Ph.D. : -
   - No. of paper published in :-
     - ❖ National Journals : -
     - ❖ International Journals : 02
     - ❖ Conference : 02

8. Projects Carried Out : -

9. Patents : -

10.Technology Transfer : -

11. Research Publications : 02

12. No. Of Books Published -
    With Details :

Signature

FACULTY PROFILE

1. NAME : Priyanka M. Shanbhag

2. Date Of Birth : 30/ 04/ 1988
3. Educational Qualification : M.E. (Digital Electronics)
4. Work Experience (Years) :
   - Teaching : 8.5Yrs
   - Research : -
   - Industry : -
   - Others : -

5. Area Of Specializations : - Digital Electronics

6. Subject Teaching At
   Under graduation Level : ADE, EEEE, SS I
   Post Graduate Level : -

7. Research Guidance :
   - ❖ Master's : -
   - ❖ Ph.D. : -
   - No. of paper published in :-
     - ❖ National Journals : -
     - ❖ International Journals : 03
     - ❖ Conference : 02

8. Projects Carried Out : -

9. Patents : -

10. Technology Transfer : -

11. Research Publications : 01

12. No. Of Books Published - With Details : -

Signature

FACULTY PROFILE

1. NAME : Shailendra A.Hingonekar

2. Date Of Birth : 06/03/1969

3. Educational Qualification: B.E(E&Tc)
   M.Tech (Electronics Design Technology)

4. Work Experience (Years) :
   - Teaching : 16Yrs
   - Research : -
   - Industry : 07Yrs
   - Others : -

5. Area Of Specializations : Electronics design technology

6. Subject Teaching At
   Under graduation Level : FOC , TV&CE, Automotive Electronics
   - Post Graduate Level :

7. Research Guidance :
   - ❖ Master's : -
   - ❖ Ph.D. : -
   - No. of paper published in :-
     - ❖ National Journals : -
     - ❖ International Journals : 01
     - ❖ Conference : 02

8. Projects Carried Out : -

9. Patents : -

10. Technology Transfer : -

11. Research Publications : 01

12. No. Of Books Published -
    With Details : -

Signature

FACULTY PROFILE

1. NAME : Yogesh S Santwani

2. Date Of Birth : 04/05/1988

3. Educational Qualification : M.E. (Digital Electronics)

4. Work Experience (Years) :
   - Teaching : 8 YrS
   - Research : -
   - Industry : 0.5Yrs
   - Others : -

5. Area Of Specializations : Antenna Design, VLSI

6.Subject Teaching At
   Under graduation Level : EMIE(Mech), NAS,LIC, FOC, AVE, VLSI Design, S&MC, Soft Skill-III
   - Post Graduate Level : -

7. Research Guidance :
   - ❖ Master's :
   - ❖ Ph.D. :
   - No. of paper published in :-
     - ❖ National Journals : Nil
     - ❖ International Journals : 02
     - ❖ Conference : 02

8. Projects Carried Out : -

9. Patents : -

10.Technology Transfer : -

11. Research Publications : -

12. No. Of Books Published -
    With Details : -

Signature

FACULTY PROFILE

1. NAME : Kalpana U. Rathod

2. Date Of Birth : 26/12/1992.

3.Educational Qualification : BE(Electronics& Telecommunication),

M.Tech.(Digital System)

4. Work Experience (Years) :
   - Teaching : 1.6Yrs
   - Research : -
   - Industry : -
   - Others : -

5. Area Of Specializations : Digital System

6. Subject Teaching At
   - Under graduation Level : EMF, MCIA, DSM, IEE, SMC
   - Post Graduate Level : -

7. Research Guidance :
   - ❖ Master's : -
   - ❖ Ph.D. : -
   - No. of paper published in :-
     - ❖ National Journals : -
     - ❖ International Journals : 03
     - ❖ Conference : -

8. Projects Carried Out : -

9. Patents : -

10.Technology Transfer : -

11. Research Publications : 03

12. No. Of Books Published - With Details : -

Signature

FACULTY PROFILE

1. NAME : Shweta R. Patil

2. Date Of Birth : 30/12/1991.

3.Educational Qualification : BE(Electronics& Telecommunication),

M.E.(Electronics& Telecommunication)

4. Work Experience (Years) :
   - Teaching : 1.6Yrs
   - Research : -
   - Industry : -
   - Others : -

5. Area Of Specializations : Communication System

6. Subject Teaching At
   - Under graduation Level : Telematics, CCN, CP-II
   - Post Graduate Level : -

7. Research Guidance :
   - ❖ Master's : -
   - ❖ Ph.D. : -
   - No. of paper published in :-
     - ❖ National Journals : 01
     - ❖ International Journals : 01
     - ❖ Conference : -

8. Projects Carried Out : -

9. Patents : -

10.Technology Transfer : -

11. Research Publications : 02

12. No. Of Books Published - With Details : -

Signature

FACULTY PROFILE

1. NAME : Harshal Arun Dahake

2. Date Of Birth : 18/09/1980.

3.Educational Qualification : BE(Electronics& Telecommunication),
M.E.(Electronics& Telecommunication)

4. Work Experience (Years) :
   - Teaching : 5 Yrs
   - Research : -
   - Industry : - 2 Yrs
   - Others : -

5. Area Of Specializations : Digital Electronics

6. Subject Teaching At
   - Under graduation Level : Microprocessor, EDC
   - Post Graduate Level : -

7. Research Guidance :
   - ❖ Master's : -
   - ❖ Ph.D. : -
   - No. of paper published in :-
     - ❖ National Journals :
     - ❖ International Journals : 02
     - ❖ Conference : -

8. Projects Carried Out : -

9. Patents : -

10.Technology Transfer : -

11. Research Publications : 02

12. No. Of Books Published - With Details : -

Signature

FACULTY PROFILE

1. NAME : Mitali V. Shewale

2. Date Of Birth : 20/05/1994.

3.Educational Qualification : BE(Electronics& Telecommunication), M.Tech(Digital System)

4. Work Experience (Years) :
   - Teaching : 6 Months
   - Research : -
   - Industry : -
   - Others : -

5. Area Of Specializations : Digital System, VLSI and DSP

6. Subject Teaching At
   - Under graduation Level : FOC, CP-II, AVE
   - Post Graduate Level : -

7. Research Guidance :
   - ❖ Master's : -
   - ❖ Ph.D. : -
   - No. of paper published in :-
     - ❖ National Journals :
     - ❖ International Journals : 04
     - ❖ Conference : -

8. Projects Carried Out : -

9. Patents : -

10.Technology Transfer : -

11. Research Publications : 04

12. No. Of Books Published - With Details : -

Signature

ELECTRICAL ENGINEERING DEPARTMENT

PROFILE OF FACULTY

1. Name : Dr. Paresh J. Shah
2. Date of Birth : 11/08/1967
3. Educational Qualification: Ph.D. (Electrical Engineering)
   M.E. Electrical Engineering (P.E.)
   BE (Industrial Electronics)
4. Work Experienced:
   a. Teaching : 27 Years
   b. Research : 05 Years
   c. Industry : 01 Years
   d. Other : NIL
5. Area of Specialization : Power Quality, Power Electronics & VLSI Design
   Subjects teaching at UG level : Power Electronic, Analog & Digital Electronics
   Subjects teaching at PG level : DSP
6. Research's Guidance Master's : 12
   PhD : Nil
7. No. of paper published in
   a. National journal : 01
   b. Internal national journal : 24
   c. International Conference : 09
   d. National Conference : 17
8. Project carried out : 01
9. Patents : Nil
10. Technology Transfer : Nil
11. Research publication : 51
12. No. of book published with detail: 02

Signature

PROFILE OF FACULTY

1. Name : Dr. P. V. Thakre
2. Date of Birth : 19/07/1970
3. Educational Qualification: Ph.D. (Energy Engineering)
   M. Tech. (Energy Engineering)
   BE (Electronics Engineering)
4. Work Experienced:
   a. Teaching : 22 Years
   b. Research : 06 Years
   c. Industry : NIL
   d. Other : NIL
5. Area of Specialization : Solar Photo Voltaic
   Subjects teaching at UG level : NA, IDC
   Subjects teaching at PG level : DSP
6. Research's Guidance Master's : 05
   PhD : Nil
7. No. of paper published in
   a. National journal : Nil
   b. Internal national journal : 10
   c. International Conference : 07
   d. National Conference : 01
8. Project carried out : 01
9. Patents : Nil
10. Technology Transfer : Nil
11. Research publication : 18
12. No. of book published with detail : Nil

Signature

PROFILE OF FACULTY

1. Name : Vijay S Pawar
2. Date of Birth : 08/04/1971
3. Educational Qualification: BE Electrical, ME (Power System)
4. Work Experienced:
    a. Teaching : 22Years
    b. Research : Nil
    c. Industry : Nil
    d. Other : Nil
5. Area of Specialization: Electrical Power System
    Subjects teaching at UG level: CS, PSDP, IEE
    Subjects teaching at PG level: PSD, PSOT
6. Research's Guidance Master's : 04
    PhD : Nil
7. No. of paper published in
    a. National journal : Nil
    b. Internal national journal : 04
    c. International Conference : 07
    d. National Conference : 09
8. Project carried out : 01
9. Patents : Nil
10. Technology Transfer: Nil
11. Research publication: 20
12. No. of book published with detail: Nil

Signature

PROFILE OF FACULTY

1. Name : M Mujtahid Ansari
2. Date of Birth : 11/10/1973
3. Educational Qualification: BE Electrical, ME (EPS)
4. Work Experienced:
   - a Teaching : 18 Years
   - b Research : Nil
   - c Industry : 03 Year
   - d Other
5. Area of Specialization : Electrical Power System
   Subjects teaching at UG level : EM/C-I, EM/C-II, PSS, PSOC & EAC
   Subjects teaching at PG level : PSD, HVPT
6. Research's Guidance Master's : 04
   PhD : Nil
7. No. of paper published in
   - a. National journal : Nil
   - b. Internal national journal : 11
   - c. Internal national Conference : 03
   - d. National Conference : 02
8. Project carried out : 01(MODROBS)
9. Patents : Nil
10. Technology Transfer : Nil
11. Research publication : 16
12. No. of book published with detail : 01, Element of Electrical Engineering
    Vrinda Publication, Jalgaon.

Signature

PROFILE OF FACULTY

1. Name : Suhas Manohar Shembekar
2. Date of Birth: 31/08 /1976
3. Educational Qualification: BE Electrical, ME (EPS)
4. Work Experienced:
   a. Teaching : 18 Years
   b. Research : Nil
   c. Industry : Nil
   d. Other : Nil
5. Area of Specialization : Electrical Power System

Subjects teaching at UG : PS-II, PSOC, SGP, EIED

Subjects teaching at PG level : PSMC, FACTS&PQ

6. Research's Guidance Master's : 05
   PhD : Nil
7. No .of paper published in
   a. National journal : 00
   b. Internal national journal : 15
   c. Internal national Conference: 08
   d. National Conference : 01

8. Project carried out : Nil
9. Patents : Nil
10. Technology Transfer : Nil
11. Research publication : 24
12. No. of book published with detail: Nil

Signature

PROFILE OF FACULTY

1. Name : Dhanesh S. Patil
2. Date of Birth : 23 /07 /1983
3. Educational Qualification: ME (EPS)
   BE Electrical
4. Work Experienced:
   a. Teaching : 10 Year
   b. Research : Nil
   c. Industry : Nil
   d. Other : Nil
5. Area of Specialization : Electrical Power System
   Subjects teaching at UG level: EEM, HVE, NT, EM-II, IEE
   Subjects teaching at PG level: Nil
6. Research's Guidance Master's : Nil
   PhD : Nil
7. No .of paper published in
   a. National journal : Nil
   b. Internal national journal : 03
   c. Internal national Conference : 01
   d. National Conference : Nil
8. Project carried out : Nil
9. Patents : Nil
10. Technology Transfer : Nil
11. Research publication : 04
12. No. of book published with detail: Nil

Signature

PROFILE OF FACULTY

1. Name : Mahajan Nilesh Suresh
2. Date of Birth: 17/05/1986
3. Educational Qualification: M.E. (EPS)
   BE Electrical
4. Work Experienced:
   a. Teaching : 06 Year
   b. Research : Nil
   c. Industry : 01 Year
   d. Other : Nil
5. Area of Specialization : Electrical Power System
   Subjects teaching at UG level: PE, CMPS, IDC, EME, EMD, FACTS&PQ, EEEE
   Subjects teaching at PG level: Power system Planning & Reliability, Computer Methods on Power System,
6. Research's Guidance Master's : Nil
   PhD : Nil
7. No. of paper published in
   a. National journal : Nil
   b. Internal national journal : 08
   c. Internal national Conference : 02
   d. National Conference : 01
8. Project carried out : Nil
9. Patents : Nil
10. Technology Transfer : Nil
11. Research publication : 04
12. No. of book published with detail: Nil

Signature

PROFILE OF FACULTY

1. Name : Ms. Ashwini Kishor Khairnar
2. Date of Birth: 07/12/1992
3. Educational Qualification: ME Electrical Power System
   BE Electrical Engineering
4. Work Experienced:
   a. Teaching : 3.5 Year
   b. Research : Nil
   c. Industry : Nil
   d. Other : Nil
5. Area of Specialization : Electrical Power System
   Subjects teaching at UG level: PS-I, PS-II, CS, EEM, IEE, NA, PSDP
   Subjects teaching at PG level: Nil
6. Research's Guidance Master's : Nil
   PhD : Nil
7. No. of paper published in
   a. National journal : 00
   b. Internal national journal : 04
   c. Internal national Conference : 03
   d. National Conference : 01

8. Project carried out : Nil
9 . Patents : Nil
10. Technology Transfer : Nil
11. Research publication :08
12. No. of book published with detail: Nil

Signature

PROFILE OF FACULTY

1. Name : Ms. Abhilasha N. Salunkhe
2. Date of Birth: 04/10/1993
3. Educational Qualification: ME (Electrical Power System – Pursing)
   BE Electrical Engineering
4. Work Experienced:
   a. Teaching : 01 Year
   b. Research : Nil
   c. Industry : Nil
   d. Other : Nil
5. Area of Specialization : Electrical Power System
   Subjects teaching at UG level: MPMC, IEE, SS-III, CP-MATLAB
   Subjects teaching at PG level: Nil
6. Research's Guidance Master's : Nil
   PhD : Nil
7. No. of paper published in
   a. National journal : Nil
   b. Internal national journal : Nil
   c. Internal national Conference : Nil
   d. National Conference : Nil
8. Project carried out : Nil
9. Patents : Nil
10. Technology Transfer : Nil
11. Research publication : Nil
12. No. of book published with detail: Nil

Signature

PROFILE OF FACULTY

1. Name : Ms. Manisha Shivaji Thakare
2. Date of Birth: 01/03/1994
3. Educational Qualification: BE Electrical Engineering
4. Work Experienced:
   a. Teaching : 01 Year
   b. Research : Nil
   c. Industry : Nil
   d. Other : Nil
5. Area of Specialization : Electrical Engineering
   Subjects teaching at UG level: EDP, IEE, SA-I,
   Subjects teaching at PG level: Nil
6. Research's Guidance Master's : Nil
   PhD : Nil
7. No. of paper published in
   a. National journal : Nil
   b. Internal national journal : Nil
   c. Internal national Conference : Nil
   d. National Conference : Nil

8. Project carried out : Nil
9 . Patents : Nil
10. Technology Transfer : Nil
11. Research publication : Nil
12. No. of book published with detail: Nil

Signature

PROFILE OF FACULTY

1. Name : Ms. Dipali B. Pawar
2. Date of Birth: 01/08/1995
3. Educational Qualification: BE Electrical Engineering
4. Work Experienced:
   a. Teaching : 06 Months
   b. Research : Nil
   c. Industry : Nil
   d. Other : Nil
5. Area of Specialization : Electrical Power System
   Subjects teaching at UG level: IEE, EDP, EW
   Subjects teaching at PG level: Nil
6. Research's Guidance Master's : Nil
   PhD : Nil
7. No. of paper published in
   a. National journal : Nil
   b. Internal national journal : Nil
   c. Internal national Conference : Nil
   d. National Conference : Nil
8. Project carried out : Nil
9. Patents : Nil
10. Technology Transfer : Nil
11. Research publication : Nil
12. No. of book published with detail: Nil

Signature

PROFILE OF FACULTY

1. Name : Ms. Nidhi D. Solanki
2. Date of Birth: 01/01/1995
3. Educational Qualification: ME (Pursuing - Digital Electronics)
   BE Electronics & Communication Engineering
4. Work Experienced:
   a. Teaching : 06 Months
   b. Research : Nil
   c. Industry : Nil
   d. Other : Nil
5. Area of Specialization : Digital Electronics
   Subjects teaching at UG level: IEE, CP-MATLAB
   Subjects teaching at PG level: Nil
6. Research's Guidance Master's : Nil
   PhD : Nil
7. No. of paper published in
   a. National journal : Nil
   b. Internal national journal : Nil
   c. Internal national Conference : Nil
   d. National Conference : Nil
8. Project carried out : Nil
9. Patents : Nil
10. Technology Transfer : Nil
11. Research publication : Nil
12. No. of book published with detail: Nil

Signature

PROFILE OF FACULTY

1. Name : Mr. Prashant R. Patil
2. Date of Birth: 01/06/1994
3. Educational Qualification: BE Electrical Engineering
4. Work Experienced:
   - a. Teaching : 06 Months
   - b. Research : Nil
   - c. Industry : Nil
   - d. Other : Nil
5. Area of Specialization : Electrical Engineering
   Subjects teaching at UG level: EM/C-II, IEE, BEDC
   Subjects teaching at PG level: Nil
6. Research's Guidance Master's : Nil
   PhD : Nil
7. No. of paper published in
   - a. National journal : Nil
   - b. Internal national journal : Nil
   - c. Internal national Conference : Nil
   - d. National Conference : Nil
8. Project carried out : Nil
9. Patents : Nil
10. Technology Transfer : Nil
11. Research publication : Nil
12. No. of book published with detail: Nil

Signature

PROFILE OF FACULTY

1. Name : Mr. Bharat D. Patil
2. Date of Birth: 16/08/1994
3. Educational Qualification: BE Electrical Engineering
4. Work Experienced:
    a. Teaching : 06 Months
    b. Research : Nil
    c. Industry : Nil
    d. Other : Nil
5. Area of Specialization : Electrical Engineering
   Subjects teaching at UG level: IEE, EM-I, BEDC
   Subjects teaching at PG level: Nil
6. Research's Guidance Master's : Nil
   PhD : Nil
7. No. of paper published in
    a. National journal : Nil
    b. Internal national journal : Nil
    c. Internal national Conference : Nil
    d. National Conference : Nil

8. Project carried out : Nil
9 . Patents : Nil
10. Technology Transfer : Nil
11. Research publication : Nil
12. No. of book published with detail: Nil

Signature

FACULTY PROFILE

1. Name : Dr. Umesh S. Bhadade

2. Date of Birth : 16/08/1971

3. Educational Qualification : B.E., M.E. (Electronics), PhD(Electrical Engg.)

4. Work Experience : Teaching : 24 Years

- Research : Nil

- Industry : Nil

5. Area of Specialization : Data Compression

6. Subject Taught at P.G. level : Software Project Management, Digital System Design

Subject Taught at U.G. level : Computer Network, Programming Paradigm & Methodology, Microprocessor (8085/8086/80386),Microcontrollers, Software Engineering, Data Structure, DBMS, OOT, FLAT

7. Research guidance at- Master's level : 5

- Ph.D. level : 07 Guide (Pursuing) + 02 Co-Guide (Pursuing)

No. Papers published/presented in

- National Journal : Nil

- International Journal : 15

- National Conferences : 15

- International Conferences : 19

8. Projects carried out: 01

9. Patents: 01 (filed)

10. Technology Transfer: Nil

11. Research publications: 49

12. No. of books published with details: --

Signature

FACULTY PROFILE

1. Name : Archana K. Bhavsar
2. Date of Birth : 22/02/1977
3. Educational Qualification : **M. Tech (CSE), B.E. (Computer Engg.), Pursuing Ph.D**
4. Work Experience : Teaching : 14 Years 6 Months
   3 Years 4 Months as a Programmer

- Research : Nil
- Industry : Nil

5. Area Specialization : Computer Science & Engg.
6. Subject Taught at P.G. level : Parallel Computing

Subject Taught at U.G. level : Object Oriented Modeling & Design, Software Engineering, Data Communication, Information Theory, Programming Paradigm & Methodology,

7. Research guidance at

- Masters's level : Nil
- Ph.D. level : Nil

No. papers published in

- National Journals : Nil
- International Journal : 06
- National Conferences : 03
- International Conferences : 04

8. Projects carried out : Nil
9. Patents : Nil
10. Technology Transfer : Nil
11. Research publications : 02
12. No. books published with details : 03

Title - : Object Oriented Modeling and Design
Publications : Prakash Publication, Jalgaon
Title - : Software Engineering
Publications : Prakash Publication, Jalgaon
Title - : Computer Network
Publications : Prakash Publication, Jalgaon

Signature

FACULTY PROFILE

1. Name : Sandeep Jagannath Patil
2. Date of Birth : 16/09/1980
3. Educational Qualification : **ME (CSE),BE (IT)**
4. Work Experience : Teaching : 12 Years

- Research : Nil
- Industry : Nil

5. Area of Specialization : Computer Science and Engg.
6. Subject Taught at P.G. level : Nil

Subject Taught at U.G. level : Internet Security, Computer Network, Cryptography & Network Security, E-Commerce, Programming Paradigm & Methodology, Web Design, Object Oriented Technology, Introduction to "C" programming, Java Programming Lab, Computer Graphics and Multimedia, Enterprise Resource Planning

7. Research guidance at
   - Master's level : Nil
   - Ph.D. level : Nil

No. Papers published/presented in
   - National Journal : Nil
   - International Journal : 09
   - National Conferences : 03
   - International Conferences : 03

8. Projects carried out : "Implementation of Smart City Using IoT" under Shram Sadhana Research Promotion Scheme
9. Patents : Nil
10. Technology Transfer : Nil
11. Research publications : 09
12. No. of books published with details : 03

1. Title - : Computer Network
   Publication: Prakash Publication, Jalgaon
2. Title - : Advanced Computer Network
   Publication: Prakash Publication, Jalgaon
3. Title - : Computer Communication Network
   Publication: Prakash Publication

Signature

FACULTY PROFILE

1. Name : Mr. Nitin Pundlik Jagtap
2. Date of Birth : 31/05/80
3. Educational Qualification : **M.E. (CSE),** B.E. (I T)
4. Work Experience : Teaching : 10 years 07 Months
   - Research : Nil
   - Industry : 1 year 5 month.
5. Area Specialization : Computer Science and Engg.
6. Subject Taught at P.G. level : Nil

Subject Taught at U.G. level : Cloud Computing, Enterprise Resource Planning, Industrial Management and Economics Database Management System, Information Theory, Management Information System, System Programming, Artificial intelligence and Neural Network, Embedded System, Data ware housing and Mining, Programming Paradigm and Methodology, Discrete Structure & Graph Theory. Computer Graphics and Multimedia.

7. Research guidance at
   - Masters's level : Nil
   - Ph.D. level : Nil

No. Papers published in
   - National Journals: 04 - International Journal: 09 - National Conferences: 02
   - International Conferences: 02

8. Projects carried out: 01
9. Patents: Nil
10. Technology Transfer: Nil
11. Research Publications: 17
12. No. of Books published with details: 02

    01) Implementation of Data watcher for
    Data Leakage Detection system Lambert Publication, Germany
    02) Data ware house and Mining Prakash Publication

Signature

FACULTY PROFILE

1. Name:	Mr. S. H. Rajput
2. Date of Birth:	26/10/1984
3. Educational Qualification:	M.E. (CSE), B.E. (Computer Engg.)
4. Work Experience:	Teaching: 10 Years
- Research: Nil	
- Industry: Nil	
5. Area Specialization:	Computer Engineering
6. Subject Taught at P.G. level: Nil	
Subject Taught at U.G. level:	Digital System and Microprocessor, Theory of Computer Science, Software Metrics and Quality Assurance, Microprocessor and Microcontroller interfacing, Data Communication, E-commerce.

7. Research guidance at

- Masters's level : Nil
- Ph.D. level : Nil

No. papers published in

- National Journals : Nil
- International Journals : 03
- National Conferences : 04
- International Conferences : 01

8. Projects carried out : Nil

9. Patents : Nil

10. Technology Transfer : Nil

11. Research publications : Nil

12. No. books published with details : Nil

Signature

FACULTY PROFILE

1. Name : Mr. Rohidas B.Sangore
2. Date of Birth : 18/09/1985
3. Educational Qualification : M Tech (IT), B.E. (IT)
4. Work Experience : Teaching : 8 Years 7 Months
   - Research : Nil
   - Industry : 3 Months
5. Area Specialization : Information Technology
6. Subject Taught at P.G. level : Nil

Subject Taught at U.G. level : Enterprise Resource Planning, ERP&SAP, Operating System, Mobile Computing, E-commerce, Data Communication, Computer Organization, Multimedia Technique, & Industrial Management and Economics

7. Research guidance at
   - Masters's level :Nil
   - Ph.D. level : Nil

No. Papers published in
   - National Journals : Nil
   - International Journal : 06
   - National Conferences : 03
   - International Conferences: Nil

8. Projects carried out: Nil
9. Patents: Nil
10. Technology Transfer: Nil
11. Research publications: Nil
12. No. Books published with details: Nil

Signature

FACULTY PROFILE

1. Name : Shambhu Kumar Singh
2. Date of Birth : 14/09/1990
3. Educational Qualification : **M.E. (CSE), B.E. (I.T)**
4. Work Experience : Teaching : 5 Years
   - Research : Nil
   - Industry : 5 months
5. Area Specialization : Information Technology.
6. Subject Taught at P.G. level : Nil

   Subject Taught at U.G. level : Data Structures, Advanced Unix Programming, Data Warehousing and Mining, Cloud Computing, Java
7. Research guidance at
   - Masters's level : Nil
   - Ph.D. level : Nil

No. Papers published in
   - National Journals : Nil
   - International Journals : 07
   - National Conferences : Nil
   - International Conferences : 01

8. Projects carried out : Nil
9. Patents : Nil
10. Technology Transfer : Nil
11. Research publications : 07
12. No. Books published with details : Nil

FACULTY PROFILE

1. Name : Ms Tejashri Anil Patil
2. Date of Birth : 22/09/1993
3. Educational Qualification : **M.E. (CSE), B.E. (CSE)**
4. Work Experience : Teaching : 1 Year, 8 Months
   - Research : Nil
   - Industry : Nil
5. Area Specialization : Computer Science and Engineering
6. Subject Taught at P.G. level : Nil

   Subject Taught at U.G. level : System Programming, Cloud Computing, Management Information System
7. Research guidance at
   - Masters's level : Nil
   - Ph.D. level : Nil

No. Papers published in
   - National Journals : Nil
   - International Journals : 01
   - National Conferences : Nil
   - International Conferences : 03

8. Projects carried out : Nil
9. Patents : Nil
10. Technology Transfer : Nil
11. Research publications : 04
12. No. Books published with details : Nil

Signature

Faculty Profile

1.	Name	: Dr. S. P. Shekhawat
2.	Date of Birth	: 03/05/1974
3.	Educational Qualification	: Ph.D (Mechanical)
4.	Work Experience	
	- Teaching	: 17Years
	- Research	: 05Years
	- Industry	: Nil
5.	Area of Specialization	: Energy, Design
6.	Subject taught at P.G. level	: Mechatronics , DSM
	Subject taught at U.G. level	: TOM-I, Thermodynamics
7.	Research Guidance at	
	- Master's level	: 10Students
	- Ph.D. level	: Nil
8.	No. of papers published in	
	- National Journals	: 02
	- International Journals	: 26
	- National Conferences	: 05
	- International Conferences	: 13
9.	Projects carried out	: 04
10.	Patents	: Nil
11.	Technology Transfer	: Nil
12.	Research publications	: 28
13.	No. of books published in details	: Nil

Signature

Faculty Profile

1.	Name	: NAVNEET K PATIL
2.	Date of Birth	: 23-09-1969
3.	Educational Qualification	: M.Tech, MBA, PhD (Pursuing)
4.	Work Experience	
	- Teaching	: 25
	- Research	: 08
	- Industry	: 02
5.	Area of Specialization	: Production, Thermal, Design, Management
6.	Subject taught at P.G. level	: Optimization, Design
	Subject taught at U.G. level	: MQC, Mechanics, Drawing, OR, TOM
7.	Research Guidance at	
	- Master's level	: 15
	- Ph.D. level	:
8.	No. of papers published in	
	- National Journals	: 08
	- International Journals	: 10
	- National Conferences	: 05
	- International Conferences	: 04
9.	Projects carried out	: 10
10.	Patents	: nil
11.	Technology Transfer	: nil
12.	Research publications	:
13.	No. of books published in details	: 03; MQC, IC Engines, App. Thermodynamics

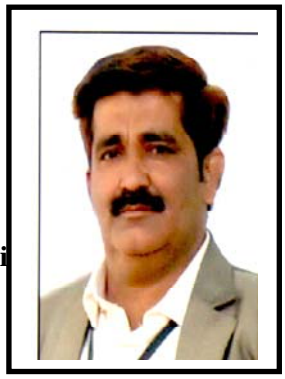
Signature

Faculty Profile

1.	Name	:	Mr.KrishnaShrivastava
2.	Date of Birth	:	7th November 1973
3.	Educational Qualification	:	Associate Professor,Mech. Engg. Dept.
4.	Work Experience		
	- Teaching	:	20 Years
	- Research	:	
	- Industry	:	
5.	Area of Specialization	:	Thermal Power
6.	Subject taught at P.G. level	:	
	Subject taught at U.G. level	:	Engg. Thermodynamics, HT , Turbo M/c, ED , Refrigeration, Mechanics.
7.	Research Guidance at		
	- Master's level	:	
	- Ph.D. level	:	
8.	No. of papers published in		
	- National Journals	:	
	- International Journals	:	04
	- National Conferences	:	05
	- International Conferences	:	05
9.	Projects carried out	:	02
10.	Patents	:	
11.	Technology Transfer	:	
12.	Research publications	:	
13.	No. of books published in details	:	01

Signature

Faculty Profile



1. Name : **Mahesh VedprakashRawlani**
2. Date of Birth : 7th June1970
3. Educational Qualification :

Degree/ Certificate	Specialization	Year of Passing	Institute	Board / University	Percentage	Division
B.E.	Production	1994	VYWS College of Engg. Badnera	Amaravati	64	First
M.E.	Mechanical	2005	S.A.T.I Vidisha	Rajiv Gandhi ProdyogikiVishwa vidyalaya, Bhopal	70	First
Ph.D	Mechanical	2015	NMU	NMU	Pursuing	

4. Work Experience
   - Teaching : 23 YEARS
   - Research :
   - Industry :
5. Area of Specialization : MANUFACTURING, MANAGEMENT
6. Subject taught at P.G. level :
   Subject taught at U.G. level : Operation research,NACM,ED
7. Research Guidance at
   - Master's level :
   - Ph.D. level :
8. No. of papers published in
   - National Journals :
   - International Journals : 5
   - National Conferences : 5
   - International Conferences : 2

9. Projects carried out : PROJECT got 1st prize at DIPEX state level competition and also project student got award from ZEE 24 TAAS

10. Patents :

11. Technology Transfer :

12. Research publications :

13. No. of books published in details :

Sr. No.	Title with page Nos.	Type of Book & Authorship	Publisher, Year & ISSN/ISBN No.	Whether principal author/corresponding author/Guide
1	Manufacturing Engineering-I	Reference Book	Dhanpatrai&co. Delhi 2013	
2	Manufacturing Engineering-II 286	Reference Book	Dhanpatrai&co. Delhi 2014	
3	Engineering Drawing 235	Subject Book	NiraliPrakashan Pune 2012 ,978-93-82448-69-3	
4	Engineering Graphics 230	Subject Book	NiraliPrakashan Pune 2012,978-93-81962-99-2	Principal
5	Manufacturing Processes 250	Subject Book	NiraliPrakashan Pune 2014, 978-93-83750-59-7	
6	INDUSTRIAL ENGINEERING AND SAFETY 104	Subject Book	NiraliPrakashan Pune 2014	Principal
7	Project &Business Management 176	Subject Book	NiraliPrakashan Pune 2015,978-93-5164-403-3	Principal
8	Numerical Analysis &Computational Methods 392	Reference Book	NiraliPrakashan Pune 2015,978-93-5164-400-2	Principal

Signature

Faculty Profile

1.	Name	: Dr. Prajitsen G. Damle
2.	Date of Birth	: 08th Oct. 1973
3.	Educational Qualification	: Ph. D. (Mechanical)
4.	Work Experience	
	- Teaching	: 17 Years
	- Research	:
	- Industry	: 1 Year
5.	Area of Specialization	: Machine Design
6.	Subject taught at P.G. level	: Mechanical Vibration, Design of Synthesis
	Subject taught at U.G. level	: Machine Design I and II, EDEME
7.	Research Guidance at	
	- Master's level	: Yes
	- Ph.D. level	:
8.	No. of papers published in	
	- National Journals	: 01
	- International Journals	: 09
	- National Conferences	: 07
	- International Conferences	: 04
9.	Projects carried out	: Nil
10.	Patents	: Nil
11.	Technology Transfer	: Nil
12.	Research publications	: 04
13.	No. of books published in details	: 01

Signature

Faculty Profile

1.	Name	: D.B.Sadaphale
2.	Date of Birth	: 01/07/1976
3.	Educational Qualification	: M.E.(Machine Design)
4.	Work Experience	
	- Teaching	: 17Years
	- Research	: 02Years
	- Industry	: nil
5.	Area of Specialization	: Machine Design
6.	Subject taught at P.G. level	: AMED,TRIBOLOGY,OTD,MTD
	Subject taught at U.G. level	: F.M.A.T., MSM, and PPE
7.	Research Guidance at	
	- Master's level	: 10Students
	- Ph.D. level	: nil
8.	No. of papers published in	
	- National Journals	: 02
	- International Journals	: 08
	- National Conferences	: 03
	- International Conferences	: 03
9.	Projects carried out	: 01
10.	Patents	: nil
11.	Technology Transfer	: nil
12.	Research publications	: nil
13.	No. of books published in details	: nil

Signature

Faculty Profile

1.	Name	: PrashantNarendraraoUlhe
2.	Date of Birth	: 09/03/1974
3.	Educational Qualification	: M.E. (Machine Design)
4.	Work Experience	
	- Teaching	: 15yrs
	- Research	: Nil
	- Industry	: 5yrs
5.	Area of Specialization	: Machine Design
6.	Subject taught at P.G. level	: Tribology, OTD.
	Subject taught at U.G. level	: SOM, MV, CAD/CAM, AE, Robotics, TOM-I
7.	Research Guidance at	
	- Master's level	: 12
	- Ph.D. level	: Nil
8.	No. of papers published in	
	- National Journals	:
	- International Journals	: 15
	- National Conferences	: 8
	- International Conferences	: 4
9.	Projects carried out	: 1
10.	Patents	: Nil
11.	Technology Transfer	: Nil
12.	Research publications	:
13.	No. of books published in details	: 1

Signature

Faculty Profile

1.	Name	: PradeepMohansinghSolanki
2.	Date of Birth	: 06/10/1981
3.	Educational Qualification	: M.E. (CAD/CAM)
4.	Work Experience	
	- Teaching	: 11.5 Yrs
	- Research	: NIL
	- Industry	: NIL
5.	Area of Specialization	: CAD/CAM
6.	Subject taught at P.G. level	: CMMD, Robotics
	Subject taught at U.G. level	: CAD/CAM, FEAST, EDEME, NACM, Mechatronix, and Computer Graphics
7.	Research Guidance at	
	- Master's level	: 11
	- Ph.D. level	: NIL
8.	No. of papers published in	
	- National Journals	: 0
	- International Journals	: 16
	- National Conferences	: 05
	- International Conferences:	08
9.	Funded Projects carried out	: 02
10.	Patents	: NIL
11.	Technology Transfer	: NIL
12.	Research publications	: 29
13.	No. of books published in details	: NIL

Signature

Faculty Profile

1. Name : PravinDharmaraj Patil

2. Date of Birth : 30 April 1980

3. Educational Qualification :Ph.D Pursuing

4. Work Experience

- Teaching : 12 Years
- Research : NIL
- Industry : 6 Months

5. Area of Specialization : CAD/CAM

6. Subject taught at P.G. level : NIL

Subject taught at U.G. level : CAD/CAM,Engg Drawing, Automobile Engg, Soft Skill, Engg thermodynamics, Manufacturing Engg, MQC

7. Research Guidance at

- Master's level : YES (01)
- Ph.D. level :

8. No. of papers published in

- National Journals : 04
- International Journals : 06
- National Conferences : 01
- International Conferences : 03

9. Projects carried out : Design and development of Human Power Operated Machine

10. Patents : NIL

11. Technology Transfer : NIL

12. Research publications : 14

13. No. of books published in details : NIL

Signature

Faculty Profile

1.	Name	: Mahesh V Kulkarni
2.	Date of Birth	: 23/07/1979
3.	Educational Qualification	: M.Tech.
4.	Work Experience	
	- Teaching	: 11
	- Research	: 02
	- Industry	: 02
5.	Area of Specialization	: Heat Power Engineering
6.	Subject taught at P.G. level	: Heat Transfer, and Turbo Machinery
	Subject taught at U.G. level	: NIL
7.	Research Guidance at	
	- Master's level	: NIL
	- Ph.D. level	: NIL
8.	No. of papers published in	
	- National Journals	: NIL
	- International Journals	: 07
	- National Conferences	: 01
	- International Conferences	: 03
9.	Projects carried out	: IEDC funded project Title "Solar Water Heating System Using Innovative Flat Plate Collector and Storage Volume" in year 2015-16
10.	Patents	: NIL
11.	Technology Transfer	: NIL
12.	Research publications	: 07
13.	No. of books published in details	: NIL

Signature

Faculty Profile

1.	Name	: Ajay R. Bhardwaj
2.	Date of Birth	: 05-07-1968
3.	Educational Qualification	: M.E (Machine Design), PhD. Pursuing
4.	Work Experience	19 Years
	- Teaching	: 11Years
	- Research	: ----
	- Industry	: 08 Years
5.	Area of Specialization	: Machine Design and Manufacturing Engineering
6.	Subject taught at P.G. level	: ---
	Subject taught at U.G. level	: Manufacturing Engineering I, Manufacturing Engineering II
7.	Research Guidance at	
	- Master's level	: ---
	- Ph.D. level	: ----
8.	No. of papers published in	
	- National Journals	: 01
	- International Journals	: 14
	- National Conferences	: 02
	- International Conferences	: ---
9.	Projects carried out	: ---
10.	Patents	: ---
11.	Technology Transfer	: ---
12.	Research publications	: 17
13.	No. of books published in details	: ---

Signature

Faculty Profile

1.	Name	: DipakChandrakantTalele
2.	Date of Birth	: 19/06/1987
3.	Educational Qualification	: M.Tech. (CAD/CAM) Ph.D. Pursuing
4.	Work Experience	
	- Teaching	: 05 years
	- Research	: Nil
	- Industry	: 09 month
5.	Area of Specialization	: CAD/CAM
6.	Subject taught at P.G. level	: Nil
	Subject taught at U.G. level	: FEA&ST, TOM-II
7.	Research Guidance at	
	- Master's level	: Nil
	- Ph.D. level	: Nil
8.	No. of papers published in	
	- National Journals	: 00
	- International Journals	: 14
	- National Conferences	: 01
	- International Conferences	: 07
9.	Projects carried out	: Nil
10.	Patents	: Nil
11.	Technology Transfer	: Nil
12.	Research publications	: 10
13.	No. of books published in details	: Nil

Signature

Faculty Profile

1.	Name	: Dr. PrashantPanditBornare
2.	Date of Birth	: 01/06/1979
3.	Educational Qualification	Ph.D (Management) B.E. Mech. MBA (Marketing & HRD), M.E.(Mechannical)
4.	Work Experience	
	- Teaching	: 11 years
	- Research	: Nil
	- Industry	: 03 years
5.	Area of Specialization	: Management, Mechanical
6.	Subject taught at P.G. level	: Nil
	Subject taught at U.G. level	: Internal combustion Engine, MMM, PBM, Automobile Engineering, Industrial Engineering
7.	Research Guidance at	
	- Master's level	: Nil
	- Ph.D. level	: Nil
8.	No. of papers published in	
	- National Journals	: 00
	- International Journals	: 09
	- National Conferences	: 01
	- International Conferences	: 02
9.	Projects carried out	: Nil
10.	Patents	: Nil
11.	Technology Transfer	: Nil
12.	Research publications	: 03
13.	No. of books published in details	: Nil

Signature

Faculty Profile

1.	Name	: Ms.Jagruti Ramesh Surange
2.	Date of Birth	: 20-11-1982
3.	Educational Qualification	: ME(Machine Design)
4.	Work Experience	
	- Teaching	: 5Yrs
	- Research	: -
	- Industry	: 1 Yr.
5.	Area of Specialization	: Machine Design
6.	Subject taught at P.G. level	: Nil
	Subject taught at U.G. level	: ME-I, ME-II, MSM, MQC, EDEME
7.	Research Guidance at	
	- Master's level	: NIL
	- Ph.D. level	: NIL
8.	No. of papers published in	
	- National Journals	: 0
	- International Journals	: 05
	- National Conferences	: 06
	- International Conferences	: 05
9.	Projects carried out	: NIL
10.	Patents	: NIL
11.	Technology Transfer	: NIL
12.	Research publications	: 10
13.	No. of books published in details	: NIL

Signature

Faculty Profile

1.	Name	: AKHILESH VIJAYSING RAJPUT
2.	Date of Birth	: 06/01/1989
3.	Educational Qualification	: ME(Machine Design)
4.	Work Experience	
	- Teaching	: 04 Yrs.
	- Research	: Nil
	- Industry	: 02 Yrs.
5.	Area of Specialization	: Machine Design
6.	Subject taught at P.G. level	: EDEME,Auto.Engg.-I,Auto.Engg.-II,IMEED
	Subject taught at U.G. level	: Nil
7.	Research Guidance at	
	- Master's level	: Nil
	- Ph.D. level	: Nil
8.	No. of papers published in	
	- National Journals	: 0
	- International Journals	: 02
	- National Conferences	: 02
	- International Conferences	: 03
9.	Projects carried out	: Nil
10.	Patents	: Nil
11.	Technology Transfer	: Nil
12.	Research publications	: 07
13.	No. of books published in details	: Nil

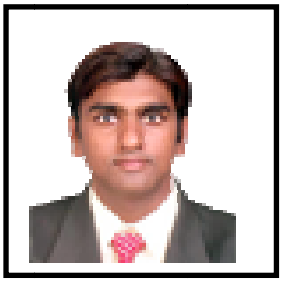
Signature

Faculty Profile

1.	Name	: Ajay JanakraoPuri
2.	Date of Birth	: 11/03/1990
3.	Educational Qualification	: M.E. (Production Engineering)
4.	Work Experience	
	- Teaching	: 03 years
	- Research	: Nil
	- Industry	: 02 years
5.	Area of Specialization	: Production Engineering
6.	Subject taught at P.G. level	: Nil
	Subject taught at U.G. level	: MSM, ME-II, PBM, IE&S
7.	Research Guidance at	
	- Master's level	: Nil
	- Ph.D. level	: Nil
8.	No. of papers published in	
	- National Journals	: 00
	- International Journals	: 01
	- National Conferences	: 01
	- International Conferences	: 02
9.	Projects carried out	: Nil
10.	Patents	: Nil
11.	Technology Transfer	: Nil
12.	Research publications	: Nil
13.	No. of books published in details	: Nil

Signature

Faculty Profile



1.	Name	: TejasGalu Patil
2.	Date of Birth	: 19/08/1988
3.	Educational Qualification	: M.E. (Thermal Engineering)
4.	Work Experience	
	- Teaching	: 03 years
	- Research	: Nil
	- Industry	: 02 years
5.	Area of Specialization	: Thermal Engineering
6.	Subject taught at P.G. level	: Nil
	Subject taught at U.G. level	: AT, RAC, Turbo M/C,
7.	Research Guidance at	
	- Master's level	: Nil
	- Ph.D. level	: Nil
8.	No. of papers published in	
	- National Journals	: 00
	- International Journals	: 07
	- National Conferences	: 01
	- International Conferences	: 01
9.	Projects carried out	: Nil
10.	Patents	: Nil
11.	Technology Transfer	: Nil
12.	Research publications	: Nil
13.	No. of books published in details	: Nil

Signature

Faculty Profile

1.	Name	:	Chetana S. Chopade
2.	Date of Birth	:	16/06/1993
3.	Educational Qualification	:	B.E. (Mechanical), M.E.(Machine Design)
4.	Work Experience		
	- Teaching	:	6 months
	- Research	:	Nil
	- Industry	:	Nil
5.	Area of Specialization	:	Machine Design
6.	Subject taught at P.G. level	:	Nil
	Subject taught at U.G. level	:	Theory of Machine-II, Machine Design, Power Plant Engineering
7.	Research Guidance at		
	- Master's level	:	Nil
	- Ph.D. level	:	Nil
8.	No. of papers published in		
	- National Journals	:	Nil
	- International Journals	:	3
	- National Conferences	:	Nil
	- International Conferences	:	4
9.	Projects carried out	:	Nil
10.	Patents	:	Nil
11.	Technology Transfer	:	Nil
12.	Research publications	:	Nil
13.	No. of books published in details	:	Nil

Signature

Faculty Profile

1. Name : SMIT.MANOHAR.ARBAT
2. Date of Birth : 26/07/1988
3. Educational Qualification : B.E. (Mechanical), M.E. (CAD-CAM)
4. Work Experience
   - Teaching : 4 YEARS 6 MONTHS
   - Research : Nil
   - Industry : Nil
5. Area of Specialization : CAD-CAM
6. Subject taught at P.G. level : Nil

   Subject taught at U.G. level : Engineering Drawing, Manufacturing Process, Engineering Thermodynamics, Engineering Mechanics , CAD Lab, HT Lab ,CG Lab, Machine Drawing.

7. Research Guidance at
   - Master's level : Nil
   - Ph.D. level : Nil
8. No. of papers published in
   - National Journals : 1
   - International Journals : 2
   - National Conferences : Nil
   - International Conferences : Nil
9. Projects carried out : Nil
10. Patents : Nil
11. Technology Transfer : Nil
12. Research publications : Nil
13. No. of books published in details : Nil

Signature

Faculty Profile

1.	Name	:	Mahesh A. Marathe
2.	Date of Birth	:	10/09/1990
3.	Educational Qualification	:	B.E. (Mechanical), M.E. (Design Engineering)
4.	Work Experience		
	- Teaching	:	3 YEARS
	- Research	:	Nil
	- Industry	:	6 MONTHS
5.	Area of Specialization	:	Design Engineering
6.	Subject taught at P.G. level	:	Nil
	Subject taught at U.G. level	:	Introduction to Mechanical Engineering & Engineering Drawing , Engineering Thermodynamics, CAD-CAM, FEA & ST, CG, Mechanical Vibration.
7.	Research Guidance at		
	- Master's level	:	Nil
	- Ph.D. level	:	Nil
8.	No. of papers published in		
	- National Journals	:	1
	- International Journals	:	6
	- National Conferences	:	1
	- International Conferences	:	2
9.	Projects carried out	:	Two B.E. Projects
10.	Patents	:	Nil
11.	Technology Transfer	:	Nil
12.	Research publications	:	Nil
13.	No. of books published in details	:	Nil

Signature

Faculty Profile

1.	Name	:	ASHWIN P. THAKKAR
2.	Date of Birth	:	01/02/1996
3.	Educational Qualification	:	B.E. (Mechanical)
4.	Work Experience		
	- Teaching	:	6 months
	- Research	:	Nil
	- Industry	:	Nil
5.	Area of Specialization	:	Nil
6.	Subject taught at P.G. level	:	Nil
	Subject taught at U.G. level	:	Fluid Mechanics, Theory of Machine-I
7.	Research Guidance at		
	- Master's level	:	Nil
	- Ph.D. level	:	Nil
8.	No. of papers published in		
	- National Journals	:	Nil
	- International Journals	:	01
	- National Conferences	:	Nil
	- International Conferences	:	Nil
9.	Projects carried out	:	Nil
10.	Patents	:	Nil
11.	Technology Transfer	:	Nil
12.	Research publications	:	Nil
13.	No. of books published in details	:	Nil

Signature

Faculty Profile

1.	Name	:	Sameer Ahmad Abdul Farooque
2.	Date of Birth	:	01/08/1995
3.	Educational Qualification	:	B.E. (Mechanical)
4.	Work Experience		
	- Teaching	:	6 months
	- Research	:	Nil
	- Industry	:	Nil
5.	Area of Specialization	:	Mechanical Engineering
6.	Subject taught at P.G. level	:	Nil
	Subject taught at U.G. level	:	Automobile Engineering-I, Machine Design-I
7.	Research Guidance at		
	- Master's level	:	Nil
	- Ph.D. level	:	Nil
8.	No. of papers published in		
	- National Journals	:	Nil
	- International Journals	:	Nil
	- National Conferences	:	Nil
	- International Conferences	:	Nil
9.	Projects carried out	:	Nil
10.	Patents	:	Nil
11.	Technology Transfer	:	Nil
12.	Research publications	:	Nil
13.	No. of books published in details	:	Nil

Signature

Faculty Profile

1.	Name	:	MAYUR MURLIDHAR GOSAVI
2.	Date of Birth	:	11/07/1995
3.	Educational Qualification	:	B.E. (Mechanical)
4.	Work Experience		
	- Teaching	:	6 months
	- Research	:	Nil
	- Industry	:	Nil
5.	Area of Specialization	:	Machine Design
6.	Subject taught at P.G. level	:	Nil
	Subject taught at U.G. level	:	Applied Thermodynamics, IC Engine, Soft Skill
7.	Research Guidance at		
	- Master's level	:	Nil
	- Ph.D. level	:	Nil
8.	No. of papers published in		
	- National Journals	:	Nil
	- International Journals	:	0
	- National Conferences	:	Nil
	- International Conferences	:	0
9.	Projects carried out	:	Nil
10.	Patents	:	Nil
11.	Technology Transfer	:	Nil
12.	Research publications	:	Nil
13.	No. of books published in details	:	Nil

Signature

Faculty Profile

1.	Name	:	JAYESH ATMARAM GOSAVI
2.	Date of Birth	:	02/10/1995
3.	Educational Qualification	:	B.E. (Mechanical)
4.	Work Experience		
	- Teaching	:	6 months
	- Research	:	Nil
	- Industry	:	Nil
5.	Area of Specialization	:	Nil
6.	Subject taught at P.G. level	:	Nil
	Subject taught at U.G. level	:	Refrigeration&Air-conditioning,Turbomachinery
7.	Research Guidance at		
	- Master's level	:	Nil
	- Ph.D. level	:	Nil
8.	No. of papers published in		
	- National Journals	:	Nil
	- International Journals	:	Nil
	- National Conferences	:	Nil
	- International Conferences	:	Nil
9.	Projects carried out	:	Nil
10.	Patents	:	Nil
11.	Technology Transfer	:	Nil
12.	Research publications	:	Nil
13.	No. of books published in details	:	Nil

Signature

DEPARTMENT OF BUSINESS ADMINISTRATION (M.B.A)

FACULTY PROFILE

1. Name : Dr.Vishal S.Rana

2. Date of Birth: 15/12/1980

3. Educational Qualification: M.Com, M.B.A (Marketing), Ph.D (Mgmt Science)

4. Work Experienced:

    1. Teaching : 11 Years 06 Months
    2. Research : Nil
    3. Industry : 0.7 Months
    4. Other : Nil

5. Area of Specialization: Marketing

6. Subjects teaching at UG level: NIL

   Subjects teaching at PG level: Organizational Behavior-I & II, Global Marketing Management, Retail Management & Consumer Behavior, Cases in Marketing, Marketing Management.

7 Research's Guidance Master's : Nil

Ph.D : Nil

No. Of paper published in a. National journal : 03

b. International journal : 16

c. National Conference : 14

d. International Conference: 05

8. Project carried out : Nil

9. Patents : Nil

10. Technology Transfer : Nil

11. Research publication : 16

12. No. of book published with detail: Nil

Signature

DEPARTMENT OF BUSINESS ADMINISTRATION (M.B.A)

FACULTY PROFILE

1. Name: Faroza A. Kazi

2. Date of Birth: 16/02/1978

3. Educational Qualification: M.B.A (HRM), M.P.M, B.com

4. Work Experienced:

    1. Teaching : 5 yrs & 3 months
    2. Research : Nil
    3. Industry : 2 yrs
    4. Other : 4 yrs Teaching as Lecturer in Engg.

5. Area of Specialization : HRM

6. Subjects teaching at UG level: Industrial Mgmt (E&TC Engg.), Industrial Org. & Mgmt (Electrical Engg.), Industrial Mgmt & Economics (Comp/IT Engg.)

Subjects teaching at PG level: Management Science, Business Research Methods, Mgmt. Information System & ERP Corporate Business Scenario, E-commerce, Information Technology for Managers, Industrial Relation & Trade Union, HR Legislations, Labour Welfare & Administration & Cases in HRM

7	Research's Guidance	Master's	:	31 (MBA)
		Ph.D	:	Nil
	No. Of paper published in	a. National Journal	:	02
		b. International Journal	:	02
		c. National Conference	:	07
		d. International Conference	:	04

12. Project carried out : Nil
13. Patents : Nil
14. Technology Transfer : Nil
15. Research publication : 15

12. No. of book published with detail: Nil

Signature

DEPARTMENT OF BUSINESS ADMINISTRATION (M.B.A)

FACULTY PROFILE

1. Name : Mukesh Bhaskar Ahirrao

2. Date of Birth : 24/06/1984

3. Educational Qualification : M.Com, M.B.A (Fin.), Ph.D Pursuing

4. Work Experienced:

    1. Teaching : 6 Years
    2. Research : Nil
    3. Industry : 3 Years 4 Months
    4. Other : Nil

5. Area of Specialization : Finance & Marketing

6. Subjects teaching at UG level: Nil

Subjects teaching at PG level: Entrepreneurship & Project Management, Global Economic Scenario, Managerial Economics, Marketing Research & Business Analytics, Investment & Portfolio Management, Marketing Management, Case Studies in Financial Management, Product & Brand Management, Practical Aspect of Business.

7	Research's Guidance	Master's	: Nil
		Ph.D	: Nil
No. Of paper published in		a. National journal	: 03
		b. International journal	: 13
		c. Conference	: 05
16. Project carried out			: Nil
17. Patents			: Nil
18. Technology Transfer			: Nil
19. Research publication			: Nil
12. No. of book published with detail			: Nil

Signature

DEPARTMENT OF BUSINESS ADMINISTRATION (M.B.A)

FACULTY PROFILE

1. Name : Er.Pankajkumar Ambadas Anawade

2. Date of Birth: 05/07/1982

3. Educational Qualification: B.E (Mech), M.B.A (Mktg)

4. Work Experienced:

    1. Teaching : 08 Years and 06 Months
    2. Research : Nil
    3. Industry : 2.5 Years
    4. Other : Nil

5. Area of Specialization: Marketing

6. Subjects teaching at UG level: Principles of Management (IT Department)

    Subjects teaching at PG level: Introduction to Operation Management, Quantitative Techniques, , Consumer Behavior and Service Marketing, , Supply Chain Management, Retail Management And Digital Marketing.

7 Research's Guidance Master's : Nil

Ph.D : Nil

No. Of paper published in a. National journal : 04
b. International journal: 06
c. National Conference : 03
d. International Conference : 06

08. Project carried out : Nil
09. Patents : Nil
10. Technology Transfer: Nil
11. Research publication: 06
12. No. of book published with detail: Nil

Signature

DEPARTMENT OF BUSINESS ADMINISTRATION (M.B.A)

FACULTY PROFILE

1. Name : Dr.Richa A.Modiyani

2. Date of Birth: 30/04/1987

3. Educational Qualification: B.B.S, M.B.A (Fin), PhD (Mgmt)

4. Work Experienced:

    1. Teaching : 08 Years & 7 Months
    2. Research : Phd & VCRMS
    3. Industry : Nil
    4. Other : Nil

5. Area of Specialization: Finance

6. Subjects teaching at UG level: NIL

Subjects teaching at PG level: Financial Management, Business Accounting, Managerial Economics, Management Accounting, Strategic Management, Management Practices, Case Studies in Finance, Consumer behavior & service marketing, Strategic Financial Management & Retail Management & Digital Marketing.

7 Research's Guidance Master's : 62

Ph.D : Nil

No. of paper published in a. National journal : 04
b. Internal national journal: 11
c. National Conference : 09
d. Internalnational journal: 11

08. Project carried out : Nil
09. Patents : Nil
10. Technology Transfer : Nil

11. Research publication : 35
12. No. of book published with detail: Nil

Signature

DEPARTMENT OF BUSINESS ADMINISTRATION (M.B.A)

FACULTY PROFILE

1. Name : Ms.Sanjivani B.Lokhande

2. Date of Birth: 30/05/1987

3. Educational Qualification: B.Sc.(Bio-chem), M.B.A.(HR), Ph.D Pursuing

4. Work Experienced:

    1. Teaching : 3 year 1 month
    2. Research : Nil
    3. Industry : Nil
    4. Other : Nil

5. Area of Specialization: HRM

6.Subjects teaching at UG level:Human Resource Management , Business Law ,Entrepreneurship & Project Management ,Communication Skills ,Organizational Behaviour ,Corporate Social Responsibility & Corporate Governance ,Managerial economics, Principal of management

Subjects teaching at PG level: Human Resource Management ,Strategic Human Resource Management ,Industrial Relation & Labour welfare ,Sales & Distribution ,Legal Aspects in Business, Services management, Organizational Behavior-II, Indian commercial law, Marketing Research and data analysis, Performance and compensation management.

7. Research's Guidance Master's : 28 (MBA)
Ph.D : Nil

No. Of paper published in a. National journal : Nil
b. International journal : 02
c. National Conference : 02
d. International Conference: Nil

20. Project carried out : Nil
21. Patents : Nil
22. Technology Transfer : Nil
23. Research publication : 04

12. No. of book published with detail: Nil

Signature

DEPARTMENT OF BUSINESS ADMINISTRATION (M.B.A)

FACULTY PROFILE

1. Name : Dr. Saroj B. Patil

2. Date of Birth: 28/05/1974

3. Educational Qualification: B.Sc.(computer), M.C.M, Ph.D

4. Work Experienced:

    1. Teaching : 3.7 yrs
    2. Research : Nil
    3. Industry : Nil
    4. Other : Nil

5. Area of Specialization: HRM

6. Subjects teaching at UG level: Nil

Subjects teaching at PG level: Human Resource Management, Information Technology for Manager, E-commerce and Excellence Management

7 Research's Guidance Master's : Nil

Ph.D : Nil

No. Of paper published in a. National journal : Nil

b. International journal : 06

c. National Conference : 02

d. International Conference: 01

24. Project carried out : Nil

25. Patents : Nil

26. Technology Transfer : Nil

27. Research publication : Nil

12. No. of book published with detail: Nil

Signature

VIII.FEE

A) Details of fee, as approved by Shikshan Shulka Samiti, for the instauration.

2016-17

Sr. No.	Branch	Tuition fee
	UG Courses	
1	Chemical Engineering	RS.64036
2	Civil Engineering	RS.64036
3	Computer Engineering	Rs.54035
4	Mechanical Engineering	Rs.64036
5	Electrical Engineering	Rs.54036
6	Electronics and Tele-comm. Engineering	Rs.64035
7	Information Technology Engineering	Rs.64035
8	Bio-Technology	Rs.64036
	PG Courses	
1	ME Civil Engineering {Environmental)	Rs.64035
2	ME Mechanical Engineering (Machine Design)	Rs.64036
3	MEE&TC(digital)	Rs.54035
4	M E Computer Sci. Engineering	Rs.54036
5	M.B.A.	Rs.64036

B) Time schedule for payment of fee the entire programme.

As per Admission rule Government of Maharashtra all fees for the entire programme. Should be remitted at the time of admission.

C) No. of Fee Waivers granted with amount and name of students.

NA

D) Number of scholarship offered by the institute, duration and amount

NA

E) Criteria for fee waivers/scholarship.

NA

F) Estimated cost of Boarding and Lodging / Hostels.

Rs.27000/- For lodging and boarding both yearly.

IX. ADMISSION

A) Number of seats sanctioned with the year of approval.

Sr.	Branch	Year				
		2013-14	2014-15	2015-16	2016-17	2017-18
1	Chemical Engineering	30	30	30	30	30
2	Civil Engineering	120	120	120	120	120
3	Computer Engineering	120	120	120	120	120
4	Mechanical Engineering	120	120	120	120	120
5	Electrical Engg.	60	60	60	60	60
6	Electronics and Tele-comm. Engg.	120	120	120	120	60
7	Information Technology	60	60	60	60	60
8	Bio-Technology	30	30	30	30	30
	Total	**660**	**660**	**660**	**660**	**600**
	PG Courses					
01	ME Civil Engg. (Environmental)	18	18	18	18	18
02	ME Mechanical Engg. (Machine Design)	18	18	18	18	18
03	ME E&TC (Digital Electronics)	18	18	18	18	18
04	ME Computer Sci. & Engg.	18	18	18	18	18
05	ME Electrical (Electrical Power System)	18	18	18	18	18
	Total	**90**	**90**	**90**	**90**	**90**
06	M.B.A.	60	60	60	60	60
	Total	**60**	**60**	**60**	**60**	**60**

B) Number of students admitted under various categories each year in the last four years.

	UG									
Year	Open	SC	ST	NT1	NT2	NT3	VJ	OBC	SBC	Total
2014-15	152	56	09	17	14	09	15	320	18	610
2015-16	138	45	14	14	15	09	13	306	18	572
2016-17	103	34	13	12	13	08	15	295	23	516
2017-18	127	36	20	13	12	08	21	313	15	565

	PG									
Year	Open	SC	ST	NT1	NT2	NT3	VJ	OBC	SBC	Total
2014-15	105	02	00	01	01	00	02	35	00	146
2015-16	43	03	00	00	00	01	00	11	00	58
2016-17	10	01	01	00	00	01	00	08	01	22
2017-18	12	00	00	00	00	00	00	04	01	17

	MBA									
Year	Open	SC	ST	NT1	NT2	NT3	VJ	OBC	SBC	Total
2016-17	16	01	00	00	00	01	01	23	03	45
2017-18	22	03	02	01	00	01	03	25	03	60

C) Number of applications received during last two years for admission under Management Quota and number admitted.

Sr.	Year	Application received	Admitted Number
1	2015-16	150	70
2	2016-17	150	78

X. Admission Procedure (UG COURSES)

A) Mention the admission test being followed, name and address of the Test Agency and its URL (website).

Sr.	Admission Test	Name and Address of Test Agency	URL (Website)
1	MHT-CET	Director of Technical Education, Maharashtra State 3, Mahapalika Marg, Mumbai -1	www.dte.org.in
2	JEE	CBSE, New Delhi	

B) Number of seats allotted to different Test Qualified candidates separately [JEE/CET (State conducted test/University tests)/Association conducted test]

2016-2017

Sr.	MH-CET/JEE State Conducted test	AI(CET/JEE)	Management Quota(CET / JEE)
1	65% (429 Seats)	15% (99 Seats)	20% (132 Seats)

C) Calendar for admission against management/vacant seats 2016-17

Sr. No.	Particular	Institute level Seats
1.	Sale of Information Broacher	08/06/2016
2.	Last date for submission of application.	30/06/2016
3.	Admission counseling & conformation of admission	01/07/2016 to 05/07/2016

X. Admission Procedure (PG COURSES)

RULES & REGULATIONS FOR M.E. COURSE

1. The postgraduate degree in Engineering consisting of 2 years (4 semesters) shall be designated as Master of Engineering in prescribed branches
2. A candidate may be permitted to register him/er self for the M.E. degree under the faculty of Engineering & Technology of North Maharashtra University, Jalgaon only if the candidate holds a Bachelor's Degree in Engineering/Technology of North Maharashtra University, Jalgaon or its equivalent by AICTE, and North Maharashtra University, Jalgaon.
3. Preference will be given to graduates of North Maharashtra University, Jalgaon.
4. The students shall be admitted to second term of first year if his/her first term is granted.
5. The students shall be admitted to second year if his/her second term of first year is granted. However he/she will not be allowed to submit his/her thesis/ dissertation unless he/she has cleared all the Theory papers and has completed all the presentations of first term of second year.
6. Every students will be required to produce a record of laboratory work in the form of journal, duly certified for satisfactory completion of the Term Work by the concerned teacher and head of the department.
7. A student whose term is not granted on account of unsatisfactory attendance/ term work is required to repeat the semester.

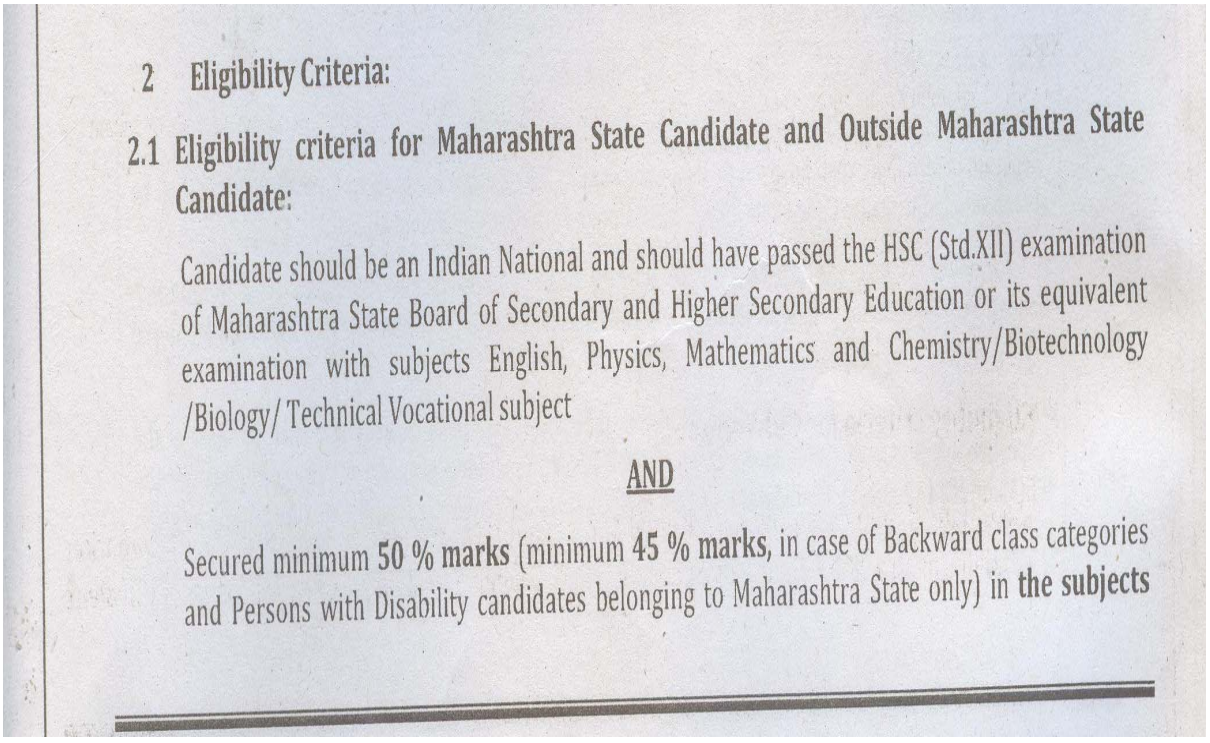
The policy of refund of the fee, in case of withdrawal, should be clearly notified.

The candidate who has been provisionally admitted may cancel admission by submitting as application in duplicate, in the prescribed pro forma – O and may request for refund of fees. The refund of fees as applicable shall be made in due course. It is made clear that such application for cancellation will be considered if and only if the admission is confirmed by paying the prescribed tuition fee and other fees in full and by submitting the original documents. Refund shall be made after deduction of the cancellation charges as shown below:

1. In the event of student/candidate withdrawing before the starting of the course, the waitlisted candidates should be given admissions against the vacant seat. The entire fee collected from the student, after a deduction of the processing fee of not more than Rs. 1000/- (Rupees one thousand only) shall be refunded and returned by the Institution/University to the student/candidate withdrawing from the programme.
2. Should a student leave after joining the course and if the seat consequently falling vacant has been filled by another candidate by the last date of admission, the Institution must return the fee collected with proportionate deductions of monthly fee and proportionate hostel rent, where applicable.

XI. CRITERIA AND WEIGHTAGES FOR ADMISSION

A) Each criteria with its respective weightages i.e. Gate examination marks & qualifying examination marks etc.



2 Eligibility Criteria:

2.1 Eligibility criteria for Maharashtra State Candidate and Outside Maharashtra State Candidate:

Candidate should be an Indian National and should have passed the HSC (Std.XII) examination of Maharashtra State Board of Secondary and Higher Secondary Education or its equivalent examination with subjects English, Physics, Mathematics and Chemistry/Biotechnology /Biology/ Technical Vocational subject

AND

Secured minimum **50 % marks** (minimum **45 % marks**, in case of Backward class categories and Persons with Disability candidates belonging to Maharashtra State only) in **the subjects**

Physics, Mathematics and Chemistry/Biotechnology/Biology/ Technical Vocational subject added together.

AND

Obtained a **positive Composite score*** i.e., marks obtained after adding 50% of JEE (Main)2014 (Paper 1) marks and 50% of normalized Standard XII (Board or Equivalent Examination) marks in Physics, Chemistry and Mathematics.

Note: -1) * - The details for calculating positive Composite score shall be notified separately.
2) Refer Rule No 2.11 regarding Rounding off of percentage of marks for deciding the eligibility, if applicable.

2.2 Eligibility Criteria for All India Candidates:

Candidate should be an Indian National and should have passed the HSC (Std.XII) examination of Maharashtra State Board of Secondary and Higher Secondary Education or its equivalent examination with subjects English, Physics, Mathematics and Chemistry/Biotechnology /Biology/ Technical Vocational subject

AND

Secured minimum **50 % marks** (minimum **45 % marks,** in case of Backward class categories and Persons with Disability candidates belonging to Maharashtra State only) in **the subjects Physics, Mathematics and Chemistry/Biotechnology/Biology/ Technical Vocational subject** added together.

AND

Obtained All India Rank in JEE (Main) 2014 (Paper 1) given by CBSE

Note: 1) Maharashtra Candidates eligible as per rule 2.1 and 2.2 shall submit single Application and Option form for the CAP for both Maharashtra State Seats and All India Seats. Such candidates will be given best single allotment through CAP as per inter-se-merit.
2) Refer Rule No 2.11 regarding Rounding off of percentage of marks for deciding the eligibility, if applicable

2.3 Eligibility Criteria for Foreign National/PIO/Children of Indian workers in the Gulf countries/ Children of NRI

Candidate should have passed the HSC (Std.XII) examination of Maharashtra State Board of Secondary and Higher Secondary Education or its equivalent examination with subjects English, Physics, Mathematics and Chemistry/Biotechnology/Biology/ Technical Vocational subject

AND

Secured minimum **50 % marks** in **the subjects Physics, Mathematics and Chemistry/Biotechnology/Biology/ Technical Vocational subject** added together.

Note :-

- The eligibility of the candidates passing the HSC (Std. XII) or equivalent examination from a school/college/Examination Board situated outside India shall be further decided by the University Authorities to which the candidate is admitted. Hence such candidates are advised to get their eligibility verified by the respective University Authorities before seeking admission to the Engineering courses in the State of Maharashtra.
- The candidate belonging to this type is not required to appear for the JEE Main 2014(Paper 1)
- Refer Rule No 2.11 regarding Rounding off of percentage of marks for deciding the eligibility, if applicable.

2.4 Eligibility criteria for GoI Nominees:

Candidate should be an Indian National and should have passed the HSC (Std.XII) examination of Maharashtra State Board of Secondary and Higher Secondary Education or its equivalent

examination with subjects English, Physics, Mathematics and Chemistry/Biotechnology /Biology/ Technical Vocational subject

AND

Secured minimum **50 % marks** (minimum **45 % marks,** in case of Backward class categories and Persons with Disability candidates of respective States) in **the subjects Physics, Mathematics and Chemistry/Biotechnology/Biology/ Technical Vocational subject** added together.

AND

Obtained All India Rank in JEE (Main) 2014 (Paper 1) given by CBSE

Note: -

Refer Rule No 2.11 regarding Rounding off of percentage of marks for deciding the eligibility, if applicable.
The candidate belonging to this type is required to appear for the JEE (Main) 2014 (Paper 1).

2.5 Eligibility criteria for J & K Migrant candidates:

Candidate should be an Indian National and should have passed the HSC (Std.XII) examination of Maharashtra State Board of Secondary and Higher Secondary Education or its equivalent examination with subjects English, Physics, Mathematics and Chemistry/Biotechnology /Biology/ Technical Vocational subject

AND

Secured minimum **50 % marks** in **the subjects Physics, Mathematics and Chemistry/Biotechnology/Biology/ Technical Vocational subject** added together.

AND

Obtained All India Rank in JEE (Main) 2014 (Paper 1) given by CBSE

Note: -

Refer Rule No 2.11 regarding Rounding off of percentage of marks for deciding the eligibility, if applicable.
The candidate belonging to this type is required to appear for the JEE (Main) 2014 (Paper 1).

2.6 Eligibility criteria for MKB candidates:

In addition to the basic eligibility criterion mentioned in rule no. 2.1, candidates belonging to the Maharashtra Karnataka Disputed Border Area are required to fulfill following additional eligibility criterions.

- Candidates should be from such villages/towns, from the Maharashtra Karnataka disputed border areas, on which Maharashtra puts its claim.
- The candidate should produce the certificate that his/her father/mother/candidate himself/herself is a domicile of Karnataka in the disputed border area as specified in the Proforma G1/G2 OR The candidate should produce the domicile certificate of his/her father/mother/candidate himself/herself stating that he/she is a resident of a village.
- The candidate should have passed SSC (or equivalent) and/or HSC (or equivalent) from an Institution situate in the disputed border area. The candidate must produce a certificate from the Principal/Head Master of the College/School stating that the candidate has passed SSC/HSC (or equivalent) Examination from that Institution.
- Mother tongue of the candidate must be Marathi. The candidate must produce a certificate from the Principal/Head Master of the School from which he/she has passed the SSC (or

equivalent) Examination, stating that the candidate's Mother tongue is Marathi as per the original School record.

- Candidate should have passed SSC or HSC (or equivalent) Examination with Marathi as one of the subject.
- **Composite Score of MKB Candidates shall be calculated in the manner similar as applied to Maharashtra state board students considering he /she has passed HSC from Maharashtra board.**
- **Composite Score of MKB Candidates shall be calculated by mapping his or her HSC performance with Maharashtra state board.**

2.7 Eligibility criteria for Candidates who are sons/daughters of Defence Service personnel:

In addition to the basic eligibility criterion mentioned in rule no.2.1, candidates who satisfying any one of the following criteria as are eligible to seek admission against seats for sons/daughters of defence service personnel.

- Candidate is a son/daughter of ex-service personnel who is domiciled in Maharashtra State (Def-1).
- Candidate is a son/daughter of active service personnel who is domiciled in Maharashtra State (Def-2).
- Candidate is a son/daughter of active service personnel (Def -3)
  - Who is transferred to Maharashtra State but is not domiciled in Maharashtra State
  - Who is not domiciled in Maharashtra State but his/her family is stationed in Maharashtra State under the provision of retention of family accommodation at the last duty station on the grounds of children's' education, provided further that, such candidate should have appeared and passed the HSC (Std.XII) examination of Maharashtra State Board of Secondary and Higher Secondary Education or its equivalent examination from a school/college situated in the State of Maharashtra.

Note: This provision is NOT available to the children of CIVILIAN STAFF who is working/ who has worked with the Indian Defence Services.

2.8 Eligibility criteria for Candidates who are Persons with Disability:

In addition to the basic qualification mentioned in rule no. 2.1, candidate who is suffering from any one of the following permanent disability is eligible to seek admission against seats for Persons with Disability candidates

- Candidate who is visually impaired (blind) candidate (type P1)
- Candidate who is speech & hearing impaired (deaf & dumb) candidate (type P2)
- Candidate who is with orthopedic disorders, learning disabilities, Dyslexia, Dyscalculia, Dysgraphica, Spastic (type P3)

Note: The certificate (Proforma F/F-1) should clearly state that the extent of disability is more than 40% and the disability is permanent in nature.

2.9 Other eligibility criteria for specialized branches of Engineering/Technology:

Candidates seeking admission to some special courses or under some special provisions have to fulfill the following additional eligibility criteria.

- **Admission to Mining Engineering course:**

Female candidates are not eligible for admission to Mining Engineering course.

2.10 Eligibility criteria of Candidates who have passed Diploma in Engineering/Technology and seeking admission to First Year of Engineering/Technology in Unaided Institutes:

Diploma holders should have passed the Diploma course in Engineering/Technology with minimum of 50% marks (45% marks in case of candidates of Backward class categories and Persons with Disability belonging only to Maharashtra State) and medium of instruction as English from the AICTE approved Diploma Institutes affiliated to State Boards of technical Education.

Note:

1. To resolve a tie i.e. more than one candidate securing equal aggregate marks in Final year of the Diploma examination, following order of preference shall be adopted: marks in Maths at SSC, Grand Total at SSC.
2. Eligible Diploma candidates (rule 2.10) shall be considered for Admission against the Institute level seats in **Unaided Private Institutes only**. The details of the admission process for filling seats are specified in Annexure-II.

2.11 Rounding off of percentage of marks for deciding eligibility for admission.

In case percentage, marks (converted out of 100) in the subjects **Physics, Mathematics and Chemistry/Biotechnology/Biology/ Technical Vocational subjects** added together at HSC (std.XII), comes in fraction then percentage of marks shall be rounded off as explained in the example for the purpose of deciding the eligibility of the candidate.

Example: - If the percentage of marks comes out to be 44.50% to 44.99% then it shall be rounded to 45% and if the percentage of marks comes out to be 44.01% to 44.49% shall be rounded to 44%.

General Notes:

1. In case the maximum marks in individual subject is other than 100, convert the marks out of 100 for individual subject but do not *round off* these marks. If the sum of the converted marks of three individual subjects without rounding off works out to be a figure with fraction then fraction up to two decimal places shall only be considered and the percentage of marks shall be calculated considering maximum marks as 300 and, If the percentage comes in fraction, rounding off shall be done as given in rule No. 2.11 to decide the eligibility.

   Example: If a candidate obtains 85 marks out of 200 in Physics, 76 marks out of 150 in Chemistry and 40 Marks out of 100 in Mathematics, then the sum of marks obtained works out to be 201 out of 450 marks. If it is converted out of 300, it works out to be 134.The % of marks comes out 44.6666 %.

   However if the marks in individual subjects are converted out of 100, then the marks are as 42.5 in Physics, 50.6666 in Chemistry and 40 in Mathematics. It means the sum of converted marks of individual subject is 133.1666, which is 133.16 up to two fractions. The % of marks comes out 44.38 % after rounding off it is 44%. Hence the candidate is not eligible for admission.

2. If **letter grades** are assigned instead of marks at SSC, HSC or its equivalent examination the candidate must obtain the certificate of conversion of letter of grades into marks from the competent authority where from the candidate has passed the examination. The candidate should produce such certificate at the time of submission of application form. The Eligibility shall be decided based on the equivalent marks submitted by such candidates.

Institute Level Seat and Vacant Seat.

1) Candidate passing the HSC (Std. XII) or its equivalent examination with subjects English, Physics, Chemistry and Mathematics and should have secured minimum 50% marks in General Category and reserve Category 45% marks in Physics, Chemistry and Mathematics added together.

2) Candidates passing Diploma in Engg. / Technology course from Maharashtra State:

Diploma holders who have passed the diploma course in Engineering/Technology with minimum of 50% marks and reserve Category 45% marks from the Polytechnics affiliated to MSBTE or AICTE approved autonomous Polytechnics in Maharashtra State.

B) Minimum level of acceptance, if any.

Eligibility criteria for Maharashtra State Candidate and Outside Maharashtra State Candidate-

Candidate should be an Indian National and should have passed the HSC (Std. XII) examination of Maharashtra State Board of Secondary and Higher Secondary Education or its equivalent examination with subjects English, Physics, Mathematics and Chemistry / Biotechnology / Biology / Technical Vocational subject

And

Secured minimum 50% marks (minimum 45% marks, in case of Backward class categories and Persons with Disability candidates belonging to Maharashtra State only) in the subjects

C) The cut-off levels of percentage & percentile scores of the candidates in the Admission test for the last three years.

Sr.	Branch	2014-15		2015-16		2016-17	
		JEE (M.S. Seats)	JEE (AI Seat)	JEE (M.S. Seats)	JEE (AI Seat)	JEE (M.S. Seats)	JEE (AI Seat)
1	Civil	54	43	18	32	98	13
2	Chemical	49	25	15	32	21	04
3	Computer	39	26	15	24	106	13
4	Electrical	42	34	15	35	52	07
5	Electronics & Tele.	56	35	13	50	19	17
6	Information Technology	50	13	28	66	18	08
7	Mechanical	50	54	20	31	107	18
8	Bio-Tech.	46	08	08	44	14	00

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Website- www.sscoetjalgaon.ac.in
Email: sscoetjal@gmail.com
Phone No. (0257) 2258393
Fax No. (0257) 2258392

Note:- (a) To be filled in and signed by the candidate.
(b) Application submitted without required certificates shall not be considered.
(c) Score out which is not applicable

1) Details of student

Particular	Surname	First Name	Middle Name
Name of Student			
Father Name			
Mother Name			

2) Date of birth:- _____

3) Address for correspondence :- _____

_____

Address for permanent:- _____

Pin Code _____ State _____

Telephone No. _____ Mobile No.:- _____

Email Address:- _____ Admitted in College Hostel :- Yes/No

4) (a) State & District from which you have passed SSC (Std. X) :-_____
(b) State & District from which you have passed HSC (Std. XII) :-_____

5) SEX :- (Male/Female) _____

6) Occupation of the Earning member(s) of the family :- _____

7) Annual income of the family:- _____

8) Indicate the category to which you belong (Tick appropriate box)

a) Category :- ( ) Open ( ) SC ( ) ST ( ) VJNT ( ) NT1 ( ) NT2
( ) NT3 ( ) OBC ( ) SBC

b) Minority :- ( ) Yes ( ) No Religion:- _____ Caste:- _____

c) Physically Handicapped :- ( ) Yes ( ) No

I) <u>U.G. Programme</u>: I hereby apply for admission to First / Second year of degree course in the branches given below in order of preference

1)_____ 2) _____ 3) _____

4)_____ 5) _____ 6) _____

7)_____ 8) _____

A) For F.E. & Direct S.E. students

PCM Total out of 300		**EXAM.**	**MERIT NO.**	**SCORE**
Category		MH-CET		
Branch Allotted		University Merit No.		
Final Year Diploma Marks Obtained /Out of		AIEEE		
Percentage HSC		State Merit No.		
Percentage Diploma		Main Group Merit		

B) Details of qualification (For F.E. & Direct S.E.):-

Examination	Month & Year of passing	Name & Address of Institution	Name & Address of Board/ University	Passed from M.S. or O.M.S.
S.S.C.				
H.S.C.				
Diploma final year				

C) S.S.C. Marks

Sr. No.	Subjects	Marks out of	Marks Obtained	Total percentage	Remark result
1	Mathematics				

D) H.S.C. Marks

Sr. No.	Subjects	Marks out of	Marks Obtained	Total PCM & percentage	Remark result
1	Physics				
2	Chemistry				
3	Mathematics				
4	Biology				
5	English				

II) <u>P.G. Programme</u>:- I hereby apply for admission to First year P.G. Programme in Engineering & Technology/ Management for M.E. Civil (Environmental Engg.)/ Mechanical (Machine Design) / E.& TC. (Digital Electronics) / Computer Science & Engineering/ M.B.A.

A) Academic Programme

1) First Year M.E. Course

i) Detail Qualification

Course & Examination	College Attended	Month & Year of Passing	No. of attempts	University/Boards	Total Marks Obtained	Max. Marks (Out of)	Percen-tage
1	2	3	4	5	6	7	8
1st Year Engineering							
2nd Year Engineering							
3rd Year Engineering							
4th Year Engineering							

ii) GATE Score: Valid up to

iii) Sponsored: ( ) Yes ( ) No

2) First Year M.B.A.

i) Details of qualification:-

Examination Passed	Name of Board/ University	Year	Subject Specialization	Marks	Percentage/ Score	Remark
S.S.C.						
H.S.C.						
Graduation						
Post graduation						
Any other exam.						

For M.B.A. Course		
EXAM.	**MERIT NO.**	**SCORE**
MH-CET		
University Merit No.		
Any other Entrance Test		

09) Work experience (attach extra sheet, if space is not enough)

Name of the Organization/Industry	Period	Nature of Work

10). Presently Employed or Unemployed? : Yes/No

If employed, give details

Name of Organization: _____

Date of appointment: _____

Regular/ Temporary :_____

11) Sponsorship certificate attached? Yes/No

(Note : Employed candidates will have to produce a certificate from the employer in the prescribed format attached with the form, without which the application may not be considered)

12) List of Certificates attached with application form:- Tick only available documents

1) CET Score Card (2) CAP Allotment letter (3) SSC (10^{th}) Marksheet
4) HSC (12^{th}) / Diploma Marksheet (5) Latest L.C./T.C. (6) Migration Certificate
7) Indian Nationality Certificate (8) Character/ Bonafide Certificate
9) First Attempt Certificate (10) Gap Affidavit (If applicable)
11) Caste Certificate (If applicable) (12) Validity Certificate (If applicable)
13) Non-Creamy Layer (If applicable) except SC/ST students only
14) Degree Marksheet (15) Degree Certificate
16) Experience Certificate (17) Sponsor Certificate
18) No Objection Certificate (19) Domicile Certificate

Please do not attach any original or photo copy of certificate not asked for.

However you shall have to submit all original certificates at the time of admission.

Declaration by the Candidates
(Undertaking)

I _____ declare that:

1) I have read all the Rules of Admission for the current year, after understanding these rules I have filled up this application form for the current year.
2) The information given by me in my application is true to the best of my knowledge and belief.
3) I have not been debarred from appearing at any examination held by any Govt. body constituted or statutory examination authority in India.
4) I fully understand that the offer of a course or branch of Engineering/ Technology/ Management will be made to me depending on my merit inter-se and availability of seat at the time of scrutiny of my application when I will report to the Admission Authority according to the schedule of the admission.
5) I understand that no other document other than those attached to the application form will be entertained for the purpose of claims/ concession etc. in connection with my admission.
6) I hereby agree to confirm to all rules and laws enforced by the Govt. including ragging Act 1999 of Maharashtra, the College Management and North Maharashtra University, Jalgaon. I hereby undertake that as long as I am a student of the college, I will do nothing either inside or outside the College which may result in disciplinary action against me under the act and laws refer to under rules Nos. 13-0. I will abide by all the rules of the Hostel, if I am given admission in to the Hostel.
7) I fully understand that the Principal of the college will have the right to expel/ rusticate me from the college for any infringement of the rules of conduct and discipline refer to under Rules No.13-0 and the rules of conduct and discipline prescribed by the College/University and the undertaking given above.
8) The total numbers of certificates attached with the application form are:_____

Place:
Date: Signature of the Candidate

Declaration by the Parents/Guardians
(Undertaking)

I _____ declare that the particulars furnished by my son/daughter/ward in this application form are correct to the best of my knowledge and belief.

I undertake & bind myself to pay on behalf my son/daughter/ward, such fees charges etc. which the College/Government of Maharashtra/University may levy from time to time by due date & in the event of failure on my part and/or on the part of my son/daughter/ward the Principal of the College may take such action against my son/daughter/ward as he may deem fit.

I will sign the requisite agreement bond as prescribed by the Government (In case or Minor only).

Place:
Date: Signature of the Parent/Guardian

A G R E E M E N T

I Shri/Shrimati/Kumari_____
(Name of the Candidate)
do hereby affirm that I have taken admission in _____ at College of Engineering & Technology, Jalgaon on my own and I solemnly declare that I will abide by all Rules & Regulation laid down by the Management of the aforesaid College, University and Government of Maharashtra, from time to time and if I fail to do so I will be liable for any punishment including expulsion from the College.

I shall not ask for transfer from the aforesaid College, to any other College, under any circumstances, I shall be responsible for full payment of fees and all dues for the entire course and shall not be entitled for refund of any fees at any stage.

Signature of the Father/Guardian Signature of the Student

Place:
Date

M E D I C A L C E R T I F I C A T E

I certify that I have carefully examined Shri/Kum._____
_____
on_____and hereby certify that him/her eye sight is good and that any minor defects in the same can be corrected by means of suitable glasses that he/she is fairly robust, his/her constitution is sound/is not likely to make him/her unfit for manual work in the workshop or active out-door service as an Engineer, (Score out whichever is not applicable)

Date: Signature_____

Address:_____ Name:_____

_____ Qualification_____

Registration No.:_____

UNDERTAKING-1

I, _____ taking admission in First Year/ Second Year_____ in the year 20 - 20 give an undertaking that as per the letter No.NMU/7/A/4718/2008, dated 27/09/2008, North Maharashtra University, Jalgaon I am not engaged in any job full time/part time. Similarly I have not taken admission in any other college within this University or any other University.

Date:- Signature of candidate

PRINCIPAL

UNDERTAKING-2

I, _____ interested to take admission in First Year/ Second Year_____ in the year 20 - 20 . As per North Maharashtra University, Jalgaon vide letter No.NMU/2/106/2002, dated 26/06/2002, I undertake that if I fail to maintain my attendance in the classes as per the rule means 80% out of total 180 working days then I will not be eligible to appear in College/University examinations. It is in my knowledge and I will not do any type of complaint against the same.

Date:- Signature of Candidate

Signature of Parents

PRINCIPAL

Shram Sadhana Bombay Trust's
COLLEGE OF ENGINEERING AND TECHNOLOGY,
BAMBHORI POST BOX NO. 94, JALGAON – 425001. (M.S.)
Included under section 2 (f) of the UGC Act, 1956
Included under section 12 (B) of the UGC Act, 1956
ISO 9001:2008 with NBA Accredited courses & ISO 9001 : 2008 certified

Website- www.sscoetjalgaon.ac.in Phone No. (0257) 2258393.
Email: sscoetjal@gmail.com Fax No. (0257) 2258392.

Chairman	Trustee	Principal
Dr. D.R. Shekhawat	Raosaheb Shri R.D. Shekhawat	Dr. Rakesh Mowar

GUIDELINES TO CURB THE MENACE OF RAGGING IN UNIVERSITIES/EDUCATIONAL INSTITUTIONS

What is ragging?

The word 'ragging' means the act of teasing, playing a practical joke upon some one or holding comic parades and other activities during certain period of a college term to raise money for charity.

Causes of ragging:

Eagerness of seniors to show off their power, authority, superiority.
An attitude of backlash – a 'do unto others did to you'.
(similar to mother-in-law Vs daughter-in-law syndrome)

Recommendations:

Before ragging to any individual please read the following and remember the cost of this heinous crime.

MAHARASHTRA ACT NO. XXXIII OF 1999:

1) This Act may be called the Maharashtra Prohibition of Ragging Act, 1999

HIGHER AND TECHNICAL EDUCATION DEPARTMENT

Mantralaya Annexe, Mumbai 400 032, dated the 19th May 1999.

NOTIFICATION

Maharashtra Prohibition of Ragging Act, 1999.

No Sankirana 1098 (133/98)/UNI-3-In exercise of the powers conferred by sub- section (2) of section 1 of the Maharashtra Prohibition of Ragging Act, 1999 (Mah. XXXIII of 1999) the Government of Maharashtra hereby appoints the First day of June 1999 to be the date on which the said Act shall come in to force. By order and in the name of the Governor of Maharashtra.

V.P. Raja
Secretary of Government

PROHIBITION OF RAGGING: Ragging within or outside of any educational institution is prohibited.

PENALTY OF RAGGING: Whoever directly or indirectly commits, participates in a beta or propagates ragging within or outside any education institution shall, on conviction, be punished with imprisonment for a term which may extend to two years and shall also be a liable to fine which may extend to ten thousand rupees.

DISMISSAL OF STUDENT: Any student convicted of an offence under section 4 shall be dismissed from the educational institution and such student shall not be admitted in any other educational institution for a period of the five years from the date of order such of dismissal.

SUSPENSION OF STUDENT:

1. Whenever any student or, as the case may be, the parent or guardian, or a teacher of an educational institution complaints, in writing, of ragging to the head of the educational institution who shall, without prejudice to the foregoing provisions, within seven days of the receipt of the complaint, enquire into the matter mentioned in the complaint and if, prima facie, it is found true, suspend the student who is accused of the offence, and shall immediately forward the complaint to the police station having jurisdiction over the area in which the educational institution is situated, for further action.
2. Where, one enquiry by the head of the educational institution, it is proved that there is substance, prima facie, in the complaint received under sub-section (i) he shall intimate the fact, in writing to the complainant.
3. The decision of the head of the educational institution that the students has indulged in ragging under sub-section (l), shall be final.

UNDERTAKING BY STUDENTS AND THEIR PARENTS:

Following two undertakings should be taken through the Head of the concerning Departments at the beginning of First Session from the students of II year onwards.

1) UNDERTAKING FROM THE STUDENTS

Name of the student _____

_____

Branch & Class _____

Address _____

_____

Affix Passport size Photo

I am aware of the law that ragging in educational institutions or its hostels is a cognizable offence. If it is committed while under institution by anyone is liable to rigorous punishments, expelled from classes and / or rustication from the college and / hostel.

Date:-_____

Signature of student

2) UNDERTAKING FROM THE PARENTS/GUARDIANS

My son/daughter/ward Name_____
has secured admission in the college in the session_____

I am aware of the law of ragging in educational institutions and agree to abide by the punishment to my son/daughter/ward in case he/she is found guilty of the offence of ragging.

Date:-_____

Signature of Parents/Guardian
Full Name:_____
_____
Address:_____
_____
_____
Ph. No. _____

3) I am not in service or in part time service nor I will do so during tenure of my study in the college.

Signature of student
Address:_____
_____
Ph. No. _____

STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Bio Technology [510408210]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 30

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
1.	Round-I	56708	70	MHT-CET	EN17101148	NAKADE SNEHAL PRAVIN	Female	Type A	GU	OBC	--	58.00	LOBCO	67640	28/07/2017	28/07/2017
2.	Round-I	97587	52	MHT-CET	EN17322425	VISHAL RAMDAS VALVI	Male	Type A	NMU	ST	--	71.33	GSTH	8913	28/07/2017	28/07/2017
3.	Round-I	101221	49	MHT-CET	EN17283174	ROHAN SITARAM THAKARE	Male	Type A	NMU	SC	--	81.67	GSCH	8913	28/07/2017	28/07/2017
4.	Round-II	40727	78	MHT-CET	EN17250708	SANKET PRAVIN SONAWANE	Male	Type A	NMU	OBC	--	54.33	GOPENH	14000	28/07/2017	28/07/2017
5.	Round-II	67538	65	MHT-CET	EN17248139	MUJMULE PUNAM GULABRAO	Female	Type A	SGBAU	SC	--	49.67	LSCH	8913	26/07/2017	26/07/2017
6.	Round-II	71706	63	MHT-CET	EN17314587	PALIWAL GAURAV ARUN	Male	Type A	NMU	OBC	--	58.00	GOPENH	15000	28/07/2017	28/07/2017
7.	Round-III	64715	66	MHT-CET	EN17182035	SHRUSHTI SONKUSARE	Female	Type A	RTMNU	SBC	--	70.33	GOPENO	30000	27/07/2017	27/07/2017
8.	Round-III	73513	63	MHT-CET	EN17277441	KHAMBAYAT MAYUR BHAGWAN	Male	Type A	NMU	OBC	--	52.67	GOPENH	36277	26/07/2017	26/07/2017
9.	Round-III	75040	62	MHT-CET	EN17299374	CHAVHAN RAHUL UDAL	Male	Type A	NMU	DT/VJ	--	52.33	GOPENH	3500	29/07/2017	29/07/2017
10.	Round-III	81440	60	MHT-CET	EN17269827	NHALADE MANASI SHASHIKANT	Female	Type A	NMU	NT-C	--	73.67	LOPENH	4913	27/07/2017	27/07/2017
11.	Round-III	81739	60	MHT-CET	EN17214059	BORKAR MRINAL BHIMRAO	Female	Type A	RTMNU	SC	--	61.67	GSCO	8913	28/07/2017	28/07/2017
12.	Round-III	95198	53	MHT-CET	EN17249802	PATIL SHUBHAM VIKAS	Male	Type A	NMU	OBC	--	64.67	GOBCH	5000	29/07/2017	29/07/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Bio Technology [510408210]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 30

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
13.	Round-III	95407	53	MHT-CET	EN17165474	CHAUDHARI DIPALI ASHOK	Female	Type A	NMU	OBC	--	69.67	LOBCH	5000	28/07/2017	28/07/2017
14.	Round-III	95593	53	MHT-CET	EN17254310	SHARMA ARATI SANJAY	Female	Type A	NMU	Open	--	59.00	PWDC	20000	28/07/2017	28/07/2017
15.	Round-III	96972	52	MHT-CET	EN17199896	PATIL KUNAL PUNDALIK	Male	Type A	NMU	OBC	--	49.17	GNT2H	14000	28/07/2017	28/07/2017
16.	Round-III	102894	48	MHT-CET	EN17161047	PATIL ADITI AJAY	Female	Type A	SGBAU	OBC	--	67.67	GVJH	36277	27/07/2017	27/07/2017
17.	Round-II	26519	43	JEE	EN17186111	RAMTEKE MANVI AJAY	Female	Type A	RTMNU	SC	--	66.33	AI	5000	29/07/2017	29/07/2017
18.	Round-III	55098	20	JEE	EN17173488	JAIN CHETAN MIYACHAND	Male	Type A	MU	Open	--	52.33	AI	35000	27/07/2017	27/07/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Bio Technology [510408210]

List of Candidates Admitted Under Against CAP (Excluding Minority) Vacant Seats

Number of Seats : 12

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
19.	Institute Level	1	76	MHT-CET	EN17302244	MUDE NEHA ANIL	Female	Type A	GU	OBC	--	50.33	ACAP	15000	28/07/2017	06/08/2017
20.	Institute Level	2	70	MHT-CET	EN17131259	CHHABDA ARTI LALCHAND	Female	Type A	NMU	Open	--	65.67	ACAP	15000	28/07/2017	06/08/2017
21.	Institute Level	3	57	MHT-CET	EN17301418	GIRIRAJ KABRA	Male	OMS	NA	Open	--	50.33	ACAP	40000	28/07/2017	06/08/2017
22.	Institute Level	4	56	MHT-CET	EN17269615	SHINDE KOMAL RAJENDRA	Female	Type A	NMU	OBC	--	51.67	ACAP	2000	04/08/2017	06/08/2017
23.	Institute Level	5	47	MHT-CET	EN17270429	BHAVE ATHARVA RAJESH	Male	Type A	DBAMU	Open	--	54.00	ACAP	40000	28/07/2017	06/08/2017
24.	Institute Level	7	60	MHT-CET	EN17338523	NIRAJ NANDAKISHOR BARI	Male	Type A	NMU	OBC	--	59.67	ACAP	1000	09/08/2017	09/08/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Bio Technology [510408210]

List of Candidates Admitted Under Supernumerary / Over and Above Seats [NRI / PIO / CIWGC / FN / PMSSS / NEUT / J&K Migrant]

Number of Seats : 1

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
1.	Institute Level	1	NA	NA	EN17340777	IBREEN MUSHTAQ	Female	JKSSS	NA	Open	--	50.67	JKSSS	0	09/09/2017	24/11/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

Summary of Admitted Candidates for Admission to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Bio Technology [510408210]

Sr. No.	Admission Details	Intake	Admitted / Uploaded Before Cut Off Date	Admitted / Uploaded After Cut Off Date	Total Admitted
1.	CAP (Excluding Minority)	30	18	0	18
2.	Against CAP (Excluding Minority)		6	0	6
3.	CAP (Minority)	0	0	0	0
4.	Against CAP (Minority)		0	0	0
5.	Institute Level	0	0	0	0
6.	J&K Migrant		0	0	0
7.	NRI/OCI/PIO/FNS/CIWGC/JKSSS/NEUT		0	1	1
8.	Over and Above		0	0	0
	Total	**30**	**24**	**1**	**25**

Seat Type used for Institute Level Admissions : ACAP-Against CAP (Excluding Minority), IL-Institute Level, ILNRI-Institute Level NRI (5% of SI if AICTE Permission), MI-Minority, NRI-NRI (15% of SI if AICTE Permission), PIO-PIO (15% of SI if AICTE Permission), FNS-FNS (15% of SI if AICTE Permission), CIWGC-Children's of Indian Workers in Gulf Countries (15% of SI if AICTE Permission), JKSSS - Prime Minister Special Scholarship Scheme, NEUT - North Eastern States and UTs, OAA-Over and Above

Home University used for Admissions : DBAMU - Dr. B. A. Marathwada University, GU - Gondwana University, MU - Mumbai University, NMU - North Maharashtra University, RTMNU - Rashtrasant Tukadoji Maharaj Nagpur University, SGBAU - Sant Gadge Baba Amravati University, SOLU - Solapur University, SPPU - Savitribai Phule Pune University, SRTMU - S. R. T. Marathwada University, SVJU - Shivaji University, NA - Not Applicable

Cut-Off Date for Admission : 31/08/2017
Cut-Off Date for Uploading : 01/09/2017

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Seal of the Regional Office **Signature of the Regional Officer**

STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Bio Technology [510408211T]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 2

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
1.	Round-I	32582	84	MHT-CET	EN17249062	FIRKE MEGHA VASUDEO	Female	Type A	SGBAU	OBC	--	77.67	TFWS	4913	25/07/2017	25/07/2017
2.	Round-III	39564	79	MHT-CET	EN17183294	AGRAWAL SHITAL SHRIKISAN	Female	Type A	DBAMU	Open	--	67.00	TFWS	4913	27/07/2017	27/07/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

Summary of Admitted Candidates for Admission to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Bio Technology [510408211T]

Sr. No.	Admission Details	Intake	Admitted / Uploaded Before Cut Off Date	Admitted / Uploaded After Cut Off Date	Total Admitted
1.	CAP (Excluding Minority)	2	2	0	2
2.	Against CAP (Excluding Minority)		0	0	0
3.	CAP (Minority)	0	0	0	0
4.	Against CAP (Minority)		0	0	0
5.	Institute Level	0	0	0	0
6.	J&K Migrant		0	0	0
7.	NRI/OCI/PIO/FNS/CIWGC/JKSSS/NEUT		0	0	0
8.	Over and Above		0	0	0
	Total	**2**	**2**	**0**	**2**

Seat Type used for Institute Level Admissions : ACAP-Against CAP (Excluding Minority), IL-Institute Level, ILNRI-Institute Level NRI (5% of SI if AICTE Permission), MI-Minority, NRI-NRI (15% of SI if AICTE Permission), PIO-PIO (15% of SI if AICTE Permission), FNS-FNS (15% of SI if AICTE Permission), CIWGC-Children's of Indian Workers in Gulf Countries (15% of SI if AICTE Permission), JKSSS - Prime Minister Special Scholarship Scheme, NEUT - North Eastern States and UTs, OAA-Over and Above

Home University used for Admissions : DBAMU - Dr. B. A. Marathwada University, GU - Gondwana University, MU - Mumbai University, NMU - North Maharashtra University, RTMNU - Rashtrasant Tukadoji Maharaj Nagpur University, SGBAU - Sant Gadge Baba Amravati University, SOLU - Solapur University, SPPU - Savitribai Phule Pune University, SRTMU - S. R. T. Marathwada University, SVJU - Shivaji University, NA - Not Applicable

Cut-Off Date for Admission : 31/08/2017
Cut-Off Date for Uploading : 01/09/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Chemical Engineering [510450710]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 30

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
1.	Round-I	37924	80	MHT-CET	EN17118360	PATIL SURHUD BHARAT	Male	Type A	NMU	OBC	--	67.67	GOPENH	36277	26/07/2017	26/07/2017
2.	Round-I	52813	71	MHT-CET	EN17112671	VERMA YOGESH JUGALKISHOR	Male	Type A	RTMNU	OBC	--	51.00	GOBCO	36277	27/07/2017	27/07/2017
3.	Round-I	92621	55	MHT-CET	EN17277008	NAGARALE VISHAL SURESH	Male	Type A	NMU	SC	--	49.33	GSCH	8913	25/07/2017	25/07/2017
4.	Round-II	46562	74	MHT-CET	EN17215341	PATIL SWAPNIL ANIL	Male	Type A	NMU	OBC	--	49.33	GOPENH	25000	29/07/2017	29/07/2017
5.	Round-II	53836	71	MHT-CET	EN17304464	PATIL PRATIK MANOJ	Male	Type A	NMU	OBC	--	64.33	GOBCH	20000	29/07/2017	29/07/2017
6.	Round-II	53967	71	MHT-CET	EN17322920	NIKHIL YOGRAJ PATIL	Male	Type A	NMU	OBC	--	58.33	GOBCH	25000	26/07/2017	26/07/2017
7.	Round-II	54414	71	MHT-CET	EN17249198	PATIL HARSHAL SUNIL	Male	Type A	NMU	OBC	--	70.33	GOBCH	29000	25/07/2017	25/07/2017
8.	Round-II	56985	69	MHT-CET	EN17154376	KOLI YOGESH RAJENDRA	Male	Type A	NMU	SBC	--	46.00	LSTH	4913	25/07/2017	25/07/2017
9.	Round-II	57778	69	MHT-CET	EN17218922	PATIL BHAGYASHRI BHIMSING	Female	Type A	NMU	Open	--	68.33	LOPENH	19000	28/07/2017	28/07/2017
10.	Round-II	65165	66	MHT-CET	EN17130164	JADHAV PRAJAKTA KISHOR	Female	Type A	NMU	Open	--	58.67	LOPENH	67640	26/07/2017	26/07/2017
11.	Round-II	69329	64	MHT-CET	EN17291573	CHAUDHARI TANUJA VISHNU	Female	Type A	NMU	OBC	--	55.00	LOBCH	36277	25/07/2017	25/07/2017
12.	Round-III	37907	80	MHT-CET	EN17122573	PATIL KUNAL SATISH	Male	Type A	NMU	OBC	--	46.67	GOPENH	36277	26/07/2017	26/07/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Chemical Engineering [510450710]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 30

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
13.	Round-III	44838	75	MHT-CET	EN17186002	TEJANE ROSHAN PANDURANGJI	Male	Type A	RTMNU	OBC	--	67.67	GOPENO	15000	29/07/2017	29/07/2017
14.	Round-III	52026	72	MHT-CET	EN17117898	THAKRE DARSHAN VIJAYRAO	Male	Type A	RTMNU	OBC	--	62.00	LSTO	20000	28/07/2017	28/07/2017
15.	Round-III	52421	72	MHT-CET	EN17209137	CHANKAPURE ABHISHEK SHYAMDEO	Male	Type A	RTMNU	SC	--	80.33	GOPENO	8913	27/07/2017	27/07/2017
16.	Round-III	56054	70	MHT-CET	EN17132250	PATIL VAIBHAV RAVINDRA	Male	Type A	NMU	OBC	--	49.00	DEFS	20000	27/07/2017	27/07/2017
17.	Round-III	73334	63	MHT-CET	EN17204218	BHARAMBE PRAJAKTA DILIP	Female	Type A	SGBAU	OBC	--	79.67	LOPENO	20000	26/07/2017	26/07/2017
18.	Round-I	6654	88	JEE	EN17166710	YEOLE PRASHANT LAHU	Male	Type A	DBAMU	Open	--	66.00	AI	10000	30/07/2017	30/07/2017
19.	Round-II	24013	45	JEE	EN17272933	KALE AJAY ANIL	Male	Type A	SGBAU	OBC	--	62.67	AI	5000	26/07/2017	26/07/2017
20.	Round-II	26047	43	JEE	EN17127497	SAURAV ANANDRAO PATIL	Male	Type A	NMU	OBC	--	50.50	AI	36277	25/07/2017	25/07/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Chemical Engineering [510450710]

List of Candidates Admitted Under Against CAP (Excluding Minority) Vacant Seats

Number of Seats : 10

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
21.	Institute Level	1	70	MHT-CET	EN17295840	KATE MAYURI SANJAY	Female	Type A	NMU	Open	--	60.00	ACAP	30000	31/07/2017	06/08/2017
22.	Institute Level	2	62	MHT-CET	EN17280259	PAWAR KALPESH ANIL	Male	Type A	NMU	Open	--	74.00	ACAP	20000	31/07/2017	06/08/2017
23.	Institute Level	3	61	MHT-CET	EN17274875	PATIL GAURAV KISAN	Male	Type A	NMU	OBC	--	69.67	ACAP	35000	31/07/2017	06/08/2017
24.	Institute Level	4	48	MHT-CET	EN17337265	GANESH SANJAY SANER	Male	Type A	NMU	OBC	--	57.00	ACAP	20000	31/07/2017	06/08/2017
25.	Institute Level	5	45	MHT-CET	EN17284928	CHAUDHARI JAYESH LAXMAN	Male	Type A	NMU	OBC	--	78.67	ACAP	15000	31/07/2017	06/08/2017
26.	Institute Level	6	40	MHT-CET	EN17210421	DEEPRAJ GOVINDSING RAJPUT	Male	Type A	NMU	Open	--	73.33	ACAP	20000	31/07/2017	06/08/2017
27.	Institute Level	7	37	JEE	EN17182427	NIMISH SHASTRI	Male	OMS	NA	Open	--	61.33	ACAP	40000	29/07/2017	06/08/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

Summary of Admitted Candidates for Admission to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Chemical Engineering [510450710]

Sr. No.	Admission Details	Intake	Admitted / Uploaded Before Cut Off Date	Admitted / Uploaded After Cut Off Date	Total Admitted
1.	CAP (Excluding Minority)	30	20	0	20
2.	Against CAP (Excluding Minority)		7	0	7
3.	CAP (Minority)	0	0	0	0
4.	Against CAP (Minority)		0	0	0
5.	Institute Level	0	0	0	0
6.	J&K Migrant		0	0	0
7.	NRI/OCI/PIO/FNS/CIWGC/JKSSS/NEUT		0	0	0
8.	Over and Above		0	0	0
	Total	**30**	**27**	**0**	**27**

Seat Type used for Institute Level Admissions : ACAP-Against CAP (Excluding Minority), IL-Institute Level, ILNRI-Institute Level NRI (5% of SI if AICTE Permission), MI-Minority, NRI-NRI (15% of SI if AICTE Permission), PIO-PIO (15% of SI if AICTE Permission), FNS-FNS (15% of SI if AICTE Permission), CIWGC-Children's of Indian Workers in Gulf Countries (15% of SI if AICTE Permission), JKSSS - Prime Minister Special Scholarship Scheme, NEUT - North Eastern States and UTs, OAA-Over and Above

Home University used for Admissions : DBAMU - Dr. B. A. Marathwada University, GU - Gondwana University, MU - Mumbai University, NMU - North Maharashtra University, RTMNU - Rashtrasant Tukadoji Maharaj Nagpur University, SGBAU - Sant Gadge Baba Amravati University, SOLU - Solapur University, SPPU - Savitribai Phule Pune University, SRTMU - S. R. T. Marathwada University, SVJU - Shivaji University, NA - Not Applicable

Cut-Off Date for Admission : 31/08/2017
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List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Chemical Engineering [510450711T]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 2

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
1.	Round-II	43880	76	MHT-CET	EN17273499	PATIL PRASHANT PRADIP	Male	Type B	NMU	OBC	--	53.33	TFWS	4913	25/07/2017	25/07/2017
2.	Round-III	46249	75	MHT-CET	EN17211643	BANIYA SAKSHI SADASHIV	Female	Type A	SGBAU	Open	--	74.67	TFWS	4913	26/07/2017	26/07/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

Summary of Admitted Candidates for Admission to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Chemical Engineering [510450711T]

Sr. No.	Admission Details	Intake	Admitted / Uploaded Before Cut Off Date	Admitted / Uploaded After Cut Off Date	Total Admitted
1.	CAP (Excluding Minority)	2	2	0	2
2.	Against CAP (Excluding Minority)		0	0	0
3.	CAP (Minority)	0	0	0	0
4.	Against CAP (Minority)		0	0	0
5.	Institute Level	0	0	0	0
6.	J&K Migrant		0	0	0
7.	NRI/OCI/PIO/FNS/CIWGC/JKSSS/NEUT		0	0	0
8.	Over and Above		0	0	0
	Total	**2**	**2**	**0**	**2**

Seat Type used for Institute Level Admissions : ACAP-Against CAP (Excluding Minority), IL-Institute Level, ILNRI-Institute Level NRI (5% of SI if AICTE Permission), MI-Minority, NRI-NRI (15% of SI if AICTE Permission), PIO-PIO (15% of SI if AICTE Permission), FNS-FNS (15% of SI if AICTE Permission), CIWGC-Children's of Indian Workers in Gulf Countries (15% of SI if AICTE Permission), JKSSS - Prime Minister Special Scholarship Scheme, NEUT - North Eastern States and UTs, OAA-Over and Above

Home University used for Admissions : DBAMU - Dr. B. A. Marathwada University, GU - Gondwana University, MU - Mumbai University, NMU - North Maharashtra University, RTMNU - Rashtrasant Tukadoji Maharaj Nagpur University, SGBAU - Sant Gadge Baba Amravati University, SOLU - Solapur University, SPPU - Savitribai Phule Pune University, SRTMU - S. R. T. Marathwada University, SVJU - Shivaji University, NA - Not Applicable

Cut-Off Date for Admission : 31/08/2017
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305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Civil Engineering [510419110]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 120

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
1.	Round-I	30945	85	MHT-CET	EN17308619	SAMDANI TEJAS MAHESH	Male	Type A	NMU	Open	--	71.50	GOPENH	20000	27/07/2017	27/07/2017
2.	Round-I	33182	83	MHT-CET	EN17292467	PATIL TEJAL RAJESH	Female	Type A	NMU	OBC	--	56.33	LOPENO	36277	27/07/2017	27/07/2017
3.	Round-I	46743	74	MHT-CET	EN17144713	PATIL PAWAN RAMKRISHNA	Male	Type A	NMU	OBC	--	52.67	GOPENH	36277	25/07/2017	25/07/2017
4.	Round-I	46854	74	MHT-CET	EN17115074	NAEEM AJIT TADAVI	Male	Type A	NMU	ST	--	73.00	GOPENH	8913	25/07/2017	25/07/2017
5.	Round-I	47230	74	MHT-CET	EN17293741	PATIL TANVI DILIP	Female	Type A	NMU	OBC	--	70.00	LOPENH	36277	26/07/2017	26/07/2017
6.	Round-I	49870	73	MHT-CET	EN17276733	GHUGE BHUMESH PRADIP	Male	Type A	NMU	NT-D	--	74.50	GOPENH	4913	26/07/2017	26/07/2017
7.	Round-I	53322	71	MHT-CET	EN17225288	PATIL SHUBHAM VIKAS	Male	Type A	NMU	NT-C	--	50.67	GOPENH	4913	26/07/2017	26/07/2017
8.	Round-I	54273	71	MHT-CET	EN17321136	KURE MONIKA PRAKASH	Female	Type A	NMU	Open	--	59.00	LOPENH	10000	27/07/2017	27/07/2017
9.	Round-I	56775	70	MHT-CET	EN17302712	BORSE JITENDRA MACHHINDRA	Male	Type A	NMU	OBC	--	50.00	GOPENH	36277	25/07/2017	25/07/2017
10.	Round-I	57210	69	MHT-CET	EN17173386	JADHAV TEJASWINI DEVIDAS	Female	Type A	SGBAU	SC	--	66.67	LOPENO	8913	28/07/2017	28/07/2017
11.	Round-I	57211	69	MHT-CET	EN17191618	CHAUDHARI DINESH SUNIL	Male	Type A	NMU	OBC	--	64.00	GOPENH	21000	25/07/2017	25/07/2017
12.	Round-I	57935	69	MHT-CET	EN17312127	VAIBHAV	Male	Type A	NMU	OBC	--	44.67	GOPENH	10000	26/07/2017	26/07/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Civil Engineering [510419110]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 120

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
13.	Round-I	57946	69	MHT-CET	EN17280390	JADHAV PALLAVI BHABUT	Female	Type A	NMU	DT/VJ	--	70.67	LOPENH	4913	27/07/2017	27/07/2017
14.	Round-I	60167	68	MHT-CET	EN17158643	PATIL HEMANT SATEESH	Male	Type A	NMU	OBC	--	45.33	GOPENH	15000	26/07/2017	26/07/2017
15.	Round-I	60577	68	MHT-CET	EN17147785	PATIL MAYUR SOPAN	Male	Type A	NMU	DT/VJ	--	61.17	GOPENH	4913	25/07/2017	25/07/2017
16.	Round-I	61727	67	MHT-CET	EN17157373	MAYUR SANJAY INGALE	Male	Type A	NMU	OBC	--	57.33	GOPENH	25000	25/07/2017	25/07/2017
17.	Round-I	64018	66	MHT-CET	EN17285612	TAYADE MUDITA KISHOR	Female	Type A	NMU	SC	--	67.67	LSCO	8913	25/07/2017	25/07/2017
18.	Round-I	64317	66	MHT-CET	EN17287270	DIPTI DIGAMBAR PATIL	Female	Type A	NMU	Open	--	61.00	LOPENH	25000	25/07/2017	25/07/2017
19.	Round-I	64640	66	MHT-CET	EN17251240	PAGARE SAKSHI MUKUND	Female	Type A	NMU	SC	--	66.67	LSCO	8000	26/07/2017	26/07/2017
20.	Round-I	65866	66	MHT-CET	EN17196032	PATIL HARSHADA GOTU	Female	Type A	NMU	OBC	--	71.00	LOBCO	36277	25/07/2017	25/07/2017
21.	Round-I	67273	65	MHT-CET	EN17191726	VALVI RAJESHWARI GOVIND	Female	Type A	NMU	ST	--	54.67	LSTO	8913	26/07/2017	26/07/2017
22.	Round-I	69119	64	MHT-CET	EN17182876	RATHOD KAJAL DNYANESHWAR	Female	Type A	DBAMU	DT/VJ	--	79.00	LOPENO	4913	28/07/2017	28/07/2017
23.	Round-I	70836	64	MHT-CET	EN17312387	DESHMUKH SAURABH MANOJ	Male	Type A	NMU	NT-C	--	50.00	GNT2H	4913	28/07/2017	28/07/2017
24.	Round-I	72357	63	MHT-CET	EN17257043	KHADSE TRUPTI DIPAK	Female	Type A	NMU	OBC	--	52.33	LOBCH	20000	27/07/2017	27/07/2017

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305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Civil Engineering [510419110]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 120

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
25.	Round-I	76560	61	MHT-CET	EN17179846	BORSE AMIT MADHUKAR	Male	Type A	NMU	OBC	--	44.67	GOBCH	20000	26/07/2017	26/07/2017
26.	Round-I	76909	61	MHT-CET	EN17307337	KAPADNER DINESH DATTATRAYA	Male	Type A	SPPU	OBC	--	63.67	GOPENO	20000	26/07/2017	26/07/2017
27.	Round-I	79506	60	MHT-CET	EN17250529	PATIL SHITAL RAGHUNATH	Female	Type A	NMU	DT/VJ	--	64.67	LVJH	4913	27/07/2017	27/07/2017
28.	Round-I	79838	60	MHT-CET	EN17212078	PAWAR VIDYA PADMAKAR	Female	Type A	NMU	SC	--	69.33	LSCH	8913	28/07/2017	28/07/2017
29.	Round-I	80850	60	MHT-CET	EN17322897	BHILALA ROHIT NANDKISHOR	Male	Type A	NMU	ST	--	61.67	GSTH	8913	29/07/2017	29/07/2017
30.	Round-I	85464	58	MHT-CET	EN17217164	PATIL PRASHANT HILAL	Male	Type A	MU	OBC	--	53.67	GOPENO	36277	25/07/2017	25/07/2017
31.	Round-I	86062	58	MHT-CET	EN17288055	WANKHEDE NEHA CHUDAMAN	Female	Type A	NMU	SC	--	57.00	LSCH	8913	29/07/2017	29/07/2017
32.	Round-I	87252	57	MHT-CET	EN17171476	DEORE ASHWINI RAJENDRA	Female	Type A	NMU	NT-B	--	69.33	LNT1H	4913	25/07/2017	25/07/2017
33.	Round-I	90517	56	MHT-CET	EN17142504	PATIL NILESH SANJAY	Male	Type A	DBAMU	Open	--	66.33	GOPENO	15000	25/07/2017	25/07/2017
34.	Round-I	91606	55	MHT-CET	EN17161051	MORE PRATIK VASANT	Male	Type A	NMU	SC	--	70.00	GSCH	8913	25/07/2017	25/07/2017
35.	Round-I	92793	55	MHT-CET	EN17173790	UMESH	Male	Type A	NMU	SC	--	74.33	GSCH	1000	29/07/2017	29/07/2017
36.	Round-I	92920	55	MHT-CET	EN17278070	NANAVATE PRANIT PRABHAKAR	Male	Type A	NMU	NT-D	--	66.00	GNT3H	4913	26/07/2017	26/07/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Civil Engineering [510419110]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 120

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
37.	Round-I	93951	54	MHT-CET	EN17301545	PAWARA ARUNESH LALSING	Male	Type A	NMU	ST	--	68.00	GSTO	8913	25/07/2017	25/07/2017
38.	Round-I	98429	51	MHT-CET	EN17280668	KEDAR DIKSHA BHAIDAS	Female	Type A	NMU	SC	--	57.33	GSCH	8913	28/07/2017	28/07/2017
39.	Round-I	99035	51	MHT-CET	EN17179286	RATHOD RAMDEO PREMSING	Male	Type A	DBAMU	DT/VJ	--	57.00	GOPENO	4913	26/07/2017	26/07/2017
40.	Round-I	100377	50	MHT-CET	EN17317050	HIROLE PRATIKSHA ASHOK	Female	Type A	NMU	SC	--	47.33	GSCH	5000	26/07/2017	26/07/2017
41.	Round-I	101154	49	MHT-CET	EN17322341	WAGH POONAM RAJENDRA	Female	Type A	NMU	NT-D	--	45.33	LNT3H	4913	28/07/2017	28/07/2017
42.	Round-II	40711	78	MHT-CET	EN17285065	THAKARE DIPTI ASHOK	Female	Type A	NMU	SBC	--	68.33	LOPENO	4913	25/07/2017	25/07/2017
43.	Round-II	46513	74	MHT-CET	EN17124560	PATIL MAYURI PRADIP	Female	Type A	NMU	OBC	--	55.33	LOPENH	16000	26/07/2017	26/07/2017
44.	Round-II	52546	71	MHT-CET	EN17211032	PRATIK	Male	Type A	NMU	OBC	--	62.00	GOPENH	36277	25/07/2017	25/07/2017
45.	Round-II	52984	71	MHT-CET	EN17146567	MARATHE PRATHA HEMANT	Female	Type A	NMU	OBC	--	87.67	LOPENH	36277	25/07/2017	25/07/2017
46.	Round-II	58132	69	MHT-CET	EN17207192	PATIL NIKITA KISAN	Female	Type A	NMU	OBC	--	60.33	LOPENH	10000	27/07/2017	27/07/2017
47.	Round-II	64115	66	MHT-CET	EN17258871	PATIL NARENDRA PITAMBAR	Male	Type A	NMU	OBC	--	53.00	GOPENH	16000	29/07/2017	29/07/2017
48.	Round-II	65345	66	MHT-CET	EN17281943	PATIL SHRADDHA SANJIV	Female	Type A	NMU	OBC	--	66.33	LOBCO	20000	26/07/2017	26/07/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Civil Engineering [510419110]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 120

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
49.	Round-II	65794	66	MHT-CET	EN17288210	VISHAL BHUPENDRA THORAT	Male	Type A	NMU	OBC	--	69.00	GOPENH	20000	26/07/2017	26/07/2017
50.	Round-II	66757	65	MHT-CET	EN17303497	PATIL GANESH SHAMLAL	Male	Type A	NMU	OBC	--	68.33	GOPENH	12000	26/07/2017	26/07/2017
51.	Round-II	70418	64	MHT-CET	EN17296482	PAWARA ROSHANI SHIVLAL	Female	Type A	NMU	ST	--	65.33	LOPENH	4913	25/07/2017	25/07/2017
52.	Round-II	70693	64	MHT-CET	EN17322661	PATIL SWAPNIL SURESH	Male	Type A	NMU	OBC	--	50.67	GOPENH	15000	28/07/2017	28/07/2017
53.	Round-II	72142	63	MHT-CET	EN17203430	MOHAMMAD ABUZAR SHAIKH ASLAM BAGWAN	Male	Type A	SPPU	OBC	--	53.00	GOPENO	5000	25/07/2017	25/07/2017
54.	Round-II	74041	62	MHT-CET	EN17286468	PATIL SAURABH KIRANSING	Male	Type A	NMU	DT/VJ	--	54.33	GVJH	4400	26/07/2017	26/07/2017
55.	Round-II	74631	62	MHT-CET	EN17278916	PATIL SNEHAL SUNIL	Female	Type A	NMU	OBC	--	69.33	LOBCH	36277	25/07/2017	25/07/2017
56.	Round-II	76530	62	MHT-CET	EN17206029	PANDHARE RANJEET VIJAY	Male	Type A	NMU	SBC	--	65.33	GOBCH	4913	28/07/2017	28/07/2017
57.	Round-II	79035	61	MHT-CET	EN17284062	SONAWANE KUNAL SANJAY	Male	Type A	NMU	OBC	--	54.00	GOBCH	36277	26/07/2017	26/07/2017
58.	Round-II	79698	60	MHT-CET	EN17253744	SAPKALE RAHUL DILIP	Male	Type A	NMU	SBC	--	44.67	GOBCH	4913	26/07/2017	26/07/2017
59.	Round-II	79791	60	MHT-CET	EN17318994	VISPUTE VAIBHAV SUNIL	Male	Type A	NMU	OBC	--	63.33	GOBCO	36277	25/07/2017	25/07/2017
60.	Round-II	79854	60	MHT-CET	EN17181350	HRISHIKESH	Male	Type A	NMU	OBC	--	58.67	GOBCH	20000	27/07/2017	27/07/2017

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305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Civil Engineering [510419110]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 120

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
61.	Round-II	84630	58	MHT-CET	EN17251057	KASAR POOJA RAVINDRA	Female	Type A	NMU	OBC	--	52.67	LOBCH	10000	27/07/2017	27/07/2017
62.	Round-II	85659	58	MHT-CET	EN17290816	DEORE RAJESHWARI SATISH	Female	Type A	NMU	OBC	--	52.33	GOBCO	20000	27/07/2017	27/07/2017
63.	Round-II	85863	58	MHT-CET	EN17176439	SAPKALE JAYSHREE BHAGWAT	Female	Type A	NMU	SBC	--	47.83	GOBCH	4913	25/07/2017	25/07/2017
64.	Round-II	86188	58	MHT-CET	EN17270092	PATIL BHUSHAN KAILAS	Male	Type A	NMU	OBC	--	55.00	GNT2H	10000	26/07/2017	26/07/2017
65.	Round-II	89052	56	MHT-CET	EN17295272	GUJAR PRATIK VIJAY	Male	Type A	NMU	OBC	--	61.00	GOBCH	20000	28/07/2017	28/07/2017
66.	Round-II	89912	56	MHT-CET	EN17256540	KUMBHAR DIPAK RAJU	Male	Type A	NMU	OBC	--	68.00	GOBCO	20000	26/07/2017	26/07/2017
67.	Round-II	93131	55	MHT-CET	EN17306360	DABHADE ATUL SANJAY	Male	Type B	NMU	ST	--	66.00	GSTH	8913	27/07/2017	27/07/2017
68.	Round-II	103324	47	MHT-CET	EN17199425	SULTANE RAKESH SOPAN	Male	Type A	NMU	NT-C	--	52.33	LNT2O	4913	25/07/2017	25/07/2017
69.	Round-II	104216	46	MHT-CET	EN17287981	SANJAY NARPAT VASAVE	Male	Type A	NMU	ST	--	63.33	LSTH	4913	25/07/2017	25/07/2017
70.	Round-III	43732	76	MHT-CET	EN17281261	PAWARA SUBHASH DETAKA	Male	Type A	NMU	ST	--	53.00	GOPENH	8913	25/07/2017	25/07/2017
71.	Round-III	46207	75	MHT-CET	EN17295079	PATIL KANCHAN PRAVIN	Female	Type A	NMU	OBC	--	72.00	LOPENH	36277	28/07/2017	28/07/2017
72.	Round-III	46545	74	MHT-CET	EN17116781	SONNI VISHAL DNYANESHWAR	Male	Type A	NMU	OBC	--	49.67	GOPENO	20000	25/07/2017	25/07/2017

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List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Civil Engineering [510419110]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 120

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
73.	Round-III	46773	74	MHT-CET	EN17293609	NIKAM PALLAVI DILIP	Female	Type A	NMU	OBC	--	65.67	LOPENH	20000	27/07/2017	27/07/2017
74.	Round-III	47932	74	MHT-CET	EN17297831	KABRA SANJANA RAJKUMAR	Female	Type A	NMU	Open	--	78.50	GOPENH	30000	29/07/2017	29/07/2017
75.	Round-III	51620	72	MHT-CET	EN17277343	KANKHARE AKASH ASHOK	Male	Type A	NMU	NT-C	--	55.67	GOPENH	4913	28/07/2017	28/07/2017
76.	Round-III	64606	66	MHT-CET	EN17316220	NARWADE AKASH MILIND	Male	Type A	NMU	SC	--	49.67	GOPENH	8913	29/07/2017	29/07/2017
77.	Round-III	65772	66	MHT-CET	EN17298071	GHORPADE DEVANG RAJESH	Male	Type A	NMU	Open	--	53.33	PWD1	49000	26/07/2017	26/07/2017
78.	Round-III	66762	65	MHT-CET	EN17135123	CHAVHAN VISHAL KAILAS	Male	Type A	NMU	ST	--	74.33	GSTH	8913	25/07/2017	25/07/2017
79.	Round-III	69208	64	MHT-CET	EN17142102	PATIL PARIKSHIT SUNIL	Male	Type A	NMU	OBC	--	56.00	GOBCH	15000	28/07/2017	28/07/2017
80.	Round-III	72853	63	MHT-CET	EN17212719	TAYADE PRASHANT TULSHIRAM	Male	Type A	NMU	SC	--	59.67	GSCH	5000	27/07/2017	27/07/2017
81.	Round-III	75179	62	MHT-CET	EN17313760	JANGID MANISH SHANKAR	Male	Type B	NMU	Open	--	62.33	PWD2	15000	29/07/2017	29/07/2017
82.	Round-III	76550	61	MHT-CET	EN17161408	FUNDE MOHIT RAJU	Male	Type A	RTMNU	OBC	--	70.00	GOPENO	36277	28/07/2017	28/07/2017
83.	Round-III	76947	61	MHT-CET	EN17321347	MARATHE SACHIN NAMDEO	Male	Type A	NMU	OBC	--	70.67	PWD3	20000	29/07/2017	29/07/2017
84.	Round-III	77061	61	MHT-CET	EN17147306	SUTAR TUSHAR RAMESH	Male	Type A	NMU	OBC	--	55.67	DEFS	25000	28/07/2017	28/07/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Civil Engineering [510419110]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 120

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
85.	Round-III	77617	61	MHT-CET	EN17215396	MAHAJAN SHUBHANGI VASUDEV	Female	Type A	NMU	OBC	--	50.33	LOBCH	20000	28/07/2017	28/07/2017
86.	Round-III	77649	61	MHT-CET	EN17321879	SAPKALE RAJENDRA VIJAY	Male	Type A	NMU	OBC	--	62.00	GOBCH	1000	29/07/2017	29/07/2017
87.	Round-III	79799	60	MHT-CET	EN17316127	DARSHAN BHAGWAN MAHAJAN	Male	Type A	NMU	OBC	--	54.17	GOBCO	15000	29/07/2017	29/07/2017
88.	Round-III	95772	53	MHT-CET	EN17295791	AKASH	Male	Type A	NMU	ST	--	60.67	GSCO	8000	25/07/2017	25/07/2017
89.	Round-III	101222	49	MHT-CET	EN17192221	AHIRE KHIVAIYYA AVINASH	Male	Type A	NMU	SC	--	73.67	GSCH	7000	26/07/2017	26/07/2017
90.	Round-I	14367	60	JEE	EN17145809	KAUSTUBH ATUL METKAR	Male	Type A	NMU	OBC	--	52.33	AI	26000	26/07/2017	26/07/2017
91.	Round-I	24345	45	JEE	EN17132019	PATIL ROHIT ANIL	Male	Type A	NMU	OBC	--	49.00	AI	40000	25/07/2017	25/07/2017
92.	Round-I	34076	35	JEE	EN17270132	WANI SHUBHAM RAMESH	Male	Type A	NMU	Open	--	59.00	AI	40000	29/07/2017	29/07/2017
93.	Round-I	37874	32	JEE	EN17134978	MOHITE SIDDHESH SURYAKANT	Male	Type A	NMU	Open	--	63.33	AI	30000	26/07/2017	26/07/2017
94.	Round-I	41280	30	JEE	EN17320656	JAIN KANCHITA VIPUL	Female	Type A	NMU	OBC	--	55.83	AI	20000	25/07/2017	25/07/2017
95.	Round-I	43952	28	JEE	EN17269481	PATIL MOHIT SHRIKANT	Male	Type A	NMU	OBC	--	59.00	AI	20000	27/07/2017	27/07/2017
96.	Round-I	47422	25	JEE	EN17325696	JADHAV GAYATRI ABAJI	Female	Type A	NMU	OBC	--	48.33	AI	15000	26/07/2017	26/07/2017

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305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Civil Engineering [510419110]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 120

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
97.	Round-II	42102	30	JEE	EN17146296	PAWARA SUNIL MANAKAR	Male	Type A	NMU	ST	--	46.67	AI	8913	26/07/2017	26/07/2017
98.	Round-II	47004	26	JEE	EN17213682	SONAR TEJAS KAILASH	Male	Type A	NMU	OBC	--	62.33	AI	22000	26/07/2017	26/07/2017
99.	Round-II	47432	25	JEE	EN17162340	CHAUGAONKAR PRANAV SANJAY	Male	Type A	NMU	Open	--	81.67	AI	32000	28/07/2017	28/07/2017
100.	Round-II	52803	22	JEE	EN17159104	NASHTE HIMANSHU UMAKANT	Male	Type A	NMU	OBC	--	52.33	AI	10000	25/07/2017	25/07/2017
101.	Round-II	57610	19	JEE	EN17157014	GAVIT PRAMIT DATTU	Male	Type A	NMU	ST	--	64.33	AI	8913	26/07/2017	26/07/2017
102.	Round-III	10246	71	JEE	EN17323233	MALI SHUBHAM DILIP	Male	Type A	NMU	OBC	--	65.67	AI	20000	28/07/2017	28/07/2017
103.	Round-III	40760	30	JEE	EN17256601	KANKHARE SAGAR ASHOK	Male	Type A	NMU	NT-C	--	48.33	AI	4913	28/07/2017	28/07/2017

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List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Civil Engineering [510419110]

List of Candidates Admitted Under Against CAP (Excluding Minority) Vacant Seats

Number of Seats : 17

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
104.	Institute Level	1	75	MHT-CET	EN17306465	PATIL KAMLESH TULASHIRAM	Male	Type A	NMU	OBC	--	65.00	ACAP	20000	05/08/2017	06/08/2017
105.	Institute Level	2	64	MHT-CET	EN17337125	KHANDELWAL SHRADDHA PURUSHOTTAM	Female	Type A	NMU	Open	--	55.17	ACAP	40000	31/07/2017	06/08/2017
106.	Institute Level	3	56	MHT-CET	EN17130235	AVES KHAN ATEEQUE ULLAH KHAN	Male	Type A	NMU	Open	--	54.33	ACAP	20000	31/07/2017	06/08/2017
107.	Institute Level	3	56	MHT-CET	EN17291825	PATIL VIJAYA SANTOSH	Female	Type A	NMU	OBC	--	50.67	ACAP	25000	31/07/2017	06/08/2017
108.	Institute Level	4	55	MHT-CET	EN17129383	SHAIKH USAMA BARKAT ALI	Male	Type A	NMU	Open	--	49.67	ACAP	20000	31/07/2017	06/08/2017
109.	Institute Level	5	54	MHT-CET	EN17239625	THAKUR SHASHIKANT VILAS	Male	Type A	NMU	ST	--	61.33	ACAP	40000	31/07/2017	06/08/2017
110.	Institute Level	6	51	MHT-CET	EN17323591	MOHAMMAD WAHID ZAKIR PINJARI	Male	Type A	NMU	Open	--	51.00	ACAP	30000	31/07/2017	06/08/2017
111.	Institute Level	7	27	MHT-CET	EN17333082	PATIL SAYALI RAJENDRA	Female	Type A	NMU	Open	--	58.00	ACAP	50000	30/07/2017	06/08/2017
112.	Institute Level	10	49	MHT-CET	EN17101301	BORSE ABHAY GULABRAO	Male	Type B	NMU	OBC	--	57.67	ACAP	10000	14/08/2017	14/08/2017
113.	Institute Level	11	55	MHT-CET	EN17278431	CHAUDHARI KAUSTUBH VILAS	Male	Type A	NMU	OBC	--	47.33	ACAP	20000	19/08/2017	22/08/2017
114.	Institute Level	12	44	MHT-CET	EN17323036	KHACHANE HIMANSHU SANJAY	Male	Type A	NMU	OBC	--	56.00	ACAP	30000	22/08/2017	22/08/2017
115.	Institute Level	13	44	MHT-CET	EN17174612	RAJPUT RUSHIKESH CHANDRSING	Male	Type A	NMU	DT/VJ	--	62.67	ACAP	10000	29/08/2017	29/08/2017

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List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Civil Engineering [510419110]

List of Candidates Admitted Under Supernumerary / Over and Above Seats [NRI / PIO / CIWGC / FN / PMSSS / NEUT / J&K Migrant]

Number of Seats : 1

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
1.	Institute Level	1	78.00	HSC	EN17339012	MANISHA	Female	JKSSS	NA	Open	--	78.00	JKSSS	25000	11/08/2017	11/08/2017

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305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

Summary of Admitted Candidates for Admission to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Civil Engineering [510419110]

Sr. No.	Admission Details	Intake	Admitted / Uploaded Before Cut Off Date	Admitted / Uploaded After Cut Off Date	Total Admitted
1.	CAP (Excluding Minority)	120	103	0	103
2.	Against CAP (Excluding Minority)		12	0	12
3.	CAP (Minority)	0	0	0	0
4.	Against CAP (Minority)		0	0	0
5.	Institute Level	0	0	0	0
6.	J&K Migrant		0	0	0
7.	NRI/OCI/PIO/FNS/CIWGC/JKSSS/NEUT		1	0	1
8.	Over and Above		0	0	0
	Total	**120**	**116**	**0**	**116**

Seat Type used for Institute Level Admissions : ACAP-Against CAP (Excluding Minority), IL-Institute Level, ILNRI-Institute Level NRI (5% of SI if AICTE Permission), MI-Minority, NRI-NRI (15% of SI if AICTE Permission), PIO-PIO (15% of SI if AICTE Permission), FNS-FNS (15% of SI if AICTE Permission), CIWGC-Children's of Indian Workers in Gulf Countries (15% of SI if AICTE Permission), JKSSS - Prime Minister Special Scholarship Scheme, NEUT - North Eastern States and UTs, OAA-Over and Above
Home University used for Admissions : DBAMU - Dr. B. A. Marathwada University, GU - Gondwana University, MU - Mumbai University, NMU - North Maharashtra University, RTMNU - Rashtrasant Tukadoji Maharaj Nagpur University, SGBAU - Sant Gadge Baba Amravati University, SOLU - Solapur University, SPPU - Savitribai Phule Pune University, SRTMU - S. R. T. Marathwada University, SVJU - Shivaji University, NA - Not Applicable

Cut-Off Date for Admission : 31/08/2017
Cut-Off Date for Uploading : 01/09/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Civil Engineering [510419111T]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 6

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
1.	Round-I	20873	97	MHT-CET	EN17109539	PATIL SHAILESH KISHOR	Male	Type A	NMU	OBC	--	75.17	TFWS	4913	26/07/2017	26/07/2017
2.	Round-I	27019	89	MHT-CET	EN17312492	GORE UJWALA SANJIV	Female	Type A	NMU	Open	--	79.83	TFWS	4913	27/07/2017	27/07/2017
3.	Round-I	37731	80	MHT-CET	EN17183142	MAHAJAN VIKAS ARUN	Male	Type A	NMU	OBC	--	63.33	TFWS	4913	26/07/2017	26/07/2017
4.	Round-I	39052	79	MHT-CET	EN17272759	PATIL CHETANA SANJAY	Female	Type A	NMU	Open	--	59.67	TFWS	4913	25/07/2017	25/07/2017
5.	Round-II	40713	78	MHT-CET	EN17185526	MOHAMMAD AATIF ABDUL QAYYUM SHAIKH	Male	Type A	NMU	OBC	--	67.33	TFWS	4913	27/07/2017	27/07/2017
6.	Round-II	40977	78	MHT-CET	EN17186081	SHAIKH GULAM KHAWJA AB SALIM	Male	Type A	NMU	OBC	--	73.33	TFWS	4913	27/07/2017	27/07/2017

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STATE COMMON ENTRANCE TEST CELL

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Summary of Admitted Candidates for Admission to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Civil Engineering [510419111T]

Sr. No.	Admission Details	Intake	Admitted / Uploaded Before Cut Off Date	Admitted / Uploaded After Cut Off Date	Total Admitted
1.	CAP (Excluding Minority)	6	6	0	6
2.	Against CAP (Excluding Minority)		0	0	0
3.	CAP (Minority)	0	0	0	0
4.	Against CAP (Minority)		0	0	0
5.	Institute Level	0	0	0	0
6.	J&K Migrant		0	0	0
7.	NRI/OCI/PIO/FNS/CIWGC/JKSSS/NEUT		0	0	0
8.	Over and Above		0	0	0
	Total	**6**	**6**	**0**	**6**

Seat Type used for Institute Level Admissions : ACAP-Against CAP (Excluding Minority), IL-Institute Level, ILNRI-Institute Level NRI (5% of SI if AICTE Permission), MI-Minority, NRI-NRI (15% of SI if AICTE Permission), PIO-PIO (15% of SI if AICTE Permission), FNS-FNS (15% of SI if AICTE Permission), CIWGC-Children's of Indian Workers in Gulf Countries (15% of SI if AICTE Permission), JKSSS - Prime Minister Special Scholarship Scheme, NEUT - North Eastern States and UTs, OAA-Over and Above

Home University used for Admissions : DBAMU - Dr. B. A. Marathwada University, GU - Gondwana University, MU - Mumbai University, NMU - North Maharashtra University, RTMNU - Rashtrasant Tukadoji Maharaj Nagpur University, SGBAU - Sant Gadge Baba Amravati University, SOLU - Solapur University, SPPU - Savitribai Phule Pune University, SRTMU - S. R. T. Marathwada University, SVJU - Shivaji University, NA - Not Applicable

Cut-Off Date for Admission : 31/08/2017
Cut-Off Date for Uploading : 01/09/2017

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List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Computer Engineering [510424510]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 120

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
1.	Round-I	24313	92	MHT-CET	EN17278821	BHATIYA PRAJAKTA PRADIP	Female	Type A	NMU	Open	--	62.67	LOPENH	67640	25/07/2017	25/07/2017
2.	Round-I	28209	88	MHT-CET	EN17165145	NHAVI ASHWINI BALKRISHNA	Female	Type A	NMU	OBC	--	70.50	LOPENH	40000	27/07/2017	27/07/2017
3.	Round-I	31168	85	MHT-CET	EN17145140	KABARA SANJANA MANOJ	Female	Type A	NMU	Open	--	65.67	LOPENH	40000	26/07/2017	26/07/2017
4.	Round-I	31902	84	MHT-CET	EN17202947	BHOLE SAYALI SOPAN	Female	Type A	NMU	OBC	--	57.33	LOPENH	25000	26/07/2017	26/07/2017
5.	Round-I	36227	81	MHT-CET	EN17174610	CHAUDHARI DIPESH SHIVAJI	Male	Type A	NMU	OBC	--	58.50	GOPENH	67640	25/07/2017	25/07/2017
6.	Round-I	37008	80	MHT-CET	EN17126102	SALUNKE YASH GANESH	Male	Type A	NMU	OBC	--	70.67	GOPENH	25000	26/07/2017	26/07/2017
7.	Round-I	39523	79	MHT-CET	EN17238689	FALAK KARISHMA SURESH	Female	Type A	NMU	OBC	--	53.00	LOPENH	25000	27/07/2017	27/07/2017
8.	Round-I	41633	77	MHT-CET	EN17147684	SHELKAR BHAGYASHREE CHANDRAKANT	Female	Type A	NMU	OBC	--	53.00	LOPENH	20000	25/07/2017	25/07/2017
9.	Round-I	43686	76	MHT-CET	EN17157341	BAGUL DHANANJAY SUDHIR	Male	Type A	NMU	SC	--	55.00	GOPENH	8913	26/07/2017	26/07/2017
10.	Round-I	44161	76	MHT-CET	EN17287072	PATIL VAISHALI DAGADU	Female	Type A	NMU	Open	--	59.33	LOPENH	40000	25/07/2017	25/07/2017
11.	Round-I	45727	75	MHT-CET	EN17116278	SHIMPI RUCHA SHAMKANT	Female	Type A	NMU	OBC	--	68.33	LOBCH	20000	25/07/2017	25/07/2017
12.	Round-I	46633	74	MHT-CET	EN17106417	JOSHI SAURABH PRAKASH	Male	Type A	NMU	Open	--	72.50	GOPENH	40000	26/07/2017	26/07/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Computer Engineering [510424510]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 120

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
13.	Round-I	47680	74	MHT-CET	EN17288164	UPASANI BHUSHAN RAMKRUSHNA	Male	Type A	NMU	Open	--	63.00	GOPENH	35000	27/07/2017	27/07/2017
14.	Round-I	48966	73	MHT-CET	EN17281221	MAMTA PANDURANG SHIRSATH	Female	Type A	NMU	OBC	--	70.33	GOPENH	25000	25/07/2017	25/07/2017
15.	Round-I	50181	73	MHT-CET	EN17128372	PRIYADARSHINI SOPAN PATIL	Female	Type A	NMU	OBC	--	71.67	GOPENH	36277	25/07/2017	25/07/2017
16.	Round-I	55790	70	MHT-CET	EN17137166	AGRAWAL GOPAL ANAND	Male	Type A	NMU	Open	--	57.83	GOPENH	25000	25/07/2017	25/07/2017
17.	Round-I	57232	69	MHT-CET	EN17270987	JAGRUTI	Female	Type A	NMU	SBC	--	64.17	LOBCH	4913	25/07/2017	25/07/2017
18.	Round-I	57268	69	MHT-CET	EN17184851	CHINCHOLE CHAITALI SANJAY	Female	Type A	NMU	OBC	--	59.50	LOBCH	25000	25/07/2017	25/07/2017
19.	Round-I	57577	69	MHT-CET	EN17270114	SHARMA VISHALKUMAR ANILKUMAR	Male	Type A	SGBAU	Open	--	67.00	GOPENO	35000	26/07/2017	26/07/2017
20.	Round-I	58937	69	MHT-CET	EN17163101	NEHA KUMARI PANDEY	Female	Type A	NMU	Open	--	58.67	GOPENH	35000	25/07/2017	25/07/2017
21.	Round-I	65240	66	MHT-CET	EN17166823	SAGAR GORAKH PATIL	Male	Type A	NMU	OBC	--	61.67	GOBCH	21000	26/07/2017	26/07/2017
22.	Round-I	65297	66	MHT-CET	EN17299476	PATIL PRAGATI VINOD	Female	Type A	SGBAU	OBC	--	83.67	LOPENO	0	27/07/2017	27/07/2017
23.	Round-I	65626	66	MHT-CET	EN17302409	PATIL PRIYANKA SUNIL	Female	Type A	NMU	OBC	--	45.33	GOBCH	10000	28/07/2017	28/07/2017
24.	Round-I	65764	66	MHT-CET	EN17298433	YASHASHREE VINOD MAHAJAN	Female	Type A	NMU	OBC	--	62.33	GOBCH	30000	27/07/2017	27/07/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Computer Engineering [510424510]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 120

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
25.	Round-I	66543	65	MHT-CET	EN17166845	CHAUDHARI MOHIT YUVRAJ	Male	Type A	NMU	OBC	--	50.50	GOBCH	25000	25/07/2017	25/07/2017
26.	Round-I	67298	65	MHT-CET	EN17215614	KAPSE ASHWINI BAJIRAV	Female	Type A	NMU	NT-D	--	45.33	GNT3O	4913	28/07/2017	28/07/2017
27.	Round-I	68942	64	MHT-CET	EN17108369	PATIL VAISHNAVI SUNIL	Female	Type A	NMU	NT-D	--	51.33	GNT3H	4913	26/07/2017	26/07/2017
28.	Round-I	70192	64	MHT-CET	EN17199217	PATIL CHAITALI ANIL	Female	Type A	SGBAU	OBC	--	79.33	LOPENO	20000	26/07/2017	26/07/2017
29.	Round-I	70215	64	MHT-CET	EN17292565	PAWAR PRIYA GOKUL	Female	Type A	NMU	OBC	DEF3	62.00	DEFS	20000	25/07/2017	25/07/2017
30.	Round-I	81887	59	MHT-CET	EN17169593	PARDESHI PRIYANKA VIJAYSING	Female	Type A	NMU	DT/VJ	--	48.67	LVJH	4913	26/07/2017	26/07/2017
31.	Round-I	88987	56	MHT-CET	EN17298371	SEJAL VILAS TAYADE	Female	Type A	NMU	SC	--	61.67	LSCH	8913	27/07/2017	27/07/2017
32.	Round-I	101520	49	MHT-CET	EN17187048	SACHIN DATTU MADANE	Male	Type A	NMU	NT-C	--	68.67	GNT2H	4913	25/07/2017	25/07/2017
33.	Round-II	25588	91	MHT-CET	EN17155560	MAHAJAN RACHANA DHANANJAY	Female	Type A	NMU	OBC	--	77.83	LOPENH	67640	26/07/2017	26/07/2017
34.	Round-II	26694	89	MHT-CET	EN17112698	CHAUDHARI SONAL VINOD	Female	Type A	NMU	Open	--	62.33	LOPENH	67640	29/07/2017	29/07/2017
35.	Round-II	29004	87	MHT-CET	EN17279716	JUMDE GAURAV PRABHAKAR	Male	Type A	GU	OBC	--	52.67	GOPENO	36277	25/07/2017	25/07/2017
36.	Round-II	30081	86	MHT-CET	EN17269098	ASHWIN SURESH BORADE	Male	Type A	NMU	Open	--	56.33	GOPENH	30000	27/07/2017	27/07/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Computer Engineering [510424510]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 120

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
37.	Round-II	35151	82	MHT-CET	EN17133207	YADAV RAGHVENDRA HARINDRA	Male	Type A	NMU	Open	--	58.67	GOPENH	30000	27/07/2017	27/07/2017
38.	Round-II	43478	76	MHT-CET	EN17288986	SHAIKH MOHD ALTAMASH SHAIKH NABI	Male	Type A	NMU	Open	--	67.17	GOPENH	10000	27/07/2017	27/07/2017
39.	Round-II	47086	74	MHT-CET	EN17159442	SAINDANE LINA ROHIDAS	Female	Type A	NMU	OBC	--	47.00	LOBCH	25000	25/07/2017	25/07/2017
40.	Round-II	49918	73	MHT-CET	EN17139608	NATHANI ADITYA MAHENDRA	Male	Type A	NMU	Open	--	58.33	GOPENH	25000	28/07/2017	28/07/2017
41.	Round-II	50009	73	MHT-CET	EN17282431	GULSHAN SHAMLAL LULLA	Male	Type A	NMU	Open	--	51.00	GOPENH	35000	26/07/2017	26/07/2017
42.	Round-II	50813	72	MHT-CET	EN17299116	BHADADE JAGRUTI PRAMOD	Female	Type A	NMU	Open	--	57.67	LOPENH	30000	28/07/2017	28/07/2017
43.	Round-II	50904	72	MHT-CET	EN17312910	KABRA AYUSHI PRAMOD	Female	Type A	NMU	Open	--	58.83	GOPENH	40000	27/07/2017	27/07/2017
44.	Round-II	58331	69	MHT-CET	EN17249707	SAGAR GANESH PAWAR	Male	Type A	NMU	OBC	--	51.67	GOPENH	40000	28/07/2017	28/07/2017
45.	Round-II	61825	67	MHT-CET	EN17314636	MAHAJAN SHREYA KIRAN	Female	Type A	NMU	OBC	--	54.33	GOPENH	10000	27/07/2017	27/07/2017
46.	Round-II	64510	66	MHT-CET	EN17277024	PATIL MAYURI SANJAY	Female	Type A	NMU	OBC	--	78.33	GOPENH	36277	25/07/2017	25/07/2017
47.	Round-II	70456	64	MHT-CET	EN17164159	TEENA MUKESH PAWAR	Female	Type B	NMU	OBC	--	93.67	LSTH	5000	26/07/2017	26/07/2017
48.	Round-II	70607	64	MHT-CET	EN17323631	PATIL NIKITA PREMSING	Female	Type A	NMU	DT/VJ	--	59.67	LVJO	4913	25/07/2017	25/07/2017

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List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Computer Engineering [510424510]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 120

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
49.	Round-II	72099	63	MHT-CET	EN17124749	CHAUDHARI JANHAVI KAILAS	Female	Type A	NMU	OBC	--	87.00	GSTH	10000	27/07/2017	27/07/2017
50.	Round-II	72405	63	MHT-CET	EN17138939	NIKAM SUSHMITA VASANT	Female	Type A	NMU	SC	--	66.33	LSCH	8913	27/07/2017	27/07/2017
51.	Round-II	72667	63	MHT-CET	EN17115994	BORNARE JATIN SHIVDAS	Male	Type A	NMU	OBC	--	55.67	GSCO	36277	28/07/2017	28/07/2017
52.	Round-II	73507	63	MHT-CET	EN17255455	PATIL PRACHI SUNIL	Female	Type A	NMU	OBC	--	53.00	GSTO	0	26/07/2017	26/07/2017
53.	Round-II	73908	62	MHT-CET	EN17194726	PATIL MADHURI BALWANT	Female	Type A	NMU	OBC	--	64.17	LSCO	30000	27/07/2017	27/07/2017
54.	Round-II	74077	62	MHT-CET	EN17285603	JAGADALE HARSHAL BHASKAR	Male	Type A	NMU	OBC	--	76.67	LSTO	15000	27/07/2017	27/07/2017
55.	Round-II	74689	62	MHT-CET	EN17269080	MAHAJAN DIPIKA SANJAY	Female	Type A	NMU	OBC	--	68.00	GOBCO	30000	25/07/2017	25/07/2017
56.	Round-II	74821	62	MHT-CET	EN17275774	PATIL VIDYA DINESH	Female	Type A	NMU	OBC	--	77.00	GSCH	10000	25/07/2017	25/07/2017
57.	Round-II	74852	62	MHT-CET	EN17310744	MORE RUTUJA RAVINDRA	Female	Type A	NMU	OBC	--	70.00	GOBCH	20000	26/07/2017	26/07/2017
58.	Round-II	76226	62	MHT-CET	EN17277625	CHAUDHARI PRAJAKTA PRAVIN	Female	Type A	NMU	OBC	--	55.17	GSCO	10000	26/07/2017	26/07/2017
59.	Round-II	77242	61	MHT-CET	EN17215392	PATIL MEHUL HIRALAL	Male	Type A	NMU	OBC	--	50.00	GSCH	36277	28/07/2017	28/07/2017
60.	Round-II	78734	61	MHT-CET	EN17313622	MAHAJAN GAYATRI NAMDEO	Female	Type A	NMU	OBC	--	83.33	GSCH	36277	27/07/2017	27/07/2017

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305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Computer Engineering [510424510]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 120

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
61.	Round-II	79796	60	MHT-CET	EN17324193	MORE BHAGYASHRI TULASHIDAS	Female	Type A	NMU	OBC	--	45.33	GOBCH	25000	27/07/2017	27/07/2017
62.	Round-II	80987	60	MHT-CET	EN17171874	BAVISKAR ANKIT JAGDISH	Male	Type A	NMU	OBC	--	50.00	GOBCH	36277	25/07/2017	25/07/2017
63.	Round-II	82014	59	MHT-CET	EN17137238	PATIL VAIBHAV SOPAN	Male	Type A	NMU	OBC	--	55.33	GNT2H	20000	25/07/2017	25/07/2017
64.	Round-II	82164	59	MHT-CET	EN17210171	WANI YASH VISHNU	Male	Type A	SPPU	OBC	--	65.00	GOPENO	20000	29/07/2017	29/07/2017
65.	Round-II	83465	59	MHT-CET	EN17310857	MUSALE MUKUL BABAN	Male	Type A	NMU	NT-B	--	66.33	GNT1H	4913	27/07/2017	27/07/2017
66.	Round-II	96284	53	MHT-CET	EN17313187	BHOI MAYURI SUKLAL	Female	Type A	NMU	NT-B	--	58.33	LNT1H	4913	25/07/2017	25/07/2017
67.	Round-III	25766	90	MHT-CET	EN17300574	BAJAJ KHUSHBOO BHUSHAN	Female	Type A	NMU	Open	--	73.33	GOPENH	40000	27/07/2017	27/07/2017
68.	Round-III	31756	84	MHT-CET	EN17101196	PATIL PARAG NARENDRA	Male	Type B	NMU	OBC	--	45.00	GOPENH	36277	26/07/2017	26/07/2017
69.	Round-III	43133	76	MHT-CET	EN17255342	BHAVSAR PRATIK SHAMKUMAR	Male	Type A	NMU	OBC	--	80.67	GOPENH	36277	29/07/2017	29/07/2017
70.	Round-III	59388	68	MHT-CET	EN17211530	TAMBAT PANKAJ RAJENDRA	Male	Type A	NMU	OBC	--	47.00	GOBCH	20000	28/07/2017	28/07/2017
71.	Round-III	59973	68	MHT-CET	EN17311882	ISHITA J MULCHANDANI	Female	Type A	NMU	Open	--	67.00	PWD3	20000	26/07/2017	26/07/2017
72.	Round-III	63159	67	MHT-CET	EN17312073	AHUJA MOHIT HARESH	Male	Type A	NMU	Open	--	60.00	PWD1	34500	28/07/2017	28/07/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Computer Engineering [510424510]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 120

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
73.	Round-III	68461	65	MHT-CET	EN17251126	PATIL SAKSHI DINESH	Female	Type A	NMU	OBC	--	70.67	LOBCO	10000	27/07/2017	27/07/2017
74.	Round-III	71163	64	MHT-CET	EN17307812	KARTIK ARVIND DEORE	Male	Type A	NMU	OBC	--	65.00	GOBCO	36277	27/07/2017	27/07/2017
75.	Round-III	76734	61	MHT-CET	EN17312866	BHOI PRATIKSHA DNYANESHWAR	Female	Type A	NMU	NT-B	--	68.33	GNT1O	4913	26/07/2017	26/07/2017
76.	Round-III	79913	60	MHT-CET	EN17271060	SAKSHI	Female	Type A	NMU	NT-B	--	58.67	GSTH	4913	29/07/2017	29/07/2017
77.	Round-III	80883	60	MHT-CET	EN17168655	PATIL RUSHIKESH PRAVIN	Male	Type A	NMU	OBC	--	74.50	GSCO	8000	26/07/2017	26/07/2017
78.	Round-III	83806	59	MHT-CET	EN17241149	PATIL JAGRUTI RAJENDRA	Female	Type A	NMU	OBC	--	52.00	LNT2H	10000	27/07/2017	27/07/2017
79.	Round-III	84465	58	MHT-CET	EN17281692	VITNARE YASH RAVINDRA	Male	Type A	NMU	OBC	--	50.00	GSCH	25000	27/07/2017	27/07/2017
80.	Round-III	84786	58	MHT-CET	EN17298407	RANE DHANASHRI VINOD	Female	Type A	NMU	OBC	--	65.00	GSCH	15000	27/07/2017	27/07/2017
81.	Round-III	86446	58	MHT-CET	EN17314577	BICHAVE VARSHA RAJENDRA	Female	Type A	NMU	OBC	--	60.00	GNT2O	36277	28/07/2017	28/07/2017
82.	Round-III	86969	57	MHT-CET	EN17154993	SMITRAJ ASHOK MALI	Male	Type A	NMU	OBC	--	68.67	GSTH	5000	28/07/2017	28/07/2017
83.	Round-III	95924	53	MHT-CET	EN17184357	TEMBHURNE HARSHAL KAILASH	Male	Type A	GU	SC	--	53.17	GOPENO	8913	25/07/2017	25/07/2017
84.	Round-III	97337	52	MHT-CET	EN17173912	SATANGE KRUTIKA GAJANAN	Female	Type A	RTMNU	OBC	--	60.67	LOPENO	36277	27/07/2017	27/07/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Computer Engineering [510424510]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 120

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
85.	Round-III	100032	50	MHT-CET	EN17186347	CHAUDHARI BHAGYASHRI DHANANJAY	Female	Type A	SGBAU	OBC	--	60.50	GOPENO	36277	26/07/2017	26/07/2017
86.	Round-III	101263	49	MHT-CET	EN17303109	SUMITKUMAR	Male	Type A	DBAMU	Open	--	67.00	GOPENO	50000	27/07/2017	27/07/2017
87.	Round-III	104348	46	MHT-CET	EN17250244	NARKHEDE CHETANA YUVRAJ	Female	Type A	DBAMU	OBC	--	77.00	GOPENO	20000	25/07/2017	25/07/2017
88.	Round-III	106340	39	MHT-CET	EN17273036	NIKAM NEHA RAJESH	Female	Type A	NMU	SC	--	62.33	LSCH	8913	27/07/2017	27/07/2017
89.	Round-I	16326	56	JEE	EN17212348	PATIL YOGITA DEVIDAS	Female	Type A	NMU	OBC	--	48.00	AI	25000	25/07/2017	25/07/2017
90.	Round-I	16655	56	JEE	EN17115621	NAUMANURRAHMAN SHAIKH MUJEEBURRAHMAN	Male	Type A	NMU	Open	--	61.33	AI	20000	27/07/2017	27/07/2017
91.	Round-I	22037	48	JEE	EN17154163	SHUBHAM SAKLA	Male	OMS	NA	Open	--	78.00	AI	27500	28/07/2017	28/07/2017
92.	Round-I	23873	45	JEE	EN17173498	DIVYANSH PATHAK	Male	OMS	NA	Open	--	70.33	AI	25000	26/07/2017	26/07/2017
93.	Round-I	25372	44	JEE	EN17113018	DANISH AHEMAD CHAND PATEL	Male	Type A	NMU	Open	--	60.33	AI	20000	25/07/2017	25/07/2017
94.	Round-I	25421	44	JEE	EN17278842	PATIL VISHAL SUJAY	Male	Type A	NMU	OBC	--	45.00	AI	15000	25/07/2017	25/07/2017
95.	Round-I	26903	42	JEE	EN17296258	HARSH PHULWANI	Male	OMS	NA	Open	--	73.33	AI	35000	26/07/2017	26/07/2017
96.	Round-I	31563	38	JEE	EN17130761	WATTAMWAR AISHWARYA SUBHASH	Female	Type A	NMU	Open	--	70.83	AI	35000	26/07/2017	26/07/2017

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305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Computer Engineering [510424510]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 120

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
97.	Round-I	34100	35	JEE	EN17297597	JANGLE GAURAV KAMALAKAR	Male	Type A	NMU	OBC	--	58.33	AI	25000	28/07/2017	28/07/2017
98.	Round-II	33696	36	JEE	EN17177160	PATIL ANUP SANJAY	Male	Type A	NMU	OBC	--	53.33	AI	20000	28/07/2017	28/07/2017
99.	Round-II	34793	35	JEE	EN17212843	JANGID MONIKA SHRIPAL	Female	Type A	NMU	Open	--	56.67	AI	35000	26/07/2017	26/07/2017
100.	Round-III	28479	40	JEE	EN17256399	THAKUR TEJASWINI ATUL	Female	Type A	NMU	Open	--	72.67	AI	30000	27/07/2017	27/07/2017
101.	Round-III	33204	36	JEE	EN17275846	SHINKAR POOJA LAXMAN	Female	Type A	NMU	Open	--	53.33	AI	40000	27/07/2017	27/07/2017
102.	Round-III	34464	35	JEE	EN17320504	ROSHANI UMESHRAO SOLUNKE	Female	Type A	DBAMU	Open	--	72.00	AI	10000	29/07/2017	29/07/2017
103.	Round-III	40325	30	JEE	EN17218982	MANISH SHAMKANT MANDHARE	Male	Type A	NMU	Open	--	53.17	AI	20000	29/07/2017	29/07/2017
104.	Round-III	40978	30	JEE	EN17248158	MAHAJAN YOGESHWARI ARUN	Female	Type A	NMU	OBC	--	52.33	AI	36277	27/07/2017	27/07/2017

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List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Computer Engineering [510424510]

List of Candidates Admitted Under Against CAP (Excluding Minority) Vacant Seats

Number of Seats : 16

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
105.	Institute Level	1	64	MHT-CET	EN17291592	CHAUDHARI NIKITA VINOD	Female	Type A	NMU	Open	--	67.33	ACAP	52958	02/08/2017	06/08/2017
106.	Institute Level	2	63	MHT-CET	EN17287530	MEHRA AMRUTPALSINGH DALBIRSINGH	Male	Type A	SGBAU	Open	--	60.17	ACAP	17000	01/08/2017	06/08/2017
107.	Institute Level	3	60	MHT-CET	EN17323431	KOLHE KAUSTUBH RAJEEV	Male	Type A	NMU	OBC	--	51.67	ACAP	30000	04/08/2017	06/08/2017
108.	Institute Level	4	55	MHT-CET	EN17223983	PINGALKAR TEJAS NARENDRA	Male	Type A	NMU	Open	--	49.67	ACAP	139280	03/08/2017	06/08/2017
109.	Institute Level	5	54	MHT-CET	EN17335261	SODHAI RUSHIKA VIJAY	Female	Type A	NMU	Open	--	52.33	ACAP	20000	31/07/2017	06/08/2017
110.	Institute Level	6	53	MHT-CET	EN17140851	CHETAN BADGUJAR	Male	OMS	NA	Open	--	67.67	ACAP	20000	31/07/2017	06/08/2017
111.	Institute Level	7	51	MHT-CET	EN17289241	BADGUJAR TEJASWINI SUDHAKAR	Female	Type A	NMU	OBC	--	69.00	ACAP	10000	31/07/2017	06/08/2017
112.	Institute Level	8	12	JEE	EN17119619	SAMAKSH WANI	Male	OMS	NA	Open	--	76.67	ACAP	25000	31/07/2017	06/08/2017
113.	Institute Level	9	65	MHT-CET	EN17303572	KAZI NAUSHEEN FIRDOUS NAFEES	Female	Type A	NMU	Open	--	68.00	ACAP	40000	09/08/2017	09/08/2017
114.	Institute Level	9	52	MHT-CET	EN17144951	PATIL VEDANT PRASHANT	Male	Type A	NMU	OBC	--	68.67	ACAP	15000	09/08/2017	09/08/2017
115.	Institute Level	10	52	MHT-CET	EN17132887	CHAVAN PRIYANKA KAILAS	Female	Type A	NMU	OBC	--	83.67	ACAP	25000	11/08/2017	11/08/2017
116.	Institute Level	11	77	MHT-CET	EN17223457	CHAUDHARI HIMANSHU NARENDRA	Male	Type A	NMU	OBC	--	77.17	ACAP	5000	22/08/2017	22/08/2017

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305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Computer Engineering [510424510]

List of Candidates Admitted Under Against CAP (Excluding Minority) Vacant Seats

Number of Seats : 16

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
117.	Institute Level	12	68	MHT-CET	EN17340295	RATHOD KETAN DINESHSINGH	Male	Type A	NMU	Open	--	50.00	ACAP	50000	29/08/2017	29/08/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

Summary of Admitted Candidates for Admission to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Computer Engineering [510424510]

Sr. No.	Admission Details	Intake	Admitted / Uploaded Before Cut Off Date	Admitted / Uploaded After Cut Off Date	Total Admitted
1.	CAP (Excluding Minority)	120	104	0	104
2.	Against CAP (Excluding Minority)		13	0	13
3.	CAP (Minority)	0	0	0	0
4.	Against CAP (Minority)		0	0	0
5.	Institute Level	0	0	0	0
6.	J&K Migrant		0	0	0
7.	NRI/OCI/PIO/FNS/CIWGC/JKSSS/NEUT		0	0	0
8.	Over and Above		0	0	0
	Total	**120**	**117**	**0**	**117**

Seat Type used for Institute Level Admissions : ACAP-Against CAP (Excluding Minority), IL-Institute Level, ILNRI-Institute Level NRI (5% of SI if AICTE Permission), MI-Minority, NRI-NRI (15% of SI if AICTE Permission), PIO-PIO (15% of SI if AICTE Permission), FNS-FNS (15% of SI if AICTE Permission), CIWGC-Children's of Indian Workers in Gulf Countries (15% of SI if AICTE Permission), JKSSS - Prime Minister Special Scholarship Scheme, NEUT - North Eastern States and UTs, OAA-Over and Above

Home University used for Admissions : DBAMU - Dr. B. A. Marathwada University, GU - Gondwana University, MU - Mumbai University, NMU - North Maharashtra University, RTMNU - Rashtrasant Tukadoji Maharaj Nagpur University, SGBAU - Sant Gadge Baba Amravati University, SOLU - Solapur University, SPPU - Savitribai Phule Pune University, SRTMU - S. R. T. Marathwada University, SVJU - Shivaji University, NA - Not Applicable

Cut-Off Date for Admission : 31/08/2017
Cut-Off Date for Uploading : 01/09/2017

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305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Computer Engineering [510424511T]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 6

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
1.	Round-I	21317	96	MHT-CET	EN17296144	REEMA SUSHIL CHANDWANI	Female	Type B	NMU	Open	--	80.00	TFWS	4913	25/07/2017	25/07/2017
2.	Round-I	26317	90	MHT-CET	EN17267537	PATIL JANHAVI SUPADU	Female	Type A	NMU	OBC	--	77.33	TFWS	4913	27/07/2017	27/07/2017
3.	Round-I	26895	89	MHT-CET	EN17146537	BHOLE HARSHADA ANIL	Female	Type A	NMU	OBC	--	67.00	TFWS	4913	26/07/2017	26/07/2017
4.	Round-I	27801	88	MHT-CET	EN17154046	RANE ANKITA SUHAS	Female	Type A	NMU	OBC	--	66.00	TFWS	4913	26/07/2017	26/07/2017
5.	Round-II	22425	94	MHT-CET	EN17271086	MARATHE RAHUL SHRIPAD	Male	Type A	NMU	Open	--	78.50	TFWS	4913	26/07/2017	26/07/2017
6.	Round-II	24805	91	MHT-CET	EN17221300	CHAVAN HARSHALI VIJAY	Female	Type A	NMU	OBC	--	69.33	TFWS	36277	25/07/2017	25/07/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

Summary of Admitted Candidates for Admission to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Computer Engineering [510424511T]

Sr. No.	Admission Details	Intake	Admitted / Uploaded Before Cut Off Date	Admitted / Uploaded After Cut Off Date	Total Admitted
1.	CAP (Excluding Minority)	6	6	0	6
2.	Against CAP (Excluding Minority)		0	0	0
3.	CAP (Minority)	0	0	0	0
4.	Against CAP (Minority)		0	0	0
5.	Institute Level	0	0	0	0
6.	J&K Migrant		0	0	0
7.	NRI/OCI/PIO/FNS/CIWGC/JKSSS/NEUT		0	0	0
8.	Over and Above		0	0	0
	Total	**6**	**6**	**0**	**6**

Seat Type used for Institute Level Admissions : ACAP-Against CAP (Excluding Minority), IL-Institute Level, ILNRI-Institute Level NRI (5% of SI if AICTE Permission), MI-Minority, NRI-NRI (15% of SI if AICTE Permission), PIO-PIO (15% of SI if AICTE Permission), FNS-FNS (15% of SI if AICTE Permission), CIWGC-Children's of Indian Workers in Gulf Countries (15% of SI if AICTE Permission), JKSSS - Prime Minister Special Scholarship Scheme, NEUT - North Eastern States and UTs, OAA-Over and Above

Home University used for Admissions : DBAMU - Dr. B. A. Marathwada University, GU - Gondwana University, MU - Mumbai University, NMU - North Maharashtra University, RTMNU - Rashtrasant Tukadoji Maharaj Nagpur University, SGBAU - Sant Gadge Baba Amravati University, SOLU - Solapur University, SPPU - Savitribai Phule Pune University, SRTMU - S. R. T. Marathwada University, SVJU - Shivaji University, NA - Not Applicable

Cut-Off Date for Admission : 31/08/2017
Cut-Off Date for Uploading : 01/09/2017

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305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Electronics and Telecommunication Engg [510437210]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 60

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
1.	Round-II	55181	70	MHT-CET	EN17277915	SHUKLA RITESH SANJAY	Male	Type A	NMU	Open	--	69.00	GOPENH	35000	25/07/2017	25/07/2017
2.	Round-II	67235	65	MHT-CET	EN17288172	PATIL VAISHNAVI ASHOK	Female	Type A	NMU	OBC	--	52.00	LOPENH	12000	27/07/2017	27/07/2017
3.	Round-II	82667	59	MHT-CET	EN17300486	PATIL NEHA DIPAK	Female	Type A	NMU	OBC	--	50.00	LOPENH	18000	27/07/2017	27/07/2017
4.	Round-II	92708	55	MHT-CET	EN17165709	SONAWANE HARSHAL MADHUKAR	Male	Type A	NMU	OBC	--	52.00	GOPENH	28436	25/07/2017	25/07/2017
5.	Round-II	92854	55	MHT-CET	EN17275696	PATIL DHEERAJ ARVIND	Male	Type A	NMU	OBC	--	49.67	GOPENH	15000	27/07/2017	27/07/2017
6.	Round-II	93043	55	MHT-CET	EN17305786	NANDAN ANAND SONI	Male	Type A	NMU	Open	--	60.83	GOPENH	20000	28/07/2017	28/07/2017
7.	Round-II	95677	53	MHT-CET	EN17114072	SHAIKH REHAN BASHIR	Male	Type A	NMU	Open	--	65.33	GOPENH	15000	27/07/2017	27/07/2017
8.	Round-II	98300	52	MHT-CET	EN17183286	PANDAV PRAGATI RAJENDRA	Female	Type A	SGBAU	OBC	--	57.33	LOPENO	28436	25/07/2017	25/07/2017
9.	Round-II	98471	51	MHT-CET	EN17131682	VAIDYA HARSHAL SUNIL	Male	Type A	NMU	OBC	--	52.67	GOPENO	0	29/07/2017	29/07/2017
10.	Round-II	99715	51	MHT-CET	EN17249595	JAWALE VAIBHAV NIVRUTTI	Male	Type B	NMU	OBC	--	51.00	GOPENH	20000	25/07/2017	25/07/2017
11.	Round-II	101907	49	MHT-CET	EN17312130	PATIL NANDLAL DNYANESHWAR	Male	Type A	NMU	OBC	--	57.00	GOPENH	6000	26/07/2017	26/07/2017
12.	Round-III	53489	71	MHT-CET	EN17218488	RIZWAN KHAN ILYAS KHAN	Male	Type A	SGBAU	Open	--	70.00	GOPENO	5000	29/07/2017	29/07/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Electronics and Telecommunication Engg [510437210]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 60

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
13.	Round-III	56639	70	MHT-CET	EN17301684	MAHAJAN DNYANDA SHARAD	Female	Type A	NMU	OBC	--	84.33	LOPENO	28436	27/07/2017	27/07/2017
14.	Round-III	88995	56	MHT-CET	EN17185420	MALVEKAR HARSHALI PRABHAKAR	Female	Type A	NMU	OBC	--	50.67	LOPENH	28436	26/07/2017	26/07/2017
15.	Round-III	90405	56	MHT-CET	EN17306196	PATIL SAMRUDDHI SHIRISH	Female	Type A	NMU	OBC	--	50.67	LOPENH	28436	29/07/2017	29/07/2017
16.	Round-III	91807	55	MHT-CET	EN17166844	PATIL NIKHIL VISHWANATH	Male	Type A	NMU	OBC	--	59.00	GOPENH	16000	28/07/2017	28/07/2017
17.	Round-III	95863	53	MHT-CET	EN17256623	MAHAJAN AISHWARYA SANJAY	Female	Type A	NMU	Open	--	75.67	GOPENO	20000	26/07/2017	26/07/2017
18.	Round-III	96444	53	MHT-CET	EN17170309	KHAN HUZAIFA SHAKIL	Male	Type A	NMU	OBC	--	53.33	GOPENO	8000	27/07/2017	27/07/2017
19.	Round-III	96465	53	MHT-CET	EN17286845	PATIL AJAY KASHINATH	Male	Type A	NMU	Open	--	72.00	GOPENO	25000	27/07/2017	27/07/2017
20.	Round-III	97500	52	MHT-CET	EN17169762	JADHAV VIRAJ SUBHASH	Male	Type A	NMU	DT/VJ	--	75.00	GOPENH	4000	26/07/2017	26/07/2017
21.	Round-III	102546	48	MHT-CET	EN17290795	GIRISH RAJENDRA SANER	Male	Type A	NMU	OBC	--	52.67	GOBCH	20000	28/07/2017	28/07/2017
22.	Round-III	104599	45	MHT-CET	EN17256279	CHAUDHARI MADHURI BHAGWAN	Female	Type A	NMU	OBC	--	77.00	LOBCH	15000	25/07/2017	25/07/2017
23.	Round-III	105566	43	MHT-CET	EN17311007	PATIL SAGAR ANNA	Male	Type A	NMU	OBC	--	61.00	GOBCH	10000	29/07/2017	29/07/2017
24.	Round-III	106499	38	MHT-CET	EN17256468	BARHATE CHINMAY RAMANAND	Male	Type A	NMU	OBC	--	45.67	GOBCH	28436	27/07/2017	27/07/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Electronics and Telecommunication Engg [510437210]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 60

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
25.	Round-III	108477	62	MHT-CET	EN17332394	KHATIK RIZWAN SHAIKH SAEED	Male	Type A	NMU	OBC	--	49.33	GNT2H	10000	27/07/2017	27/07/2017
26.	Round-III	110018	47	MHT-CET	EN17331230	PATIL NIKHIL ARJUN	Male	Type A	NMU	OBC	--	47.00	GNT3H	20000	27/07/2017	27/07/2017
27.	Round-III	110179	43	MHT-CET	EN17332938	SHAIKH FAIZAN SHAIKH YUNUS	Male	Type A	NMU	Open	--	52.67	GOBCH	5000	29/07/2017	29/07/2017
28.	Round-I	34314	35	JEE	EN17218136	GARUD SHVETA SANDIP	Female	Type A	NMU	Open	--	74.33	AI	40000	27/07/2017	27/07/2017
29.	Round-I	61508	16	JEE	EN17283943	PATIL PRACHI MUKUND	Female	Type A	NMU	OBC	--	51.33	AI	28436	27/07/2017	27/07/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Electronics and Telecommunication Engg [510437210]

List of Candidates Admitted Under Against CAP (Excluding Minority) Vacant Seats

Number of Seats : 31

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
30.	Institute Level	2	54	MHT-CET	EN17197704	KHATIK FAISAL ISMAIL	Male	Type A	NMU	OBC	--	59.33	ACAP	5000	29/07/2017	06/08/2017
31.	Institute Level	3	53	MHT-CET	EN17216487	PATIL YOGESHWARI SUDHIR	Female	Type A	NMU	OBC	--	48.67	ACAP	20000	31/07/2017	06/08/2017
32.	Institute Level	4	39	MHT-CET	EN17299899	TAUFIQUE AHAMAD AZIZUDDIN SHAIKH	Male	Type A	NMU	Open	--	62.17	ACAP	5000	31/07/2017	06/08/2017
33.	Institute Level	5	15	JEE	EN17334567	YADAV ANOOP KUMAR RAMESH	Male	OMS	NA	Open	--	65.33	ACAP	5000	02/08/2017	06/08/2017
34.	Institute Level	5	55	MHT-CET	EN17299392	DESHMUKH GAURAV SHAM	Male	Type A	NMU	Open	--	62.00	ACAP	29500	31/08/2017	31/08/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Electronics and Telecommunication Engg [510437210]

List of Candidates Admitted Under Supernumerary / Over and Above Seats [NRI / PIO / CIWGC / FN / PMSSS / NEUT / J&K Migrant]

Number of Seats : 1

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
1.	Institute Level	1	47.33	HSC	EN17339263	SALOMI R MARAK	Female	NEUT	NA	Open	--	48.33	NEUT	26940	16/08/2017	16/08/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

Summary of Admitted Candidates for Admission to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Electronics and Telecommunication Engg [510437210]

Sr. No.	Admission Details	Intake	Admitted / Uploaded Before Cut Off Date	Admitted / Uploaded After Cut Off Date	Total Admitted
1.	CAP (Excluding Minority)	60	29	0	29
2.	Against CAP (Excluding Minority)		5	0	5
3.	CAP (Minority)	0	0	0	0
4.	Against CAP (Minority)		0	0	0
5.	Institute Level	0	0	0	0
6.	J&K Migrant		0	0	0
7.	NRI/OCI/PIO/FNS/CIWGC/JKSSS/NEUT		1	0	1
8.	Over and Above		0	0	0
	Total	**60**	**35**	**0**	**35**

Seat Type used for Institute Level Admissions : ACAP-Against CAP (Excluding Minority), IL-Institute Level, ILNRI-Institute Level NRI (5% of SI if AICTE Permission), MI-Minority, NRI-NRI (15% of SI if AICTE Permission), PIO-PIO (15% of SI if AICTE Permission), FNS-FNS (15% of SI if AICTE Permission), CIWGC-Children's of Indian Workers in Gulf Countries (15% of SI if AICTE Permission), JKSSS - Prime Minister Special Scholarship Scheme, NEUT - North Eastern States and UTs, OAA-Over and Above
Home University used for Admissions : DBAMU - Dr. B. A. Marathwada University, GU - Gondwana University, MU - Mumbai University, NMU - North Maharashtra University, RTMNU - Rashtrasant Tukadoji Maharaj Nagpur University, SGBAU - Sant Gadge Baba Amravati University, SOLU - Solapur University, SPPU - Savitribai Phule Pune University, SRTMU - S. R. T. Marathwada University, SVJU - Shivaji University, NA - Not Applicable

Cut-Off Date for Admission : 31/08/2017
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List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Electronics and Telecommunication Engg [510437211T]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 3

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
1.	Round-I	45511	75	MHT-CET	EN17147283	SUPE MEGHANA GAJANAN	Female	Type A	SGBAU	OBC	--	75.00	TFWS	4913	26/07/2017	26/07/2017
2.	Round-II	44361	76	MHT-CET	EN17304764	PATIL SWAPNIL MANOJ	Male	Type A	NMU	OBC	--	64.33	TFWS	4913	26/07/2017	26/07/2017
3.	Round-III	50201	73	MHT-CET	EN17219131	AHIR AKASH ANIL	Male	Type A	NMU	Open	--	62.67	TFWS	4913	28/07/2017	28/07/2017

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STATE COMMON ENTRANCE TEST CELL

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Summary of Admitted Candidates for Admission to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Electronics and Telecommunication Engg [510437211T]

Sr. No.	Admission Details	Intake	Admitted / Uploaded Before Cut Off Date	Admitted / Uploaded After Cut Off Date	Total Admitted
1.	CAP (Excluding Minority)	3	3	0	3
2.	Against CAP (Excluding Minority)		0	0	0
3.	CAP (Minority)	0	0	0	0
4.	Against CAP (Minority)		0	0	0
5.	Institute Level	0	0	0	0
6.	J&K Migrant		0	0	0
7.	NRI/OCI/PIO/FNS/CIWGC/JKSSS/NEUT		0	0	0
8.	Over and Above		0	0	0
	Total	**3**	**3**	**0**	**3**

Seat Type used for Institute Level Admissions : ACAP-Against CAP (Excluding Minority), IL-Institute Level, ILNRI-Institute Level NRI (5% of SI if AICTE Permission), MI-Minority, NRI-NRI (15% of SI if AICTE Permission), PIO-PIO (15% of SI if AICTE Permission), FNS-FNS (15% of SI if AICTE Permission), CIWGC-Children's of Indian Workers in Gulf Countries (15% of SI if AICTE Permission), JKSSS - Prime Minister Special Scholarship Scheme, NEUT - North Eastern States and UTs, OAA-Over and Above

Home University used for Admissions : DBAMU - Dr. B. A. Marathwada University, GU - Gondwana University, MU - Mumbai University, NMU - North Maharashtra University, RTMNU - Rashtrasant Tukadoji Maharaj Nagpur University, SGBAU - Sant Gadge Baba Amravati University, SOLU - Solapur University, SPPU - Savitribai Phule Pune University, SRTMU - S. R. T. Marathwada University, SVJU - Shivaji University, NA - Not Applicable

Cut-Off Date for Admission : 31/08/2017
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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Electrical Engineering [510429311T]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 3

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
1.	Round-I	24324	92	MHT-CET	EN17170063	IKRAMUDDIN AMINUDDIN SHAIKH	Male	Type A	NMU	Open	--	77.50	TFWS	4913	27/07/2017	27/07/2017
2.	Round-I	37429	80	MHT-CET	EN17269476	JADHAV SAURABH PANDURANG	Male	Type A	NMU	Open	--	51.67	TFWS	4913	27/07/2017	27/07/2017
3.	Round-II	35187	82	MHT-CET	EN17207817	PATIL HARSHADA DNYANESHWAR	Female	Type A	NMU	OBC	--	74.00	TFWS	4913	25/07/2017	25/07/2017

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STATE COMMON ENTRANCE TEST CELL

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Summary of Admitted Candidates for Admission to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Electrical Engineering [510429311T]

Sr. No.	Admission Details	Intake	Admitted / Uploaded Before Cut Off Date	Admitted / Uploaded After Cut Off Date	Total Admitted
1.	CAP (Excluding Minority)	3	3	0	3
2.	Against CAP (Excluding Minority)		0	0	0
3.	CAP (Minority)	0	0	0	0
4.	Against CAP (Minority)		0	0	0
5.	Institute Level	0	0	0	0
6.	J&K Migrant		0	0	0
7.	NRI/OCI/PIO/FNS/CIWGC/JKSSS/NEUT		0	0	0
8.	Over and Above		0	0	0
	Total	**3**	**3**	**0**	**3**

Seat Type used for Institute Level Admissions : ACAP-Against CAP (Excluding Minority), IL-Institute Level, ILNRI-Institute Level NRI (5% of SI if AICTE Permission), MI-Minority, NRI-NRI (15% of SI if AICTE Permission), PIO-PIO (15% of SI if AICTE Permission), FNS-FNS (15% of SI if AICTE Permission), CIWGC-Children's of Indian Workers in Gulf Countries (15% of SI if AICTE Permission), JKSSS - Prime Minister Special Scholarship Scheme, NEUT - North Eastern States and UTs, OAA-Over and Above

Home University used for Admissions : DBAMU - Dr. B. A. Marathwada University, GU - Gondwana University, MU - Mumbai University, NMU - North Maharashtra University, RTMNU - Rashtrasant Tukadoji Maharaj Nagpur University, SGBAU - Sant Gadge Baba Amravati University, SOLU - Solapur University, SPPU - Savitribai Phule Pune University, SRTMU - S. R. T. Marathwada University, SVJU - Shivaji University, NA - Not Applicable

Cut-Off Date for Admission : 31/08/2017
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305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Electrical Engineering [510429310]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 60

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
1.	Round-I	23998	92	MHT-CET	EN17249684	PATIL YOSHITA SANJAY	Female	Type A	NMU	OBC	--	67.17	LOPENO	44000	26/07/2017	26/07/2017
2.	Round-I	33086	83	MHT-CET	EN17142687	SONAR PRACHEE SURESH	Female	Type A	NMU	OBC	--	63.33	LOPENH	67640	29/07/2017	29/07/2017
3.	Round-I	38164	80	MHT-CET	EN17279254	PATIL PRITESH SANJAY	Male	Type A	NMU	Open	--	71.00	GOPENH	20000	25/07/2017	25/07/2017
4.	Round-I	40625	78	MHT-CET	EN17241791	MAHAJAN SHREYA SANTOSH	Female	Type A	NMU	OBC	--	76.17	LOPENH	36277	25/07/2017	25/07/2017
5.	Round-I	42130	77	MHT-CET	EN17321902	RATHOD TRUSHALI BHARAT	Female	Type A	NMU	Open	--	73.67	LOPENH	67640	25/07/2017	25/07/2017
6.	Round-I	42652	77	MHT-CET	EN17204090	SAPKALE BHAVESH UPENDRA	Male	Type A	NMU	SBC	--	84.50	GOPENH	4913	27/07/2017	27/07/2017
7.	Round-I	48651	73	MHT-CET	EN17190091	PAWAR SANJAY RANJIT	Male	Type A	NMU	DT/VJ	--	51.67	GOPENH	4913	26/07/2017	26/07/2017
8.	Round-I	55440	70	MHT-CET	EN17284865	NARKHEDE PUSHKAR CHANDRAKANT	Male	Type A	NMU	OBC	--	70.67	GOPENH	25000	27/07/2017	27/07/2017
9.	Round-I	61835	67	MHT-CET	EN17129144	KOLI AKASH ANIL	Male	Type A	NMU	SBC	--	45.33	GOPENH	4913	27/07/2017	27/07/2017
10.	Round-I	62059	67	MHT-CET	EN17105527	INGALE GANESH BABURAO	Male	Type A	NMU	OBC	--	55.33	GOPENH	36277	25/07/2017	25/07/2017
11.	Round-I	81106	60	MHT-CET	EN17130045	PARADHI VIJAY CHAMAKLAL	Male	Type A	NMU	ST	--	68.33	GSTO	8913	26/07/2017	26/07/2017
12.	Round-I	81919	59	MHT-CET	EN17167333	JADHAV AVINASH PUNA	Male	Type A	NMU	DT/VJ	--	57.67	GVJH	4913	25/07/2017	25/07/2017

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List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Electrical Engineering [510429310]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 60

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
13.	Round-I	87231	57	MHT-CET	EN17287300	MANORE ROHIT DHANRAJ	Male	Type A	NMU	NT-C	--	72.33	LNT2O	4913	26/07/2017	26/07/2017
14.	Round-I	96660	53	MHT-CET	EN17324176	TADAVI MAYUR VAHED	Male	Type A	NMU	ST	--	46.33	GSTH	8913	26/07/2017	26/07/2017
15.	Round-II	30824	85	MHT-CET	EN17301301	KUMBHAR KAJAL ISHWAR	Female	Type A	NMU	OBC	--	62.00	LOPENO	20000	25/07/2017	25/07/2017
16.	Round-II	50911	72	MHT-CET	EN17191692	PATIL PALLAVI BHARAT	Female	Type A	NMU	OBC	--	49.67	LOPENH	15000	25/07/2017	25/07/2017
17.	Round-II	64075	66	MHT-CET	EN17317813	BALAPURE DHANANJAY PRAKASH	Male	Type A	NMU	OBC	--	65.33	GOPENH	36277	26/07/2017	26/07/2017
18.	Round-II	64373	66	MHT-CET	EN17287453	BHOLE PRIYANKA KAMALAKAR	Female	Type A	NMU	OBC	--	54.67	LOBCH	10000	28/07/2017	28/07/2017
19.	Round-II	64375	66	MHT-CET	EN17299688	KOSHTI RUSHIRAJ NARAYAN	Male	Type A	NMU	SBC	--	58.50	GOPENH	4913	27/07/2017	27/07/2017
20.	Round-II	66707	65	MHT-CET	EN17216159	MANISH NANABHAU PATIL	Male	Type A	NMU	OBC	--	49.00	GOPENH	22000	28/07/2017	28/07/2017
21.	Round-II	67805	65	MHT-CET	EN17299234	SHANKOPAL MUKESH SUDHAKAR	Male	Type A	NMU	SBC	--	58.00	GOBCH	4913	27/07/2017	27/07/2017
22.	Round-II	77643	61	MHT-CET	EN17297692	THAKARE BHAGYASHRI NANA	Female	Type A	NMU	SBC	--	68.83	LSCH	3000	28/07/2017	28/07/2017
23.	Round-II	81055	60	MHT-CET	EN17185859	SAYYED RIZWAN SYD SALIM	Male	Type A	NMU	OBC	--	58.33	GSCH	10000	29/07/2017	29/07/2017
24.	Round-II	82605	59	MHT-CET	EN17214159	PATIL MANISH MANSARAM	Male	Type A	NMU	OBC	--	46.33	GSCH	36277	29/07/2017	29/07/2017

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List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Electrical Engineering [510429310]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 60

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
25.	Round-II	84042	59	MHT-CET	EN17165660	PATIL KALPESH SUNIL	Male	Type A	NMU	OBC	--	62.67	GOBCO	16000	26/07/2017	26/07/2017
26.	Round-II	85987	58	MHT-CET	EN17213813	RATHOD INDAL NARSING	Male	Type A	NMU	DT/VJ	--	53.67	GSTH	4913	28/07/2017	28/07/2017
27.	Round-II	88197	57	MHT-CET	EN17127191	DASARE ABHISHEK SUNIL	Male	Type A	DBAMU	OBC	--	54.33	GOPENO	20000	27/07/2017	27/07/2017
28.	Round-II	88466	57	MHT-CET	EN17312149	ABHIJEET CHANDRAKANT BHAGWAT	Male	Type A	NMU	OBC	--	48.33	GOBCH	36277	25/07/2017	25/07/2017
29.	Round-II	90967	56	MHT-CET	EN17198661	UPADHYE NISHANT DILIP	Male	Type A	MU	Open	--	50.00	GOPENO	67640	27/07/2017	27/07/2017
30.	Round-II	91174	55	MHT-CET	EN17118484	SAWAKARE DIPAK RAMESH	Male	Type A	NMU	SC	--	81.67	GSCH	8913	26/07/2017	26/07/2017
31.	Round-II	102649	48	MHT-CET	EN17273492	TADAVI ARSHAD AYUB	Male	Type A	NMU	ST	--	69.67	LSCO	8913	25/07/2017	25/07/2017
32.	Round-II	105301	44	MHT-CET	EN17218531	PATIL AKSHAY RAVINDRA	Male	Type A	NMU	DT/VJ	--	71.67	LNT1O	4913	26/07/2017	26/07/2017
33.	Round-III	60239	68	MHT-CET	EN17307899	PATIL KHUSHI SANJAY	Female	Type A	NMU	Open	--	71.00	PWDC	20000	27/07/2017	27/07/2017
34.	Round-III	60835	68	MHT-CET	EN17287976	BHOLE BHAIRAVI PRAVIN	Female	Type A	NMU	OBC	--	53.67	LOBCO	20000	27/07/2017	27/07/2017
35.	Round-III	66537	65	MHT-CET	EN17208189	MAHAJAN ANIKET SANJAY	Male	Type A	NMU	OBC	--	52.00	LNT3H	20000	27/07/2017	27/07/2017
36.	Round-III	67153	65	MHT-CET	EN17176788	PATIL PRASHANT RAJENDRA	Male	Type A	NMU	OBC	--	44.67	GOPENH	36277	26/07/2017	26/07/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Electrical Engineering [510429310]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 60

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
37.	Round-III	75925	62	MHT-CET	EN17287510	HARSHADA BHAGVAT PATIL	Female	Type A	NMU	Open	--	53.33	PWDC	20000	27/07/2017	27/07/2017
38.	Round-III	78644	61	MHT-CET	EN17187985	PRATIK VILAS BAVISKAR	Male	Type A	NMU	OBC	--	64.00	GOBCH	20000	27/07/2017	27/07/2017
39.	Round-III	79928	60	MHT-CET	EN17260887	BAHIRAM SURAJ GULABRAO	Male	Type A	NMU	OBC	DEF1	52.67	GOBCO	36277	27/07/2017	27/07/2017
40.	Round-III	82133	59	MHT-CET	EN17184261	CHOPADE GAURAV RAJENDRA	Male	Type A	SGBAU	OBC	--	53.33	GOPENO	36277	27/07/2017	27/07/2017
41.	Round-III	83282	59	MHT-CET	EN17180650	WAGH KAPIL VIJAY	Male	Type A	DBAMU	SC	--	48.17	GSCO	8913	27/07/2017	27/07/2017
42.	Round-III	87141	57	MHT-CET	EN17221187	KHODAPE KIRAN PRAKASH	Male	Type A	NMU	OBC	--	48.33	LSCH	20000	27/07/2017	27/07/2017
43.	Round-III	88659	57	MHT-CET	EN17316314	KUMAVAT MAYUR SANTOSH	Male	Type A	NMU	NT-B	--	54.00	GNT1H	4913	26/07/2017	26/07/2017
44.	Round-III	91804	55	MHT-CET	EN17293961	SHINDE GANESH SHAMKANT	Male	Type A	NMU	OBC	--	63.67	GNT2H	20000	27/07/2017	27/07/2017
45.	Round-I	27541	41	JEE	EN17216521	KOMAL PURUSHOTTAM PATIL	Female	Type A	NMU	OBC	--	72.00	AI	40000	26/07/2017	26/07/2017
46.	Round-I	29303	40	JEE	EN17217226	PATIL JAGRUTI RAVINDRA	Female	Type A	NMU	OBC	--	67.67	AI	25000	25/07/2017	25/07/2017
47.	Round-I	34813	35	JEE	EN17219287	SONAWANE SHUBHAM AVINASH	Male	Type A	NMU	OBC	--	76.33	AI	40000	28/07/2017	28/07/2017
48.	Round-I	37149	33	JEE	EN17266249	JAWALE SHRUTIKA SUNIL	Female	Type A	NMU	OBC	--	64.33	AI	20000	27/07/2017	27/07/2017

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List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Electrical Engineering [510429310]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 60

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
49.	Round-II	17426	55	JEE	EN17171917	DEVKAR TUSHAR RAJESH	Male	Type A	MU	OBC	--	50.67	AI	20000	26/07/2017	26/07/2017
50.	Round-II	18942	52	JEE	EN17299554	TADVI ASHISH DABIR	Male	Type A	NMU	ST	--	45.33	AI	8913	25/07/2017	25/07/2017
51.	Round-II	45465	27	JEE	EN17137681	PATIL VINAY SUNIL	Male	Type A	NMU	OBC	--	67.33	AI	10000	29/07/2017	29/07/2017
52.	Round-II	49062	25	JEE	EN17302235	PATIL KUNAL SURESH	Male	Type A	NMU	OBC	--	77.67	AI	21000	26/07/2017	26/07/2017
53.	Round-III	17734	54	JEE	EN17284869	SHELKE KARTIK SUNILRAO	Male	Type A	NMU	OBC	--	55.67	AI	20000	26/07/2017	26/07/2017

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List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Electrical Engineering [510429310]

List of Candidates Admitted Under Against CAP (Excluding Minority) Vacant Seats

Number of Seats : 7

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
54.	Institute Level	1	71	MHT-CET	EN17310206	CHETAN ASHOK THAKUR	Male	Type A	NMU	ST	--	44.67	ACAP	20000	31/07/2017	06/08/2017
55.	Institute Level	2	60	MHT-CET	EN17184193	HINGANKAR ASHUTOSH GANESH	Male	Type A	SGBAU	OBC	--	63.33	ACAP	30000	23/08/2017	23/08/2017
56.	Institute Level	3	14	JEE	EN17339888	GIRHEPUNJE SHASHANK RAMKRUSHNA	Male	Type A	RTMNU	OBC	--	52.00	ACAP	71640	23/08/2017	24/08/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

Summary of Admitted Candidates for Admission to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Electrical Engineering [510429310]

Sr. No.	Admission Details	Intake	Admitted / Uploaded Before Cut Off Date	Admitted / Uploaded After Cut Off Date	Total Admitted
1.	CAP (Excluding Minority)	60	53	0	53
2.	Against CAP (Excluding Minority)		3	0	3
3.	CAP (Minority)	0	0	0	0
4.	Against CAP (Minority)		0	0	0
5.	Institute Level	0	0	0	0
6.	J&K Migrant		0	0	0
7.	NRI/OCI/PIO/FNS/CIWGC/JKSSS/NEUT		0	0	0
8.	Over and Above		0	0	0
	Total	**60**	**56**	**0**	**56**

Seat Type used for Institute Level Admissions : ACAP-Against CAP (Excluding Minority), IL-Institute Level, ILNRI-Institute Level NRI (5% of SI if AICTE Permission), MI-Minority, NRI-NRI (15% of SI if AICTE Permission), PIO-PIO (15% of SI if AICTE Permission), FNS-FNS (15% of SI if AICTE Permission), CIWGC-Children's of Indian Workers in Gulf Countries (15% of SI if AICTE Permission), JKSSS - Prime Minister Special Scholarship Scheme, NEUT - North Eastern States and UTs, OAA-Over and Above

Home University used for Admissions : DBAMU - Dr. B. A. Marathwada University, GU - Gondwana University, MU - Mumbai University, NMU - North Maharashtra University, RTMNU - Rashtrasant Tukadoji Maharaj Nagpur University, SGBAU - Sant Gadge Baba Amravati University, SOLU - Solapur University, SPPU - Savitribai Phule Pune University, SRTMU - S. R. T. Marathwada University, SVJU - Shivaji University, NA - Not Applicable

Cut-Off Date for Admission : 31/08/2017
Cut-Off Date for Uploading : 01/09/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Information Technology [510424610]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 60

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
1.	Round-I	20600	97	MHT-CET	EN17181898	MALU RAKHI SHIRISH	Female	Type A	NMU	Open	--	78.67	LOPENH	25000	29/07/2017	29/07/2017
2.	Round-I	60580	68	MHT-CET	EN17131648	DESAI TWINKAL BALASAHEB	Female	Type A	NMU	OBC	--	61.00	LOPENH	28436	27/07/2017	27/07/2017
3.	Round-I	78263	61	MHT-CET	EN17297816	MAHAJAN NILESH ANIL	Male	Type A	NMU	OBC	--	73.33	GOPENH	15000	27/07/2017	27/07/2017
4.	Round-I	101298	49	MHT-CET	EN17253343	BHOI SAMADHAN SURESH	Male	Type A	NMU	NT-B	--	47.00	GNT1H	4913	28/07/2017	28/07/2017
5.	Round-II	37108	80	MHT-CET	EN17285956	SAYYED NUZHAT FATEMA MOHSIN	Female	Type A	NMU	Open	--	71.00	LOPENO	20000	28/07/2017	28/07/2017
6.	Round-II	62077	67	MHT-CET	EN17319619	GYAN MANOJ VILAS	Male	Type A	NMU	OBC	--	50.00	GOPENH	20000	26/07/2017	26/07/2017
7.	Round-II	80754	60	MHT-CET	EN17284126	LALIT	Male	Type A	NMU	OBC	--	57.00	GOPENO	15000	26/07/2017	26/07/2017
8.	Round-II	82157	59	MHT-CET	EN17172063	PADOL ASHWINI RAJENDRA	Female	Type A	NMU	Open	--	81.33	GOPENH	30000	26/07/2017	26/07/2017
9.	Round-II	85065	58	MHT-CET	EN17177488	SUTARE PARAG NARAYANSA	Male	Type A	NMU	OBC	--	58.33	GOPENH	20000	28/07/2017	28/07/2017
10.	Round-II	89929	56	MHT-CET	EN17274807	PATIL RAJSHRI DNYANESHWAR	Female	Type A	NMU	OBC	--	58.00	LOBCH	6000	26/07/2017	26/07/2017
11.	Round-II	90044	56	MHT-CET	EN17166063	GUNJAL TEJASVI SUBHASH	Female	Type A	NMU	Open	--	50.33	GOPENH	28000	26/07/2017	26/07/2017
12.	Round-II	91798	55	MHT-CET	EN17279843	PATIL MAHESHWARI RAJENDRA	Female	Type A	NMU	OBC	--	66.67	LOBCO	22000	26/07/2017	26/07/2017

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List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Information Technology [510424610]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 60

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
13.	Round-II	92390	55	MHT-CET	EN17314645	MORE PRAJWAL PRAKASH	Male	Type A	NMU	OBC	--	78.33	LNT2H	20000	27/07/2017	27/07/2017
14.	Round-II	98272	52	MHT-CET	EN17308598	SHIROLE CHINMAYEE NARENDRA	Female	Type A	NMU	OBC	--	52.33	LSCH	20000	26/07/2017	26/07/2017
15.	Round-II	99434	51	MHT-CET	EN17282908	PATIL NARAYAN PURUSHOTTAM	Male	Type A	NMU	OBC	--	75.00	GOPENH	15000	27/07/2017	27/07/2017
16.	Round-II	102025	49	MHT-CET	EN17318452	SUTAR NITIN ASHOK	Male	Type A	NMU	OBC	--	49.00	GOBCH	0	29/07/2017	29/07/2017
17.	Round-III	41446	77	MHT-CET	EN17298174	PATIL SANKET PRADIP	Male	Type A	NMU	OBC	--	73.33	GOPENO	10000	28/07/2017	28/07/2017
18.	Round-III	63419	67	MHT-CET	EN17270258	PATIL YOGITA RATANASING	Female	Type A	NMU	Open	--	50.33	LOPENO	10000	27/07/2017	27/07/2017
19.	Round-III	63508	67	MHT-CET	EN17219234	SHEVALKAR NIKHIL KISHOR	Male	Type A	NMU	OBC	--	61.00	GOPENO	10000	29/07/2017	29/07/2017
20.	Round-III	69444	64	MHT-CET	EN17203514	JAISAWAL SHUBHAM VIJAY	Male	Type A	NMU	OBC	--	47.00	GOPENO	5000	31/07/2017	31/07/2017
21.	Round-III	71123	8	JEE	EN17167355	LOKESH VYAS	Male	OMS	NA	Open	--	91.33	GSTO	30000	28/07/2017	28/07/2017
22.	Round-III	74779	62	MHT-CET	EN17136322	ICHHAPURKAR PRATIKSHA PRAMOD	Female	Type A	NMU	Open	--	50.67	LOPENH	25000	26/07/2017	26/07/2017
23.	Round-III	86181	58	MHT-CET	EN17324594	PATIL NIKITA DNYANESHWAR	Female	Type A	NMU	Open	--	55.33	GOPENH	5000	28/07/2017	28/07/2017
24.	Round-III	87580	57	MHT-CET	EN17290508	PATIL JAGRUTI JITENDRA	Female	Type A	NMU	Open	--	79.67	PWDC	20000	26/07/2017	26/07/2017

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305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Information Technology [510424610]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 60

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
25.	Round-III	91291	55	MHT-CET	EN17304409	LATHI SAMIKSHA ATUL	Female	Type A	NMU	Open	--	71.00	GOPENH	35000	27/07/2017	27/07/2017
26.	Round-III	91668	55	MHT-CET	EN17188167	YASH BHAGWAT CHOPADE	Male	Type A	NMU	OBC	--	46.50	GOPENO	28436	27/07/2017	27/07/2017
27.	Round-III	92891	55	MHT-CET	EN17287614	FUSE PRITAM SUKALAL	Male	Type A	NMU	OBC	--	46.67	GOPENH	20000	27/07/2017	27/07/2017
28.	Round-III	93163	55	MHT-CET	EN17172701	SHAIKH M AFFAN MOHD ZUBAIR	Male	Type A	NMU	Open	--	58.67	GSCH	30000	27/07/2017	27/07/2017
29.	Round-III	93254	54	MHT-CET	EN17299032	MAHURKAR RUTIK AKASH	Male	Type A	NMU	OBC	--	52.00	GOBCH	15000	25/07/2017	25/07/2017
30.	Round-III	99999	50	MHT-CET	EN17298613	MAGARE TUSHAR SURESH	Male	Type A	NMU	OBC	--	75.33	GOBCH	20000	26/07/2017	26/07/2017
31.	Round-III	101063	50	MHT-CET	EN17162729	KHAN HAMMAD AHMED KHALIL AHMED	Male	Type A	NMU	Open	--	49.67	GNT2O	15000	26/07/2017	26/07/2017
32.	Round-III	101386	49	MHT-CET	EN17179947	SHAIKH SHARIQUE AB QAYYUM PINJARI	Male	Type A	NMU	OBC	--	63.00	GOBCH	10000	28/07/2017	28/07/2017
33.	Round-III	101607	49	MHT-CET	EN17286843	MOHAMMAD MUZAMMIL SHAH ATAULLAH SHAH	Male	Type A	NMU	DT/VJ	--	48.67	GVJH	4913	29/07/2017	29/07/2017
34.	Round-III	105945	41	MHT-CET	EN17304984	PATIL NOBAL BHARAT	Male	Type A	NMU	OBC	--	51.33	GOBCO	20000	28/07/2017	28/07/2017
35.	Round-III	107961	67	MHT-CET	EN17330873	JAYDEEP	Male	Type A	NMU	ST	--	56.33	GSCH	5000	28/07/2017	28/07/2017
36.	Round-III	108180	65	MHT-CET	EN17334936	PATIL DINESH MOHAN	Male	Type A	NMU	OBC	--	55.00	GSCH	15000	27/07/2017	27/07/2017

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List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Information Technology [510424610]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 60

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
37.	Round-III	108378	63	MHT-CET	EN17335095	MANDHAN MUSKAN SUSHIL	Female	Type A	NMU	Open	--	57.67	GSTH	30000	26/07/2017	26/07/2017
38.	Round-III	108558	61	MHT-CET	EN17328903	SHAIKH MOEEN MOHD KALIM MANYAR	Male	Type A	NMU	OBC	--	56.33	GOBCO	6000	29/07/2017	29/07/2017
39.	Round-I	39539	31	JEE	EN17199746	KALE BHAGYASHRI ABHIMAN	Female	Type A	NMU	OBC	--	45.00	AI	25000	25/07/2017	25/07/2017
40.	Round-I	45411	27	JEE	EN17311305	PAWAR PAWAN RAMCHANDRA	Male	Type A	NMU	OBC	--	47.33	AI	10000	27/07/2017	27/07/2017
41.	Round-I	46421	26	JEE	EN17132424	PATIL HARSHADA VITTHAL	Female	Type A	NMU	OBC	--	55.67	AI	36277	27/07/2017	27/07/2017
42.	Round-II	19487	51	JEE	EN17131696	PATIL SAURAV PREMSING	Male	Type A	NMU	Open	--	57.67	AI	30000	25/07/2017	25/07/2017
43.	Round-II	49511	24	JEE	EN17169128	MONIS AHEMAD NAFIS KHAN	Male	Type A	NMU	Open	--	53.67	AI	40000	28/07/2017	28/07/2017
44.	Round-III	116115	14	JEE	EN17118302	DEEPAK PATIL	Male	OMS	NA	Open	--	63.00	AI	25000	26/07/2017	26/07/2017

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List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Information Technology [510424610]

List of Candidates Admitted Under Against CAP (Excluding Minority) Vacant Seats

Number of Seats : 16

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
45.	Institute Level	1	58	MHT-CET	EN17279049	PATIL GAURAV RAMDAS	Male	Type A	NMU	OBC	--	57.33	ACAP	5000	29/07/2017	06/08/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

Summary of Admitted Candidates for Admission to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Information Technology [510424610]

Sr. No.	Admission Details	Intake	Admitted / Uploaded Before Cut Off Date	Admitted / Uploaded After Cut Off Date	Total Admitted
1.	CAP (Excluding Minority)	60	44	0	44
2.	Against CAP (Excluding Minority)		1	0	1
3.	CAP (Minority)	0	0	0	0
4.	Against CAP (Minority)		0	0	0
5.	Institute Level	0	0	0	0
6.	J&K Migrant		0	0	0
7.	NRI/OCI/PIO/FNS/CIWGC/JKSSS/NEUT		0	0	0
8.	Over and Above		0	0	0
	Total	**60**	**45**	**0**	**45**

Seat Type used for Institute Level Admissions : ACAP-Against CAP (Excluding Minority), IL-Institute Level, ILNRI-Institute Level NRI (5% of SI if AICTE Permission), MI-Minority, NRI-NRI (15% of SI if AICTE Permission), PIO-PIO (15% of SI if AICTE Permission), FNS-FNS (15% of SI if AICTE Permission), CIWGC-Children's of Indian Workers in Gulf Countries (15% of SI if AICTE Permission), JKSSS - Prime Minister Special Scholarship Scheme, NEUT - North Eastern States and UTs, OAA-Over and Above
Home University used for Admissions : DBAMU - Dr. B. A. Marathwada University, GU - Gondwana University, MU - Mumbai University, NMU - North Maharashtra University, RTMNU - Rashtrasant Tukadoji Maharaj Nagpur University, SGBAU - Sant Gadge Baba Amravati University, SOLU - Solapur University, SPPU - Savitribai Phule Pune University, SRTMU - S. R. T. Marathwada University, SVJU - Shivaji University, NA - Not Applicable

Cut-Off Date for Admission : 31/08/2017
Cut-Off Date for Uploading : 01/09/2017

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STATE COMMON ENTRANCE TEST CELL

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List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Information Technology [510424611T]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 3

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
1.	Round-I	30109	86	MHT-CET	EN17235030	PATIL SRISHTI SATISH	Female	Type A	SGBAU	OBC	--	90.00	TFWS	4913	25/07/2017	25/07/2017
2.	Round-I	38400	79	MHT-CET	EN17169488	MORE BHUSHAN ANANDA	Male	Type A	NMU	NT-B	--	49.67	TFWS	4913	25/07/2017	25/07/2017
3.	Round-II	26449	90	MHT-CET	EN17180487	INGALE RAJ DIPAK	Male	Type A	NMU	OBC	--	65.00	TFWS	4913	27/07/2017	27/07/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

Summary of Admitted Candidates for Admission to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Information Technology [510424611T]

Sr. No.	Admission Details	Intake	Admitted / Uploaded Before Cut Off Date	Admitted / Uploaded After Cut Off Date	Total Admitted
1.	CAP (Excluding Minority)	3	3	0	3
2.	Against CAP (Excluding Minority)		0	0	0
3.	CAP (Minority)	0	0	0	0
4.	Against CAP (Minority)		0	0	0
5.	Institute Level	0	0	0	0
6.	J&K Migrant		0	0	0
7.	NRI/OCI/PIO/FNS/CIWGC/JKSSS/NEUT		0	0	0
8.	Over and Above		0	0	0
	Total	**3**	**3**	**0**	**3**

Seat Type used for Institute Level Admissions : ACAP-Against CAP (Excluding Minority), IL-Institute Level, ILNRI-Institute Level NRI (5% of SI if AICTE Permission), MI-Minority, NRI-NRI (15% of SI if AICTE Permission), PIO-PIO (15% of SI if AICTE Permission), FNS-FNS (15% of SI if AICTE Permission), CIWGC-Children's of Indian Workers in Gulf Countries (15% of SI if AICTE Permission), JKSSS - Prime Minister Special Scholarship Scheme, NEUT - North Eastern States and UTs, OAA-Over and Above

Home University used for Admissions : DBAMU - Dr. B. A. Marathwada University, GU - Gondwana University, MU - Mumbai University, NMU - North Maharashtra University, RTMNU - Rashtrasant Tukadoji Maharaj Nagpur University, SGBAU - Sant Gadge Baba Amravati University, SOLU - Solapur University, SPPU - Savitribai Phule Pune University, SRTMU - S. R. T. Marathwada University, SVJU - Shivaji University, NA - Not Applicable

Cut-Off Date for Admission : 31/08/2017
Cut-Off Date for Uploading : 01/09/2017

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305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Mechanical Engineering [510461210]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 120

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
1.	Round-I	29508	87	MHT-CET	EN17212033	JOSHI ROHIT DINESH	Male	Type A	NMU	NT-B	--	62.67	GOPENH	4913	25/07/2017	25/07/2017
2.	Round-I	33986	83	MHT-CET	EN17290699	PATIL SUYASH PRAFULLA	Male	Type A	NMU	OBC	--	55.67	GOPENH	36277	27/07/2017	27/07/2017
3.	Round-I	34390	82	MHT-CET	EN17170790	KHADKE NIKHIL CHANDRAHAS	Male	Type A	NMU	OBC	--	69.67	GOPENH	36277	25/07/2017	25/07/2017
4.	Round-I	36841	80	MHT-CET	EN17182825	PATIL YASH PRAVIN	Male	Type A	NMU	OBC	--	51.67	GOPENH	36277	25/07/2017	25/07/2017
5.	Round-I	41184	78	MHT-CET	EN17161385	JAIN VINAY MANISHKUMAR	Male	Type A	NMU	Open	--	79.67	GOPENH	35000	26/07/2017	26/07/2017
6.	Round-I	45316	75	MHT-CET	EN17195115	DIVYENDU HEMANT PATIL	Male	Type A	NMU	OBC	--	57.67	GOPENH	67640	27/07/2017	27/07/2017
7.	Round-I	45432	75	MHT-CET	EN17291650	PATIL ALPESH ANIL	Male	Type A	NMU	Open	--	69.67	GOPENH	20000	25/07/2017	25/07/2017
8.	Round-I	47864	74	MHT-CET	EN17167585	SHIRSATH BHUSHAN VITTHAL	Male	Type A	NMU	SBC	--	74.00	GOPENH	4913	26/07/2017	26/07/2017
9.	Round-I	48971	73	MHT-CET	EN17249502	MAHALE KARAN RAJKUKMAR	Male	Type A	NMU	OBC	--	58.00	GOPENH	20000	28/07/2017	28/07/2017
10.	Round-I	49958	73	MHT-CET	EN17148670	PATIL VAIBHAV VIKAS	Male	Type A	DBAMU	OBC	--	73.67	GOPENO	25000	25/07/2017	25/07/2017
11.	Round-I	49981	73	MHT-CET	EN17297558	GHUGE AKSHAYKUMAR SANJAY	Male	Type A	NMU	NT-D	--	48.67	GNT3O	4913	25/07/2017	25/07/2017
12.	Round-I	50902	72	MHT-CET	EN17211053	MOURYA AAKASH SHAMBAHADUR	Male	Type A	NMU	OBC	--	60.50	GOPENH	20000	27/07/2017	27/07/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Mechanical Engineering [510461210]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 120

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
13.	Round-I	51376	72	MHT-CET	EN17295558	GUJAR VIJAY RAJARAM	Male	Type A	NMU	OBC	--	57.33	GOPENH	20000	28/07/2017	28/07/2017
14.	Round-I	53099	71	MHT-CET	EN17310688	KOLHE KUNAL RAJESH	Male	Type A	DBAMU	OBC	--	54.33	GOPENO	36277	26/07/2017	26/07/2017
15.	Round-I	54804	70	MHT-CET	EN17290587	SANKET DEVIDAS PATIL	Male	Type A	NMU	OBC	--	66.33	LOBCH	25000	29/07/2017	29/07/2017
16.	Round-I	54852	70	MHT-CET	EN17113088	SHAIKH ABUZER SK MD ASIF	Male	Type A	NMU	Open	--	60.67	LOPENH	67640	26/07/2017	26/07/2017
17.	Round-I	57363	69	MHT-CET	EN17145642	KUMBHAR KIRAN DILIP	Male	Type A	NMU	OBC	--	50.33	GOBCH	20000	25/07/2017	25/07/2017
18.	Round-I	57609	69	MHT-CET	EN17172062	BORSE DIPRAJ GAJANAN	Male	Type A	NMU	OBC	DEF1	55.33	DEFS	36277	28/07/2017	28/07/2017
19.	Round-I	59444	68	MHT-CET	EN17182534	LOHARE SARVESH MANOHAR	Male	Type A	NMU	SBC	--	71.33	GOBCH	4913	25/07/2017	25/07/2017
20.	Round-I	59735	68	MHT-CET	EN17303721	PATIL SHUBHAM PRAVIN	Male	Type A	NMU	OBC	--	55.67	GOBCH	20000	27/07/2017	27/07/2017
21.	Round-I	61032	68	MHT-CET	EN17249196	SARASKAR YASH BALASAHEB	Male	Type A	SGBAU	Open	--	49.67	GOPENO	40000	26/07/2017	26/07/2017
22.	Round-I	61940	67	MHT-CET	EN17209204	NILESH SHRIKRISHNA KHADSE	Male	Type A	NMU	OBC	--	69.33	GOBCH	36277	26/07/2017	26/07/2017
23.	Round-I	62327	67	MHT-CET	EN17269420	RATHOD SACHIN VARJAN	Male	Type A	NMU	NT-D	--	83.67	GNT3H	4913	25/07/2017	25/07/2017
24.	Round-I	62820	67	MHT-CET	EN17157699	MOHAMMAD UZAIR MOHAMMAD ZUBAIR	Male	Type A	SGBAU	OBC	--	56.50	GOPENO	36277	25/07/2017	25/07/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Mechanical Engineering [510461210]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 120

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
25.	Round-I	64319	66	MHT-CET	EN17184848	BHAVSAR JAYANT NARENDRA	Male	Type A	NMU	OBC	--	59.67	GOBCH	20000	26/07/2017	26/07/2017
26.	Round-I	65731	66	MHT-CET	EN17215795	MORE HARSHAL DILIP	Male	Type A	SPPU	OBC	--	66.00	GOPENO	20000	27/07/2017	27/07/2017
27.	Round-I	68974	64	MHT-CET	EN17244613	SONAWANE ROHIT DINKAR	Male	Type A	NMU	SC	DEF1	50.00	DEFS	8913	26/07/2017	26/07/2017
28.	Round-I	71283	64	MHT-CET	EN17180021	PATIL VAIBHAV GOPAL	Male	Type A	SGBAU	OBC	--	82.67	GOPENO	25000	25/07/2017	25/07/2017
29.	Round-I	72485	63	MHT-CET	EN17277789	MOHAMMAD SAQLAIN RAZA AQUEEL KHAN	Male	Type A	NMU	NT-B	--	61.67	GNT1H	4913	25/07/2017	25/07/2017
30.	Round-I	75286	62	MHT-CET	EN17250367	KAWAL RAHUL DHANSING	Male	Type A	DBAMU	DT/VJ	--	70.33	GOPENO	4913	26/07/2017	26/07/2017
31.	Round-I	79054	61	MHT-CET	EN17285508	BAVISKAR SUYOG KAILAS	Male	Type A	MU	SBC	--	46.67	GOPENO	4913	25/07/2017	25/07/2017
32.	Round-I	80813	60	MHT-CET	EN17123707	BHALERAO MANGESH GOKUL	Male	Type A	NMU	SC	--	56.33	GSCH	8913	26/07/2017	26/07/2017
33.	Round-I	82303	59	MHT-CET	EN17272002	KHARE TEJAS DASHARATH	Male	Type A	NMU	SC	--	65.00	GSCH	8913	26/07/2017	26/07/2017
34.	Round-I	86754	57	MHT-CET	EN17156792	BANSODE ATUL SANJAY	Male	Type A	NMU	SC	--	53.67	GSCH	8913	27/07/2017	27/07/2017
35.	Round-I	89163	56	MHT-CET	EN17291927	SHEJWAL GANESH LAHU	Male	Type A	NMU	SC	--	60.00	GSCH	8913	25/07/2017	25/07/2017
36.	Round-I	98285	52	MHT-CET	EN17101577	GAWAI PRAFUL PRAKASH	Male	Type A	SGBAU	SC	--	56.00	GSCO	4913	26/07/2017	26/07/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Mechanical Engineering [510461210]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 120

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
37.	Round-I	99968	50	MHT-CET	EN17312646	SHUKLA SHUBHAM CHANDRAKANT	Male	Type A	SGBAU	Open	--	68.67	LOPENO	25000	25/07/2017	25/07/2017
38.	Round-I	102902	48	MHT-CET	EN17171997	KACHAVE DHARAMSING ISHWARSING	Male	Type A	SGBAU	Open	--	53.33	LOPENO	25000	25/07/2017	25/07/2017
39.	Round-II	23283	93	MHT-CET	EN17179652	GAIKWAD MANGESH RAJENDRA	Male	Type A	SGBAU	OBC	--	61.00	GOPENO	36277	28/07/2017	28/07/2017
40.	Round-II	26486	90	MHT-CET	EN17131072	ALKARI VIJAY SUNIL	Male	Type A	NMU	OBC	--	82.67	GOPENH	15000	25/07/2017	25/07/2017
41.	Round-II	40397	78	MHT-CET	EN17291920	PATIL SIMRAN PRAMOD	Female	Type A	NMU	OBC	--	63.33	LOPENO	36277	25/07/2017	25/07/2017
42.	Round-II	45878	75	MHT-CET	EN17272601	PARDESHI KUNAL JOHARALAL	Male	Type A	NMU	NT-B	--	64.33	GOPENH	4913	27/07/2017	27/07/2017
43.	Round-II	48833	73	MHT-CET	EN17195957	GADILOHAR PAVAN RAJENDRA	Male	Type A	NMU	NT-B	--	55.33	GOPENH	4913	28/07/2017	28/07/2017
44.	Round-II	51912	72	MHT-CET	EN17199774	WAGH YADNESH SANJAY	Male	Type A	NMU	OBC	--	53.33	GOPENH	36277	26/07/2017	26/07/2017
45.	Round-II	53561	71	MHT-CET	EN17303345	BAVISKAR RUPESH SANJAY	Male	Type A	NMU	OBC	--	62.67	GOPENH	20000	27/07/2017	27/07/2017
46.	Round-II	55523	70	MHT-CET	EN17311870	SHIMPI DIPAK SUDHAKAR	Male	Type A	NMU	OBC	--	51.67	LOBCH	15000	26/07/2017	26/07/2017
47.	Round-II	57647	69	MHT-CET	EN17157882	PATIL SWAPNIL UTTAM	Male	Type A	NMU	Open	--	57.00	LOPENH	15000	25/07/2017	25/07/2017
48.	Round-II	64682	66	MHT-CET	EN17277369	KASAR PRASAD VIJAY	Male	Type A	NMU	OBC	--	51.33	LOBCH	20000	27/07/2017	27/07/2017

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305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Mechanical Engineering [510461210]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 120

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
49.	Round-II	66082	66	MHT-CET	EN17297635	MAHAJAN RAHUL SURESH	Male	Type A	NMU	OBC	--	51.67	LSCH	20000	28/07/2017	28/07/2017
50.	Round-II	66548	65	MHT-CET	EN17202961	PATIL ROHIT ARUN	Male	Type A	SPPU	OBC	--	67.33	GOPENO	10000	27/07/2017	27/07/2017
51.	Round-II	67245	65	MHT-CET	EN17212620	CHAUDHARI SAHIL PRAVIN	Male	Type A	NMU	OBC	--	48.00	LSTH	20000	27/07/2017	27/07/2017
52.	Round-II	68715	65	MHT-CET	EN17131687	PATIL SANGHARSH JIVAN	Male	Type A	NMU	OBC	--	67.33	LSCO	36277	26/07/2017	26/07/2017
53.	Round-II	70813	64	MHT-CET	EN17293114	SONAWANE BHAVESH NIMBA	Male	Type A	NMU	OBC	--	64.33	GOBCH	25000	26/07/2017	26/07/2017
54.	Round-II	71168	64	MHT-CET	EN17216048	TAYADE AKSHYAKUMAR PANDIT	Male	Type A	NMU	SC	--	53.00	GSCH	8913	29/07/2017	29/07/2017
55.	Round-II	73164	63	MHT-CET	EN17214023	MORE PUNIT KISHOR	Male	Type A	NMU	OBC	--	47.33	GSTH	20000	26/07/2017	26/07/2017
56.	Round-II	73330	63	MHT-CET	EN17277052	PATIL KALPESH NAVAL	Male	Type A	NMU	OBC	--	54.00	GOBCH	40000	27/07/2017	27/07/2017
57.	Round-II	74556	62	MHT-CET	EN17297612	PATIL MAYUR VIKRAM	Male	Type A	NMU	OBC	--	61.33	GSCO	15000	28/07/2017	28/07/2017
58.	Round-II	75175	62	MHT-CET	EN17239867	MANISH ANANDA PATIL	Male	Type A	NMU	OBC	--	72.83	GSTO	36277	25/07/2017	25/07/2017
59.	Round-II	76502	62	MHT-CET	EN17217828	PATIL RUPESH RAMESH	Male	Type A	NMU	OBC	--	63.67	GOBCO	36277	27/07/2017	27/07/2017
60.	Round-II	77173	61	MHT-CET	EN17310453	CHAVAN MUKESH MAGAN	Male	Type A	NMU	DT/VJ	--	56.00	GVJO	4913	26/07/2017	26/07/2017

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305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Mechanical Engineering [510461210]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 120

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
61.	Round-II	77855	61	MHT-CET	EN17223620	RATHOD VIKAS DHARAMCHAND	Male	Type A	NMU	DT/VJ	--	54.33	GVJH	4913	26/07/2017	26/07/2017
62.	Round-II	78198	61	MHT-CET	EN17190171	NAGTILAK SATSWARUP BABASAHEB	Male	Type A	NMU	Open	--	61.50	LOPENH	15000	25/07/2017	25/07/2017
63.	Round-II	78514	61	MHT-CET	EN17184817	RATHOD AMIT GOWARSING	Male	Type A	NMU	DT/VJ	--	55.00	GVJH	4913	28/07/2017	28/07/2017
64.	Round-II	82659	59	MHT-CET	EN17322978	KHAIRNAR ASHISH SAMADHAN	Male	Type A	NMU	SC	--	54.67	GSCH	8913	25/07/2017	25/07/2017
65.	Round-II	83124	59	MHT-CET	EN17165623	CHHADEKAR VISHAL LALIT	Male	Type A	NMU	NT-B	--	48.00	GNT1H	4913	28/07/2017	28/07/2017
66.	Round-II	83445	59	MHT-CET	EN17254163	SALUNKHE TEJAS JIJABRAO	Male	Type A	NMU	OBC	--	45.00	LOBCO	36277	25/07/2017	25/07/2017
67.	Round-II	83810	59	MHT-CET	EN17282412	RAJPUT YASHRAJSING RAJENDRASING	Male	Type A	NMU	DT/VJ	--	55.67	GSTH	4913	25/07/2017	25/07/2017
68.	Round-II	84328	58	MHT-CET	EN17246318	PATIL VISHAL SHIVAJI	Male	Type A	NMU	OBC	--	45.33	GOBCH	20000	26/07/2017	26/07/2017
69.	Round-II	88461	57	MHT-CET	EN17214125	VANJARI SACHIN MADHUKAR	Male	Type A	NMU	NT-D	--	49.67	GSTH	4913	26/07/2017	26/07/2017
70.	Round-II	94176	54	MHT-CET	EN17293441	PANDHARE VISHAL SANJAY	Male	Type A	NMU	NT-C	--	46.67	GNT2H	4913	26/07/2017	26/07/2017
71.	Round-II	95132	53	MHT-CET	EN17309385	PATIL VAISHNAVI RAMKRUSHNA	Female	Type A	NMU	OBC	--	67.00	LOPENH	25000	25/07/2017	25/07/2017
72.	Round-II	102110	49	MHT-CET	EN17322041	BHARUDE KIRAN NANDU	Male	Type A	NMU	SC	--	54.33	LSCH	2500	26/07/2017	26/07/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Mechanical Engineering [510461210]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 120

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
73.	Round-III	45855	75	MHT-CET	EN17174038	JADHAV AKSHAY BHAGWAT	Male	Type A	SRTMU	Open	--	52.67	GOPENO	20000	27/07/2017	27/07/2017
74.	Round-III	47511	74	MHT-CET	EN17195378	PATIL AJAY ANIL	Male	Type A	NMU	OBC	--	55.00	GOPENH	36277	26/07/2017	26/07/2017
75.	Round-III	56911	70	MHT-CET	EN17116327	MESHRAM ROHIT JAYAPAL	Male	Type A	GU	SC	--	80.00	GSCO	8913	28/07/2017	28/07/2017
76.	Round-III	58097	69	MHT-CET	EN17281773	MAHAJAN NILESH BAPU	Male	Type A	NMU	OBC	--	64.00	GOBCH	36277	26/07/2017	26/07/2017
77.	Round-III	68693	65	MHT-CET	EN17102209	PATIL SANCHIT PRAVIN	Male	Type A	NMU	OBC	--	50.33	GOBCH	36277	27/07/2017	27/07/2017
78.	Round-III	69093	64	MHT-CET	EN17116060	PATIL SAGAR SUHAS	Male	Type A	NMU	OBC	--	71.50	LOBCH	20000	28/07/2017	28/07/2017
79.	Round-III	71834	63	MHT-CET	EN17211523	JAISWAL KUNAL SANJAY	Male	Type A	DBAMU	OBC	--	47.00	GOBCO	36277	26/07/2017	26/07/2017
80.	Round-III	77941	61	MHT-CET	EN17293248	PATIL JAGDISH SURESH	Male	Type A	NMU	OBC	--	53.33	PWDC	20000	27/07/2017	27/07/2017
81.	Round-III	80909	60	MHT-CET	EN17173535	SK TAUFEEQUE AHMAD SK RAFIQUE	Male	Type A	NMU	Open	--	52.33	PWD2	36000	25/07/2017	25/07/2017
82.	Round-III	83207	59	MHT-CET	EN17275510	INGALE BHAGYASHREE SUNIL	Female	Type A	NMU	SC	--	54.33	LOPENH	8913	27/07/2017	27/07/2017
83.	Round-III	94292	54	MHT-CET	EN17281430	DHAWALE SAHIL KAILAS	Male	Type A	SGBAU	OBC	--	66.67	GSTO	25000	26/07/2017	26/07/2017
84.	Round-III	100968	50	MHT-CET	EN17297729	NAIK PRATIMA SANJAY	Female	Type A	NMU	OBC	--	76.83	LOPENH	36277	29/07/2017	29/07/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Mechanical Engineering [510461210]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 120

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
85.	Round-III	103709	47	MHT-CET	EN17305274	GOPAL PRAKASH SHIRSATH	Male	Type A	NMU	NT-C	--	58.33	GNT2O	4913	26/07/2017	26/07/2017
86.	Round-I	13973	61	JEE	EN17174107	SHAIKH ALTAMASH SHAIKH ASIF	Male	Type A	NMU	Open	--	54.33	AI	20000	25/07/2017	25/07/2017
87.	Round-I	14842	60	JEE	EN17179700	BARI GIRISH PRAKASH	Male	Type A	NMU	OBC	--	74.00	AI	36277	29/07/2017	29/07/2017
88.	Round-I	19905	50	JEE	EN17321206	GAIKWAD BUHSHAN ARJUN	Male	Type A	NMU	OBC	--	47.33	AI	21000	25/07/2017	25/07/2017
89.	Round-I	28757	40	JEE	EN17167874	PATIL HARSHAL NANDU	Male	Type A	NMU	OBC	--	62.00	AI	36277	25/07/2017	25/07/2017
90.	Round-I	30663	39	JEE	EN17204326	BAVISKAR JAYESH SOPAN	Male	Type A	NMU	OBC	--	54.00	AI	0	26/07/2017	26/07/2017
91.	Round-I	35168	35	JEE	EN17181629	PATIL DHANANJAY DILIP	Male	Type A	NMU	OBC	--	59.33	AI	19277	26/07/2017	26/07/2017
92.	Round-II	35184	35	JEE	EN17146099	MALI RUSHIKESH PURUSHOTTAM	Male	Type A	NMU	OBC	--	68.50	AI	20000	26/07/2017	26/07/2017
93.	Round-II	42580	29	JEE	EN17286198	PATIL RAJAN KOMAL	Male	Type A	NMU	OBC	--	59.83	AI	20000	27/07/2017	27/07/2017
94.	Round-II	43401	29	JEE	EN17276482	SOMWANSHI MAHESH BHAGVAN	Male	Type A	NMU	OBC	--	58.67	AI	20000	26/07/2017	26/07/2017
95.	Round-II	43489	29	JEE	EN17136753	AHERAR BAIG AKRAM BAIG MIRZA	Male	Type A	NMU	OBC	--	62.50	AI	20000	27/07/2017	27/07/2017
96.	Round-III	7191	85	JEE	EN17315511	MARATHE MANOJ SUNIL	Male	Type A	NMU	OBC	--	50.33	AI	25000	27/07/2017	27/07/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Mechanical Engineering [510461210]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 120

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
97.	Round-III	31830	37	JEE	EN17183723	ASHISHKUMAR RAJENDRA PATIL	Male	Type A	NMU	OBC	--	46.33	AI	15000	26/07/2017	26/07/2017
98.	Round-III	48060	25	JEE	EN17251957	UMALE SANTOSH BHAGWAT	Male	Type A	NMU	OBC	--	53.00	AI	20000	27/07/2017	27/07/2017
99.	Round-III	49678	24	JEE	EN17298799	PATIL AKASH DNYANESHWAR	Male	Type A	NMU	OBC	--	60.33	AI	18000	26/07/2017	26/07/2017
100.	Round-III	51518	23	JEE	EN17272870	SONAWANE VISHAL ANIL	Male	Type A	NMU	OBC	DEF1	46.00	AI	36277	27/07/2017	27/07/2017
101.	Round-III	54831	20	JEE	EN17300973	HADAPE HEMANT ASHOK	Male	Type A	NMU	NT-C	--	61.33	AI	4913	26/07/2017	26/07/2017
102.	Round-III	56241	20	JEE	EN17269462	PATIL ASHUTOSH RAMAKANT	Male	Type A	NMU	OBC	--	67.33	AI	20000	29/07/2017	29/07/2017

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STATE COMMON ENTRANCE TEST CELL

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List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Mechanical Engineering [510461210]

List of Candidates Admitted Under Against CAP (Excluding Minority) Vacant Seats

Number of Seats : 18

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
103.	Institute Level	1	69	MHT-CET	EN17328621	DESHMUKH AASIF MANZOOR AHMED	Male	Type A	NMU	Open	--	67.00	ACAP	20000	31/07/2017	06/08/2017
104.	Institute Level	3	62	MHT-CET	EN17220798	PATIL SANKET ASHOK	Male	Type A	NMU	NT-C	--	52.50	ACAP	10000	31/07/2017	06/08/2017
105.	Institute Level	4	61	MHT-CET	EN17119809	SHREYAS SUNIL NIKAM	Male	Type A	NMU	OBC	--	58.33	ACAP	25000	31/07/2017	06/08/2017
106.	Institute Level	5	60	MHT-CET	EN17331447	PATIL PRATIK MAHENDRA	Male	Type A	NMU	OBC	--	64.00	ACAP	30000	31/07/2017	06/08/2017
107.	Institute Level	6	43	MHT-CET	EN17277981	NIKUMBH MAYUR SHIVAJI	Male	Type A	NMU	OBC	--	46.67	ACAP	25000	01/08/2017	06/08/2017
108.	Institute Level	7	41	MHT-CET	EN17250206	JAVARE PRATIK SURESH	Male	Type A	NMU	OBC	--	51.67	ACAP	25000	31/07/2017	06/08/2017
109.	Institute Level	9	32	JEE	EN17338419	ABHIJIT BISWAS	Male	OMS	NA	Open	--	54.67	ACAP	50000	09/08/2017	09/08/2017
110.	Institute Level	9	70	MHT-CET	EN17208041	BARI PRADEEP ARUN	Male	Type A	NMU	OBC	--	50.33	ACAP	25000	10/08/2017	10/08/2017
111.	Institute Level	10	1	JEE	EN17316411	PARVEZ AHMAD KHAN	Male	OMS	NA	Open	--	79.67	ACAP	53358	17/08/2017	17/08/2017
112.	Institute Level	12	45	JEE	EN17340009	CHAVADA JAY PRAVIN	Male	Type A	NMU	Open	P3	63.67	ACAP	10000	24/08/2017	26/08/2017
113.	Institute Level	13	64	MHT-CET	EN17307276	SONAR TEJAS PRAMOD	Male	Type A	NMU	OBC	--	66.17	ACAP	35000	24/08/2017	26/08/2017
114.	Institute Level	13	69	MHT-CET	EN17282332	PATIL SHUBHAM SUNIL	Male	Type A	NMU	OBC	--	53.00	ACAP	3000	31/08/2017	31/08/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Mechanical Engineering [510461210]

List of Candidates Admitted Under Against CAP (Excluding Minority) Vacant Seats

Number of Seats : 18

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
115.	Institute Level	14	56	MHT-CET	EN17218830	DHOBI MAHESH BHALCHANDRA	Male	Type A	NMU	OBC	--	62.67	ACAP	7000	31/08/2017	31/08/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

Summary of Admitted Candidates for Admission to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Mechanical Engineering [510461210]

Sr. No.	Admission Details	Intake	Admitted / Uploaded Before Cut Off Date	Admitted / Uploaded After Cut Off Date	Total Admitted
1.	CAP (Excluding Minority)	120	102	0	102
2.	Against CAP (Excluding Minority)		13	0	13
3.	CAP (Minority)	0	0	0	0
4.	Against CAP (Minority)		0	0	0
5.	Institute Level	0	0	0	0
6.	J&K Migrant		0	0	0
7.	NRI/OCI/PIO/FNS/CIWGC/JKSSS/NEUT		0	0	0
8.	Over and Above		0	0	0
	Total	**120**	**115**	**0**	**115**

Seat Type used for Institute Level Admissions : ACAP-Against CAP (Excluding Minority), IL-Institute Level, ILNRI-Institute Level NRI (5% of SI if AICTE Permission), MI-Minority, NRI-NRI (15% of SI if AICTE Permission), PIO-PIO (15% of SI if AICTE Permission), FNS-FNS (15% of SI if AICTE Permission), CIWGC-Children's of Indian Workers in Gulf Countries (15% of SI if AICTE Permission), JKSSS - Prime Minister Special Scholarship Scheme, NEUT - North Eastern States and UTs, OAA-Over and Above

Home University used for Admissions : DBAMU - Dr. B. A. Marathwada University, GU - Gondwana University, MU - Mumbai University, NMU - North Maharashtra University, RTMNU - Rashtrasant Tukadoji Maharaj Nagpur University, SGBAU - Sant Gadge Baba Amravati University, SOLU - Solapur University, SPPU - Savitribai Phule Pune University, SRTMU - S. R. T. Marathwada University, SVJU - Shivaji University, NA - Not Applicable

Cut-Off Date for Admission : 31/08/2017
Cut-Off Date for Uploading : 01/09/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Mechanical Engineering [510461211T]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 6

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type / Defence Type	Eligibility Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
1.	Round-I	15362	106	MHT-CET	EN17148822	MARATHE TUSHAR BALU	Male	Type A	NMU	OBC	--	70.33	TFWS	4913	25/07/2017	25/07/2017
2.	Round-I	17405	102	MHT-CET	EN17220976	PARMAR MANUPRATAP SINGH HIRENDRA	Male	Type A	NMU	Open	--	87.67	TFWS	4913	26/07/2017	26/07/2017
3.	Round-I	21149	96	MHT-CET	EN17274280	WAGH PANKAJ SHRAVAN	Male	Type A	DBAMU	OBC	--	75.33	TFWS	4913	25/07/2017	25/07/2017
4.	Round-I	27733	88	MHT-CET	EN17182389	SONAWANE NILESH BHIKA	Male	Type A	NMU	OBC	--	86.67	TFWS	4913	26/07/2017	26/07/2017
5.	Round-II	31208	85	MHT-CET	EN17147320	KHIVSARA PRIYANKA VIJAY	Female	Type A	NMU	Open	--	76.67	TFWS	4913	25/07/2017	25/07/2017
6.	Round-II	36665	81	MHT-CET	EN17161226	KHAN SAOOD AHMED AJMAL	Male	Type A	NMU	Open	--	62.17	TFWS	4913	25/07/2017	25/07/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

Summary of Admitted Candidates for Admission to First Year of Under Graduate Technical Courses in Engineering / Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Mechanical Engineering [510461211T]

Sr. No.	Admission Details	Intake	Admitted / Uploaded Before Cut Off Date	Admitted / Uploaded After Cut Off Date	Total Admitted
1.	CAP (Excluding Minority)	6	6	0	6
2.	Against CAP (Excluding Minority)		0	0	0
3.	CAP (Minority)	0	0	0	0
4.	Against CAP (Minority)		0	0	0
5.	Institute Level	0	0	0	0
6.	J&K Migrant		0	0	0
7.	NRI/OCI/PIO/FNS/CIWGC/JKSSS/NEUT		0	0	0
8.	Over and Above		0	0	0
	Total	**6**	**6**	**0**	**6**

Seat Type used for Institute Level Admissions : ACAP-Against CAP (Excluding Minority), IL-Institute Level, ILNRI-Institute Level NRI (5% of SI if AICTE Permission), MI-Minority, NRI-NRI (15% of SI if AICTE Permission), PIO-PIO (15% of SI if AICTE Permission), FNS-FNS (15% of SI if AICTE Permission), CIWGC-Children's of Indian Workers in Gulf Countries (15% of SI if AICTE Permission), JKSSS - Prime Minister Special Scholarship Scheme, NEUT - North Eastern States and UTs, OAA-Over and Above

Home University used for Admissions : DBAMU - Dr. B. A. Marathwada University, GU - Gondwana University, MU - Mumbai University, NMU - North Maharashtra University, RTMNU - Rashtrasant Tukadoji Maharaj Nagpur University, SGBAU - Sant Gadge Baba Amravati University, SOLU - Solapur University, SPPU - Savitribai Phule Pune University, SRTMU - S. R. T. Marathwada University, SVJU - Shivaji University, NA - Not Applicable

Cut-Off Date for Admission : 31/08/2017
Cut-Off Date for Uploading : 01/09/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Post Graduate Technical Courses in Engineering and Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Computer Science and Engineering [510424210]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 18

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Category	PH Type	Graduation Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
1.	Round-I	210	67.53	Graduation	ME17109570	REENA	Female	Type A	Open	--	67.53	General	25000	18/08/2017	18/08/2017
2.	Round-I	6286	9.45	GATE	ME17111849	DESHMUKH NOURIN SADIK	Female	Type A	Open	--	73.40	General	22000	16/08/2017	16/08/2017
3.	Round-I	7509	6.92	GATE	ME17102094	NARKHEDE VIKAS PITAMBAR	Male	Type A	Open	--	64.27	General	14000	16/08/2017	16/08/2017
4.	Round-I	7755	6.51	GATE	ME17109263	THOMBARE SHWETA MUKUND	Female	Type A	Open	--	65.73	General	25000	19/08/2017	19/08/2017
5.	Round-I	9202	3.61	GATE	ME17108233	SWAPNALI	Female	Type A	OBC	--	64.87	OBC	39840	16/08/2017	16/08/2017
6.	Round-II	7917	6.20	GATE	ME17104506	PATIL ANITA ASHOK	Female	Type A	OBC	--	68.20	General	20000	16/08/2017	16/08/2017
7.	Round-II	8760	4.57	GATE	ME17102404	SOLANKE ASHWINI VIKAS	Female	Type A	Open	--	67.80	General	10000	16/08/2017	16/08/2017
8.	Round-III	6284	9.45	GATE	ME17111690	YAMINI VIJAY BHANDARI	Female	Type A	SBC	--	67.07	PH	39840	17/08/2017	17/08/2017
9.	Round-III	8806	4.39	GATE	ME17108165	BORA MAMTA SANJAY	Female	Type A	Open	--	70.20	General	20000	18/08/2017	18/08/2017
10.	Round-III	8900	4.27	GATE	ME17112082	WANI DIVYA ATULCHANDRA	Female	Type A	Open	--	72.10	General	39840	17/08/2017	17/08/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Post Graduate Technical Courses in Engineering and Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Computer Science and Engineering [510424210]

List of Candidates Admitted Under Against CAP (Excluding Minority) Vacant Seats

Number of Seats : 8

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Category	PH Type	Graduation Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
11.	Institute Level	3	1.63	GATE	ME17116210	PATIL YOGITA KISHOR	Female	Type A	Open	--	67.40	ACAPNS	20000	22/08/2017	26/08/2017
12.	Institute Level	3	10.87	GATE	ME17103226	NEHA NAAZ YUNUSUDDIN MALIK	Female	Type A	Open	--	78.40	ACAPNS	20000	26/08/2017	26/08/2017

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STATE COMMON ENTRANCE TEST CELL

305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

Summary of Admitted Candidates for Admission to First Year of Post Graduate Technical Courses in Engineering and Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Computer Science and Engineering [510424210]

Sr. No.	Admission Details	Intake	Admitted / Uploaded Before Cut Off Date	Admitted / Uploaded After Cut Off Date	Total Admitted
1.	CAP (Excluding Minority)	18	10	0	10
2.	Against CAP (Excluding Minority)		2	0	2
3.	CAP (Minority)	0	0	0	0
4.	Against CAP (Minority)		0	0	0
5.	Institute Level	0	0	0	0
6.	J&K Migrant		0	0	0
7.	NRI/OCI/PIO/FNS/CIWGC/JKSSS/NEUT		0	0	0
8.	Over and Above		0	0	0
	Total	**18**	**12**	**0**	**12**

Seat Type used for Institute Level Admissions : ACAP-Against CAP (Excluding Minority), IL-Institute Level, ILNRI-Institute Level NRI (5% of SI if AICTE Permission), MI-Minority, NRI-NRI (15% of SI if AICTE Permission), PIO-PIO (15% of SI if AICTE Permission), FNS-FNS (15% of SI if AICTE Permission), CIWGC-Children's of Indian Workers in Gulf Countries (15% of SI if AICTE Permission), JKSSS - Prime Minister Special Scholarship Scheme, NEUT - North Eastern States and UTs, OAA-Over and Above

Cut-Off Date for Admission : 31/08/2017
Cut-Off Date for Uploading : 01/09/2017

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List of Candidates Admitted to First Year of Post Graduate Technical Courses in Engineering and Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Electrical Power System [510429210]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 18

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Category	PH Type	Graduation Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
1.	Round-I	5286	11.62	GATE	ME17101395	MAHAJAN TEJASHRI SHRIKANT	Female	Type A	OBC	--	68.00	General	39840	16/08/2017	16/08/2017
2.	Round-I	8184	5.70	GATE	ME17110684	DARSHANA KHEDKAR	Female	Type A	OBC	--	69.00	General	21840	16/08/2017	16/08/2017
3.	Round-I	10193	0.87	GATE	ME17113783	ATWAL GITANJALI DILIP	Female	Type A	Open	--	73.43	General	20000	18/08/2017	18/08/2017
4.	Round-III	5208	11.84	GATE	ME17113835	PATIL RUSHIKESH RAVINDRA	Male	Type A	Open	--	68.33	PH	20000	16/08/2017	16/08/2017

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List of Candidates Admitted to First Year of Post Graduate Technical Courses in Engineering and Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Electrical Power System [510429210]

List of Candidates Admitted Under Against CAP (Excluding Minority) Vacant Seats

Number of Seats : 14

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Category	PH Type	Graduation Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
5.	Institute Level	1	1.14	GATE	ME17116500	BIRARI NILESH SHASHIKANT	Male	Type A	Open	--	64.70	ACAPNS	10000	22/08/2017	26/08/2017

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Summary of Admitted Candidates for Admission to First Year of Post Graduate Technical Courses in Engineering and Technology for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- Electrical Power System [510429210]

Sr. No.	Admission Details	Intake	Admitted / Uploaded Before Cut Off Date	Admitted / Uploaded After Cut Off Date	Total Admitted
1.	CAP (Excluding Minority)	18	4	0	4
2.	Against CAP (Excluding Minority)		1	0	1
3.	CAP (Minority)	0	0	0	0
4.	Against CAP (Minority)		0	0	0
5.	Institute Level	0	0	0	0
6.	J&K Migrant		0	0	0
7.	NRI/OCI/PIO/FNS/CIWGC/JKSSS/NEUT		0	0	0
8.	Over and Above		0	0	0
	Total	**18**	**5**	**0**	**5**

Seat Type used for Institute Level Admissions : ACAP-Against CAP (Excluding Minority), IL-Institute Level, ILNRI-Institute Level NRI (5% of SI if AICTE Permission), MI-Minority, NRI-NRI (15% of SI if AICTE Permission), PIO-PIO (15% of SI if AICTE Permission), FNS-FNS (15% of SI if AICTE Permission), CIWGC-Children's of Indian Workers in Gulf Countries (15% of SI if AICTE Permission), JKSSS - Prime Minister Special Scholarship Scheme, NEUT - North Eastern States and UTs, OAA-Over and Above

Cut-Off Date for Admission : 31/08/2017
Cut-Off Date for Uploading : 01/09/2017

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List of Candidates Admitted to First Year of Post Graduate Technical Courses in Management for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- M. B. A. [510410110]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 54

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type	Graduation Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
1.	Round-I	9550	62	CET	MB17125834	HARSHAL PANDHARINATH RAJPUT	Male	Type A	NMU	Open	--	66.87	GOPENH	15000	21/07/2017	21/07/2017
2.	Round-I	11411	58	CET	MB17141656	VIPUL KEVALSING PATIL	Male	Type A	NMU	DT/VJ	--	60.00	GOPENH	5522	19/07/2017	19/07/2017
3.	Round-I	13112	55	CET	MB17114639	ASHUTOSH PRALHAD PATIL	Male	Type A	NMU	OBC	--	64.30	GOPENH	10000	21/07/2017	21/07/2017
4.	Round-I	14905	53	CET	MB17124418	DIPAK NAVALSING PATIL	Male	Type A	NMU	Open	--	56.00	GOPENH	10000	22/07/2017	22/07/2017
5.	Round-I	14919	53	CET	MB17133352	AMITSING RAJENDRASING GIRASE	Male	Type A	NMU	Open	--	50.00	GOPENH	20000	19/07/2017	19/07/2017
6.	Round-I	15185	52	CET	MB17144290	SONAM DHANRAJ AHUJA	Female	Type A	NMU	Open	--	50.00	GOPENO	16000	24/07/2017	24/07/2017
7.	Round-I	26583	42	CET	MB17135364	MONIKA GULAB BARELA	Female	Type A	NMU	ST	--	86.00	GSTH	0	22/07/2017	22/07/2017
8.	Round-I	26718	42	CET	MB17116494	DILIP ASHOK UMARE	Male	Type A	NMU	SC	--	72.90	GSCH	4000	21/07/2017	21/07/2017
9.	Round-I	32076	37	CET	MB17118726	ANIL HANA PADVI	Male	Type A	NMU	ST	--	52.50	GSTH	8000	20/07/2017	20/07/2017
10.	Round-II	10214	60	CET	MB17128641	SAPNA RAMSING JADHAV	Female	Type A	NMU	DT/VJ	--	68.47	GOPENO	5522	21/07/2017	21/07/2017
11.	Round-II	10681	59	CET	MB17140825	GAURAV GANESH SAPKALE	Male	Type A	NMU	SBC	--	50.00	GOPENO	5522	21/07/2017	21/07/2017
12.	Round-II	16217	51	CET	MB17149348	GIRISH SANJAY RUPANI	Male	Type A	NMU	Open	--	50.00	GOPENH	15000	25/07/2017	25/07/2017

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List of Candidates Admitted to First Year of Post Graduate Technical Courses in Management for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- M. B. A. [510410110]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 54

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type	Graduation Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
13.	Round-II	17145	50	CET	MB17136340	UMESH HIRAMAN ZOPE	Male	Type A	NMU	OBC	--	74.00	GOPENH	15000	20/07/2017	20/07/2017
14.	Round-II	17279	50	CET	MB17139241	LALIT ANNA VANJARI	Male	Type A	NMU	NT-D	--	45.00	GOPENH	0	22/07/2017	22/07/2017
15.	Round-II	18847	48	CET	MB17117298	SAGAR RAMESH MORE	Male	Type A	NMU	NT-B	--	55.00	GNT1O	5522	19/07/2017	19/07/2017
16.	Round-II	20164	47	CET	MB17122071	KALYANI RAJENDRA SURVE	Female	Type A	NMU	Open	--	78.90	GOPENH	15000	24/07/2017	24/07/2017
17.	Round-II	20483	47	CET	MB17127895	LINA PRADIP PATIL	Female	Type A	NMU	OBC	--	51.00	GOBCH	26431	21/07/2017	21/07/2017
18.	Round-II	20754	47	CET	MB17138387	RUCHITA SANJAY BAVISKAR	Female	Type A	NMU	OBC	--	64.00	GOBCH	0	22/07/2017	22/07/2017
19.	Round-II	21033	46	CET	MB17118558	KOMAL DIGAMBAR PATIL	Female	Type A	NMU	OBC	--	45.00	GOBCH	15000	21/07/2017	21/07/2017
20.	Round-II	24723	43	CET	MB17140847	SWATI KAILAS PATIL	Female	Type A	NMU	OBC	--	45.00	GNT3H	26431	24/07/2017	24/07/2017
21.	Round-II	25115	43	CET	MB17138824	DATTATRAY DINKAR SONAWANE	Male	Type A	NMU	SBC	--	45.00	GSCH	0	22/07/2017	22/07/2017
22.	Round-II	26340	42	CET	MB17124209	SWAPNIL ISHWAR UDALKAR	Male	Type A	NMU	OBC	--	51.00	GSCH	10000	24/07/2017	24/07/2017
23.	Round-II	34285	34	CET	MB17120745	GAURAV RAJENDRA JAIN	Male	Type A	SGBAU	Open	--	59.17	GOPENO	20000	21/07/2017	21/07/2017
24.	Round-III	9374	62	CET	MB17128189	GAYATRI SURESH CHAVAN	Female	Type A	NMU	OBC	--	50.00	GOPENH	12000	25/07/2017	25/07/2017

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305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Post Graduate Technical Courses in Management for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- M. B. A. [510410110]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 54

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type	Graduation Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
25.	Round-III	17685	49	CET	MB17116389	MOHINI KIRAN VISPUTE	Female	Type A	NMU	OBC	--	50.00	GOPENO	14000	20/07/2017	20/07/2017
26.	Round-III	18665	48	CET	MB17114252	PANKAJ SHRAVAN NANNAVARE	Male	Type A	NMU	SBC	--	45.00	GOPENO	5522	21/07/2017	21/07/2017
27.	Round-III	19138	48	CET	MB17143891	TRUPTI SATISH KOKATE	Female	Type A	NMU	OBC	--	52.00	GOBCH	26431	24/07/2017	24/07/2017
28.	Round-III	19788	47	CET	MB17135932	YOGESH YUVRAJ PATEL	Male	Type A	NMU	OBC	--	45.00	GOPENH	26431	20/07/2017	20/07/2017
29.	Round-III	20393	47	CET	MB17137855	CHANDRAJEET SANJAY PATIL	Male	Type A	NMU	DT/VJ	--	60.87	GOPENH	5522	20/07/2017	20/07/2017
30.	Round-III	20870	47	CET	MB17135662	ADITI MAHENDRA PUROHIT	Female	Type A	NMU	Open	--	65.00	PWDC	19000	24/07/2017	24/07/2017
31.	Round-III	21226	46	CET	MB17116496	ROHINI RAVINDRA KASAR	Female	Type A	NMU	OBC	--	45.00	GOBCO	26431	24/07/2017	24/07/2017
32.	Round-III	21918	46	CET	MB17121675	SWATI DEVRAM PATIL	Female	Type A	NMU	OBC	--	79.00	GOBCO	9000	24/07/2017	24/07/2017
33.	Round-III	24616	44	CET	MB17151049	RAHUL PANDHARINATH PATIL	Male	Type A	NMU	OBC	--	53.00	GOBCO	10000	22/07/2017	22/07/2017
34.	Round-III	25238	43	CET	MB17125829	DHARMARAJ BHAVARAO PATIL	Male	Type A	NMU	OBC	--	45.00	GNT2H	0	22/07/2017	22/07/2017
35.	Round-III	25903	43	CET	MB17129986	SHUBHAM MOHAN PAITHANKAR	Male	Type A	NMU	OBC	--	51.10	GSCH	20000	22/07/2017	22/07/2017
36.	Round-III	26889	42	CET	MB17149389	AJAY SUBHASH DEVKAR	Male	Type A	NMU	OBC	--	68.00	GVJH	10000	25/07/2017	25/07/2017

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305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

List of Candidates Admitted to First Year of Post Graduate Technical Courses in Management for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- M. B. A. [510410110]

List of Candidates Admitted Under CAP (Excluding Minority) Seats

Number of Seats : 54

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type	Graduation Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
37.	Round-III	27384	41	CET	MB17133735	DIPALI SUNIL BARI	Female	Type A	NMU	OBC	--	45.00	GSCO	10000	19/07/2017	19/07/2017
38.	Round-I	9962	78	ATMA	MB17148547	AHIRRAO GANESHKUMAR DEVIDAS	Male	Type A	SPPU	OBC	--	67.13	AI	10000	23/07/2017	23/07/2017
39.	Round-I	15204	63	ATMA	MB17144852	BAJAJ KAPIL KISHOR	Male	Type A	NMU	Open	--	50.00	AI	20000	20/07/2017	20/07/2017
40.	Round-I	20895	49	CET	MB17139127	SANKET SATISH CHHAJED	Male	Type A	NMU	Open	--	50.00	AI	21000	19/07/2017	19/07/2017
41.	Round-I	22446	46	CET	MB17130428	SHAMAL SHASHIKANT GHODKE	Female	Type A	NMU	OBC	--	50.00	AI	15000	24/07/2017	24/07/2017
42.	Round-I	23277	43	CET	MB17133782	ANKITA BALWANT PATIL	Female	Type A	NMU	OBC	--	55.00	AI	11431	19/07/2017	19/07/2017
43.	Round-I	23751	43	CET	MB17125380	NIKITA BHIKCHAND DEORE	Female	Type A	NMU	OBC	--	74.00	AI	9000	19/07/2017	19/07/2017
44.	Round-II	24400	42.24	ATMA	MB17142775	KATIYARA ASHISH PREMKUMAR	Male	Type A	NMU	Open	--	50.00	AI	20000	20/07/2017	20/07/2017
45.	Round-III	18481	56.18	ATMA	MB17151272	CHANDWANI PRIYANKA KANHAIYALAL	Female	Type A	NMU	Open	--	50.00	AI	25000	24/07/2017	24/07/2017

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List of Candidates Admitted to First Year of Post Graduate Technical Courses in Management for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- M. B. A. [510410110]

List of Candidates Admitted Under Against CAP (Excluding Minority) Vacant Seats

Number of Seats : 9

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type	Graduation Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
46.	Institute Level	1	45	CET	MB17136707	AAKASH UMESH BADER	Male	Type A	NMU	Open	--	50.00	ACAP	30000	29/07/2017	06/08/2017
47.	Institute Level	2	46.07	ATMA	MB17156891	ASHWINI VIJAYSING RAJPUT	Female	Type A	NMU	Open	--	75.67	ACAP	10000	01/08/2017	06/08/2017
48.	Institute Level	3	48.26	ATMA	MB17158315	RIYA VASUDEV ADWANI	Female	OMS	NA	Open	--	62.64	ACAP	20000	02/08/2017	06/08/2017
49.	Institute Level	4	42	CET	MB17123565	NEHA VINOD CHORDIYA	Female	Type A	NMU	Open	--	50.00	ACAP	51340	01/08/2017	06/08/2017
50.	Institute Level	5	9.90	ATMA	MB17156032	PATIL VALMIK BALVANT	Male	Type A	NMU	OBC	--	58.40	ACAP	25000	29/07/2017	06/08/2017
51.	Institute Level	6	35	CET	MB17133900	KHUSHBOO RAMESH PORWAL	Female	Type A	NMU	Open	--	61.70	ACAP	25000	29/07/2017	06/08/2017
52.	Institute Level	7	38	CET	MB17153474	HEMANT RAJENDRA ATTARDE	Male	Type A	NMU	OBC	--	65.90	ACAP	15000	31/07/2017	06/08/2017
53.	Institute Level	7	52	CET	MB17153095	SNEHA KISHOR NAGRANI	Female	Type A	NMU	Open	--	50.00	ACAP	15000	29/07/2017	06/08/2017
54.	Institute Level	15	18	CET	MB17150529	DEEPALI NARESHKUMAR NARA	Female	Type A	NMU	Open	--	68.00	ACAP	30000	12/08/2017	12/08/2017

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List of Candidates Admitted to First Year of Post Graduate Technical Courses in Management for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- M. B. A. [510410110]

List of Candidates Admitted Under Institutional Seats

Number of Seats : 6

Sr. No.	CAP Round	Merit No	Merit Marks	Entrance Exam	Application ID	Candidate Name	Gender	Candidature Type	Home University	Category	PH Type	Graduation Percentage	Seat Type	Fees Paid	Admission Date	Uploaded Date
55.	Institute Level	1	38	CET	MB17146306	KAUSTUBH PRATAP PATIL	Male	Type A	NMU	OBC	--	58.00	IL	20000	31/07/2017	06/08/2017
56.	Institute Level	2	50.40	ATMA	MB17156307	DESHMUKH PRERANA CHANDRAKANT	Female	Type A	NMU	Open	--	79.10	IL	20000	29/07/2017	06/08/2017
57.	Institute Level	3	36	CET	MB17144613	SHWETA GURUDUTT MANDHAN	Female	Type A	NMU	Open	--	50.00	IL	25000	29/07/2017	06/08/2017
58.	Institute Level	4	24	CET	MB17152815	NEETA RAJESING GIRASE	Female	Type A	NMU	Open	--	68.00	IL	28000	29/07/2017	06/08/2017
59.	Institute Level	5	24.88	ATMA	MB17153808	DEOGADE SONALI MADAN	Female	Type A	NMU	SC	--	72.50	IL	20000	29/07/2017	06/08/2017
60.	Institute Level	6	31.43	ATMA	MB17152513	PANKAJ PANDHARI SONAWANE	Male	Type A	NMU	SC	--	62.90	IL	15000	29/07/2017	06/08/2017

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305, Government Polytechnic Building, 49, Kherwadi, Bandra (E), Mumbai – 400 051 (M.S.)

Summary of Admitted Candidates for Admission to First Year of Post Graduate Technical Courses in Management for the Academic Year 2017-18

Institution Name [Code] :- Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon [5104]

Course Name [Choice Code] :- M. B. A. [510410110]

Sr. No.	Admission Details	Intake	Admitted / Uploaded Before Cut Off Date	Admitted / Uploaded After Cut Off Date	Total Admitted
1.	CAP (Excluding Minority)	54	45	0	45
2.	Against CAP (Excluding Minority)		9	0	9
3.	CAP (Minority)	0	0	0	0
4.	Against CAP (Minority)		0	0	0
5.	Institute Level	6	6	0	6
6.	J&K Migrant		0	0	0
7.	NRI/OCI/PIO/FNS/CIWGC/JKSSS/NEUT		0	0	0
8.	Over and Above		0	0	0
	Total	**60**	**60**	**0**	**60**

Seat Type used for Institute Level Admissions : ACAP-Against CAP (Excluding Minority), IL-Institute Level, ILNRI-Institute Level NRI (5% of SI if AICTE Permission), MI-Minority, NRI-NRI (15% of SI if AICTE Permission), PIO-PIO (15% of SI if AICTE Permission), FNS-FNS (15% of SI if AICTE Permission), CIWGC-Children's of Indian Workers in Gulf Countries (15% of SI if AICTE Permission), JKSSS - Prime Minister Special Scholarship Scheme, NEUT - North Eastern States and UTs, OAA-Over and Above

Home University used for Admissions : DBAMU - Dr. B. A. Marathwada University, GU - Gondwana University, MU - Mumbai University, NMU - North Maharashtra University, RTMNU - Rashtrasant Tukadoji Maharaj Nagpur University, SGBAU - Sant Gadge Baba Amravati University, SOLU - Solapur University, SPPU - Savitribai Phule Pune University, SRTMU - S. R. T. Marathwada University, SVJU - Shivaji University, NA - Not Applicable

Cut-Off Date for Admission : 31/08/2017
Cut-Off Date for Uploading : 01/09/2017

Printed On : 29/01/2018 3:57:11 PM **Seal of the Institute** **Signature of the Director/Principal** **Submitted On :**

For Regional Office Use Only

Seal of the Regional Office **Signature of the Regional Officer**

FEES REGULATING AUTHORITY MAHARASHTRA

"शिक्षण – नव्हेव्यवसाय – ज्ञान यज्ञ"

(Higher & Technical Education Department / Medical Education & Research, Govt. of MS)

Meeting Date : 2nd March, 2017

Minutes of the 39th Meeting of the Fees Regulating Authority (constituted under section 11 (2)(3)(4) of the Maharashtra Unaided Private Professional Educational Institutions (Regulation Admission and Fees) Act, 2015) held on **Thursday , the 2nd March, 2017 at 10:30 a.m.** in the Conference Hall, Room No. 305, Government Polytechnic Building, 49 Kherwadi, Ali Yawar Jung Marg, Bandra (E), Mumbai – 400 051.

Following were present :

1.	Hon'ble Justice M.N. Gilani, (Retd.)	:	Chairperson
2.	Dr. R.S. Mali	:	Member
3.	Shri. Sanjay Panse	:	Member
4.	Shri. Ravindra Dahad	:	Member
5.	Shri. K.B. Phand, IAS	:	Secretary

The Authority is assisted by Chartered Accountants 1) Mr. Mukesh Haseza & 2) Mrs. Ujjwala Bagade (CMA) .

Item No. 1 : **To confirm the minutes of the 38th Meeting of the Fees Regulating Authority.**

The Minutes of the 38th Meeting dated 18th February, 2017 of the Fees Regulating Authority are confirmed and approved.

Item No. 2: **To decide reasonable fees for the Colleges/Institutes as per list annexed .**

ENGINEERING (AY 2017-18)

Sr. No.	Code No	Name of the Institutes	Courses
1.	EN6767	Suman Ramesh Tulsiani Technical Campus, Faculty of Engineering, Pune.	POLY/EN
2.	EN6809	Shivganga Charitable Trust, Sangli's, Vishveshwarya Technical Campus, Faculty of Degree & Diploma Engineering, Patgaon, Miraj	
3.	EN6794	Anantrao Pawar College of Engineering & Research, PUNE.	EN/ME

4.	EN6609	Jaihind College Of Engineering,Kuran,Junnar	EN/ME
5.	EN6217	Shri. Balasaheb Mane Prasarak Mandals, Ashokrao Mane Group of Institutions, Kolhapur	EN/ME/MB
6.	EN3471	New Horizon Institute of Technology & Management, Thane	
7.	EN6203	Marathwada Mitra Mandal's Institute of Technology, Lohgaon, Pune	
8.	EN6304	Adarsh Institute of Technology and Research Center, Vita	
9.	EN6640	N. B. Navale Sinhgad College of Engineering, Kegaon, Solapur	EN/ME
10.	EN6780	D.Y.Patil Education Society's, D.Y. Patil Technical Campus, Faculty of Engineering & Faculty of Management, Kolhapur.	EN/MB
11.	EN3219	Koti Vidya Charitable Trust's Smt. Alamuri Ratnamala Institute of Engineering and Technology, Sapgaon, Tal. Shahapur	EN/ME/MB/ POLY
12.	EN3447	G.M.Vedak Institute of Technology, Tala, Raigad.	
13.	EN4179	Lokmanya Tilak Jankalyan Shiksan Sanstha, Priyadarshini Indira Gandhi College of Engineering, Nagpu	
14.	EN6732	Dr. DY Patil Group of Institutions (Technical Campus), Lohegaon, Pune	EN/ME/POLY
15.	EN4177	Smt. Bhagwati Chaturvedi College of Engineering,Harpur Nagar, Nagpur	EN/ME
16.	EN6184	K. J.'s Educational Institute's Trinity College of Engineering and Research, Pisoli, Haveli	EN/MB/ME
17.	EN4171	Lokmanya Tilak Jankalyan Shikshan Sanstha's , Priyadarshini Institute of Engineering and Technology, Nagpur	EN/ME
18.	EN6769	RMD Sinhgad School Of Engineering	EN/MB/MC/ME
19.	EN6178	STES Smt. Kashibai Navale College of Engineering, Vadgaon, Pune	EN/ME/MB
20.	EN3139	Vidyalankar Institute of Technology, Wadala, Mumbai.	EN/ME/MB
21.	EN2145	Geetai Charitable Trust's Khurana Sawant Institute of Engineering & Technology, Hingoli.	EN/ME/POLY
22.	EN1129	Dhamangaon Education Society's College of Engineering and Technology, Dhamangaon	

23.	EN4189	Sardar Patel Memorial Society's Namdevrao Poreddiwar College of Engineering and Technology, Gadchiroli	
24.	EN6768	P K Technical Campus, Khed, Pune	EN/MB/POLY
25.	EN3222	Haji Jamaluddin Thim Trust's Theem College of Engineering, At. Villege Betegaon, Chilhar Road, Near Union Park, Boisar (E), Tal. Palghar, Dist. Thane, Pin Code - 401501	EN/POLY
26.	EN5409	Rajiv Gandhi College of Engineering, Parner, Ahmednagar	EN/POLY
27.	EN5104	Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon	EN/MB/ME
28.	EN5105	GHR. Education Foundation Society's Raisoni Institute of Engineering and Management, Jalgaon	EN/MB/POLY/ ME
29.	EN5180	Nashik Gramin Shikshan Prasarak Mandal's Brahma Valley College of Engineering and Research Institute Anjaneri, Nashik	EN/MBA
30.	EN6277	Dr. J.J. Magdum Charitable Trust's Dr. J.J. Magdum College of Engineering, Jaysingpur	EN/ME
31.	EN6323	Dr. D. Y. Patil College of Engineering, Ambi, Talegaon, Maval	EN/ME
32.	EN3465	Ideal Institute of Technology	
33.	EN4190	Shri Sai College of Engineering & Technology, Bhadravati	EN/ME
34.	EN2114	Marathwada Shikshan Prasarak Mandal's Group of Institution,Aurangabad	EN/ME/MB
35.	EN1108	Maratha Shikshan Sanstha, P.R. Patil College of Engineering & Technology, Amravati	EN/ME/MB
36.	EN3217	Vighnaharata Trust's Shivajirao S. Jondhale College of Engineering & Technology, Shahapur, Asangaon, Dist Thane	EN/ME
37.	EN6628	Dattakala Group Of Institutions Faculty of Engineering	EN/ME/MB/MC/ POLY
38.	EN2127	Mahatma Gandhi Missions College of Engg., Hingoli Rd, Nanded.	EN/ME
39.	EN1107	P. R. Pote (Patil) Education & Welfare Trust's Group of Institute College of Engineering & Management, Amravati	EN/ME/MB/MC
40.	EN4305	G.H.Raisoni Academy of Engineering & Technology, Nagpur	EN/ME **DEFERRED**
41.	EN6176	G. H.Raisoni Institute of Engineering and Technology, Wagholi, Pune	EN/ME/POLY **DEFERRED**

42.	EN6206	Pune District Education Association's College of Engineering ,Manjari (Bk.) Pune -412307	EN/MB
43.	EN6755	Rajarshi Shahu School of Engg. & Research	EN/MB/MC/ME
44.	EN4151	Vidarbha Bahu-Uddeshiya Shikshan Sanstha's Tulshiramji Gaikwad Patil College of Engineering & Technology, Nagpur	EN/MB/MC/ME/ POLY
45.	EN4118	Yashwant Rural Education Society's Bapurao Deshmukh Engineering College, Sevagram	EN/MB/ME
46.	EN4195	Vidarbha Bahu Uddeshiya Shikshan Sanstha's Abha Gaikwad - Patil College of Engineering, Nagpur	EN/ME/POLY
47.	EN6185	Sinhgad Technical Education Soceity, Sinhgad Institute Of Technology, Lonavala	EN/ME
48.	EN4116	Ankush Shikshan Sanstha's G.H.Raisoni College of Engineering, Nagpur	EN/MB/MC/ME
49.	EN2252	Marathwada Shikshan Prasarak Mandal's Shri Shivaji Institute of Engineering and Management Studies, Parbhani	EN/MB/ME
50.	EN1267	Pratap Institute Of Management And Technology	
51.	EN1130	Vision Buldhana Educational & Welfare Society's Pankaj Laddhad Institute of Technology & Management Studies, Yelgaon, Bu	EN/ME
52.	EN3191	Mandar Education Society's Rajaram Shinde College of Engineering, Pedhambe	
53.	EN6839	Dr. D.Y. Patil Pratishthan's College of Engineering, Kolhapur	
54.	EN2141	Shri Sai Samajik Vikas Santha's Shri Sai Colllege of Engineering, Pardari Village, Po. Adgaon,Tal. & Dist. Aurangabad	
55.	EN6796	Bharati Vidyapeeth Group of Institute, Technical Campus, College of Engineering, Mulsi, Pune	
56.	EN5168	T.M.E. Society's J.T.Mahajan College of Engineering, Faizpur	EN/ME
57.	EN6269	Dr. Vasantraodada PatilShetkari Shikshan Mandal's Pad. Vasnatraodada Patil Institute of Technology, Budhgaon, Sangli	EN/ME
58.	EN6802	Dr. D.Y. Patil Institute of Engineering Management and Research, Akurdi, Pune	
59.	EN6250	D.Y. Patil College of Engineering and Technology, Kasaba-Bavada, Kolhapur	EN/ME
60.	EN3187	N.Y.S.S.'s Datta Meghe College of Engineering, Airoli, Navi Mumbai	EN/ME

POLYTECHNIC (AY 2016-17 & 2017-18)
not declared in meeting dated 17.2.2017 now declared

Sr. No.	Code No	Name of the Institutes
112.	PL6423	Shri Jain Vidya Prasarak Mandal's Rasiklal M. Dhariwal Institute of Technology, Chinchwadgaon, Pune
113.	PL2171	Gramodyogik Shikshan Mandal's Marathwada Institute Of Technology, Rotegaon, Vaijapur, Dist. Aurangabad

Item No. 3 : Any other issue with the permission of the Chair

Nil.

The meeting is concluded with thanks to the Chair.

Date : 2nd March , 2017

Place : Mumbai

(M.N. GILANI)
CHAIRPERSON
FEES REGULATING AUTHORITY

FEES REGULATING AUTHORITY MAHARASHTRA

"शिक्षण – नव्हेव्यवसाय – ज्ञान यज्ञ"

(Higher & Technical Education Department / Medical Education & Research, Govt. of MS)

Meeting Date : 2nd March, 2017

Minutes of the 39th Meeting of the Fees Regulating Authority (constituted under section 11 (2)(3)(4) of the Maharashtra Unaided Private Professional Educational Institutions (Regulation Admission and Fees) Act, 2015) held on **Thursday , the 2nd March, 2017 at 10:30 a.m.** in the Conference Hall, Room No. 305, Government Polytechnic Building, 49 Kherwadi, Ali Yawar Jung Marg, Bandra (E), Mumbai – 400 051.

Following were present :

1.	Hon'ble Justice M.N. Gilani, (Retd.)	:	Chairperson
2.	Dr. R.S. Mali	:	Member
3.	Shri. Sanjay Panse	:	Member
4.	Shri. Ravindra Dahad	:	Member
5.	Shri. K.B. Phand, IAS	:	Secretary

The Authority is assisted by Chartered Accountants 1) Mr. Mukesh Haseza & 2) Mrs. Ujjwala Bagade (CMA) .

Item No. 2: **To decide reasonable fees for the Colleges/Institutes as per list annexed .**

ENGINEERING (AY 2017-18)

Sr. No.	Code No	Name of the Institutes		Final fees declared by Authority for AY 2017-18
1.	EN6767	Suman Ramesh Tulsiani Technical Campus, Faculty of Engineering, Pune.	**EN**	**45,000/-**
			POLY	**31,500/-**
2.	EN6809	Shivganga Charitable Trust, Sangli's, Vishveshwarya Technical Campus, Faculty of Degree & Diploma Engineering, Patgaon, Miraj		**62,000/-**
3.	EN6794	Anantrao Pawar College of Engineering & Research, PUNE.	**EN**	**52,000/-**
			ME	**67,000/-**

4.	EN6609	Jaihind College Of Engineering,Kuran,Junnar	**EN**	**54,000/-**
			ME	**51,500/-**
5.	EN6217	Shri. Balasaheb Mane Prasarak Mandals, Ashokrao Mane Group of Institutions, Kolhapur	**EN**	**64,000/-**
			ME	**70,000/-**
			MBA	**60,100/-**
6.	EN3471	New Horizon Institute of Technology & Management, Thane		**65,000/-**
7.	EN6203	Marathwada Mitra Mandal's Institute of Technology, Lohgaon, Pune		**68,500/-**
8.	EN6304	Adarsh Institute of Technology and Research Center, Vita		**63,000/-**
9.	EN6640	N. B. Navale Sinhgad College of Engineering, Kegaon, Solapur	**EN**	**60,000/-**
			ME	**64,000/-**
10.	EN6780	D.Y.Patil Education Society's, D.Y. Patil Technical Campus, Faculty of Engineering & Faculty of Management, Kolhapur.	**EN**	**87,000/-**
			MB	**67,500/-**
11.	EN3219	Koti Vidya Charitable Trust's Smt. Alamuri Ratnamala Institute of Engineering and Technology, Sapgaon, Tal. Shahapur	**EN**	**89,000/-**
			ME	**81,000/-**
			MBA	**81,000/-**
			POLY	**44,000/-**
12.	EN3447	G.M.Vedak Institute of Technology, Tala, Raigad.		**73,500/-**
13.	EN4179	Lokmanya Tilak Jankalyan Shiksan Sanstha, Priyadarshini Indira Gandhi College of Engineering, Nagpu		**87,000/-**
14.	EN6732	Dr. DY Patil Group of Institutions (Technical Campus), Lohegaon, Pune	**EN**	**90,200/-**
			ME	**93,000/-**
			POLY	**46,500/-**
15.	EN4177	Smt. Bhagwati Chaturvedi College of Engineering,Harpur Nagar, Nagpur	**EN**	**90,000/-**
			ME	**75,000/-**
16.	EN6184	K. J.'s Educational Institute's Trinity College of Engineering and Research, Pisoli, Haveli	**EN**	**97,000/-**
			ME	**97,000/-**
			MBA	**97,000/-**
17.	EN4171	Lokmanya Tilak Jankalyan Shikshan Sanstha's , Priyadarshini Institute of Engineering and Technology, Nagpur	**EN**	**98,000/-**
			ME	**80,000/-**

18.	EN6769	RMD Sinhgad School Of Engineering	**EN**	**78,500/-**
			MBA	**74000/-**
			MCA	**70,000/-**
			ME	**81,000/-**
19.	EN6178	STES Smt. Kashibai Navale College of Engineering, Vadgaon, Pune	**EN**	**82,000/-**
			MBA	**91,000/-**
			ME	**73,500/-**
20.	EN3139	Vidyalankar Institute of Technology, Wadala, Mumbai.	**EN**	**1,32,500/-**
			MBA	**1,35,000/-**
			ME	**50,500/-**
21.	EN2145	Geetai Charitable Trust's Khurana Sawant Institute of Engineering & Technology, Hingoli.	**EN**	**14,200/-**
			ME	**23,000/-**
			POLY	**13,500/-**
22.	EN1129	Dhamangaon Education Society's College of Engineering and Technology, Dhamangaon		**38,500/-**
23.	EN4189	Sardar Patel Memorial Society's Namdevrao Poreddiwar College of Engineering and Technology, Gadchiroli		**35,000/-**
24.	EN6768	P K Technical Campus, Khed, Pune	**EN**	**65,000/-**
			MBA	**66,000/-**
			POLY	**37,500/-**
25.	EN3222	Haji Jamaluddin Thim Trust's Theem College of Engineering, At. Villege Betegaon, Chilhar Road, Near Union Park, Boisar (E), Tal. Palghar, Dist. Thane, Pin Code - 401501	**EN**	**62,500/-**
			POLY	**35,000/-**
26.	EN5409	Rajiv Gandhi College of Engineering, Parner, Ahmednagar	**EN**	**60,000/-**
			POLY	**60,000/-**
27.	EN5104	Shramsadhana Bombay Trust, College of Engineering & Technology, Jalgaon	**EN**	**69,000/-**
			ME	**40,000/-**
			MBA	**46,000/-**
28.	EN5105	GHR. Education Foundation Society's Raisoni Institute of Engineering and Management, Jalgaon	**EN**	**60,000/-**
			MBA	**54,000/-**
			EN	**78,000/-**
			POLY	**38,000/-**
29.	EN5180	Nashik Gramin Shikshan Prasarak Mandal's Brahma Valley College of Engineering and Research Institute Anjaneri, Nashik	**EN**	**77,500/-**
			MBA	**65,500/-**
30.	EN6277	Dr. J.J. Magdum Charitable Trust's Dr. J.J. Magdum College of Engineering, Jaysingpur	**EN**	**74,000/-**
			ME	**81,000/-(For AY 2016-17)**
				89,500/-(For AY 2017-18)

31.	EN6323	Dr. D. Y. Patil College of Engineering, Ambi, Talegaon, Maval	**EN**	**70,000/-**
			ME	**65,000/-(For AY 2016-17)**
32.	EN3465	Ideal Institute of Technology		**68,000/-**
33.	EN4190	Shri Sai College of Engineering & Technology, Bhadravati	**EN**	**60,000/-**
			ME	**50,000/-**
34.	EN2114	Marathwada Shikshan Prasarak Mandal's Group of Institution,Aurangabad	**EN**	**81,000/-**
			ME	**58,000/-**
			MBA	**38,000/-**
35.	EN1108	Maratha Shikshan Sanstha, P.R. Patil College of Engineering & Technology, Amravati	**EN**	**78,000/-**
			MBA	**73,000/-**
			ME	**73,000/-**
36.	EN3217	Vighnaharata Trust's Shivajirao S. Jondhale College of Engineering & Technology, Shahapur, Asangaon, Dist Thane	**EN**	**73,000/-**
			ME	**79,000/-**
37.	EN6628	Dattakala Group Of Institutions Faculty of Engineering	**EN**	**78,000/-**
			MBA	**87,000/-**
			MCA	**15,500/-**
			ME	**1,14,000/-**
			POLY	**58,500/-**
38.	EN2127	Mahatma Gandhi Missions College of Engg., Hingoli Rd, Nanded.	**EN**	**76,000/-**
			ME	**78,000/-**
39	EN1107	P. R. Pote (Patil) Education & Welfare Trust's Group of Institute College of Engineering & Management, Amravati	**EN**	**70,000/**
			MBA	**77,000/**
			MCA	**70,000/-**
			ME	**73,000/-**
40.	EN4305	G.H.Raisoni Academy of Engineering & Technology, Nagpur	**EN**	**DEFERRED**
			ME	
41.	EN6176	G. H.Raisoni Institute of Engineering and Technology, Wagholi, Pune	**EN**	**DEFERRED**
			ME	
			POLY	
42.	EN6206	Pune District Education Association's College of Engineering ,Manjari (Bk.) Pune -412307	**EN**	**84,200/-**
			MBA	**66,000/-**
43.	EN6755	Rajarshi Shahu School of Engg. & Research	**EN**	**82,000/-**
			MBA	**82,500/-**
			MC	**79,000/-**
			ME	**87,000/-**

44.	EN4151	Vidarbha Bahu-Uddeshiya Shikshan Sanstha's Tulshiramji Gaikwad Patil College of Engineering & Technology, Nagpur	**EN**	**93,500/-**
			MBA	**86,000/-**
			MCA	**95,000/-**
			ME	**95,000/-**
			POLY	**53,000/-**
45.	EN4118	Yashwant Rural Education Society's Bapurao Deshmukh Engineering College, Sevagram	**EN**	**93,700/-**
			MB	**75,000/-**
			ME	**94,500/-**
46.	EN4195	Vidarbha Bahu Uddeshiya Shikshan Sanstha's Abha Gaikwad - Patil College of Engineering, Nagpur	**EN**	**95,000/-**
			ME	**90,000/-**
			POLY	**49,000/-**
47.	EN6185	Sinhgad Technical Education Soceity, Sinhgad Institute Of Technology, Lonavala	**EN**	**90,000/-**
			ME	**89,500/-**
48.	EN4116	Ankush Shikshan Sanstha's G.H.Raisoni College of Engineering, Nagpur	**EN**	**1,05,000/-**
			MBA	**91,000/-**
			MCA	**62,500/-**
			ME	**79,000/-**
49.	EN2252	Marathwada Shikshan Prasarak Mandal's Shri Shivaji Institute of Engineering and Management Studies, Parbhani	**EN**	**25,000/-**
			MBA	**28,000/-**
			ME	**26,000/-**
50.	EN1267	Pratap Institute Of Management And Technology		**24,000/-**
51.	EN1130	Vision Buldhana Educational & Welfare Society's Pankaj Laddhad Institute of Technology & Management Studies, Yelgaon, Bu	**EN**	**40,000/-**
			ME	**51,500/-**
52.	EN3191	Mandar Education Society's Rajaram Shinde College of Engineering, Pedhambe		**30,000/**
53.	EN6839	Dr. D.Y. Patil Pratishthan's College of Engineering, Kolhapur		**30,000/**
54.	EN2141	Shri Sai Samajik Vikas Santha's Shri Sai Colllege of Engineering, Pardari Village, Po. Adgaon,Tal. & Dist. Aurangabad		**65,000/**
55.	EN6796	Bharati Vidyapeeth Group of Institute, Technical Campus, College of Engineering, Mulsi, Pune		**61,000/-**
56.	EN5168	T.M.E. Society's J.T.Mahajan College of Engineering, Faizpur	**EN**	**62,000/-**
			ME	**96,000/-**
57.	EN6269	Dr. Vasantraodada PatilShetkari Shikshan Mandal's Pad. Vasnatraodada Patil Institute of Technology, Budhgaon, Sangli	**EN**	**85,000/-**
			ME	**85,700/-**
58.	EN6802	Dr. D.Y. Patil Institute of Engineering Management and Research, Akurdi, Pune		**72,500/-**

59.	EN6250	D.Y. Patil College of Engineering and Technology, Kasaba-Bavada, Kolhapur	**EN**	**90,000/-**
			ME	**95,000/-**
60.	EN3187	N.Y.S.S.'s Datta Meghe College of Engineering, Airoli, Navi Mumbai	**EN**	**81,000/-**
			ME	**75,600/-**

POLYTECHNIC (AY 2016-17 & 2017-18)
not declared in meeting dated 17.2.2017 now declared

Sr. No.	Code No	Name of the Institutes	Final fees declared by Authority for AY 2016-17	Final fees declared by Authority for AY 2017-18
112.	PL6423	Shri Jain Vidya Prasarak Mandal's Rasiklal M. Dhariwal Institute of Technology, Chinchwadgaon, Pune	**31,000/-**	**31,000/-**
113.	PL2171	Gramodyogik Shikshan Mandal's Marathwada Institute Of Technology, Rotegaon, Vaijapur, Dist. Aurangabad	**31,000/-**	**34,000/-**

Date : 7th March , 2017
Place : Mumbai

SECRETARY
FEES REGULATING AUTHORITY

18. **Details of Laboratories and Workshop**

Sr No	Name of the laboratory/Workshop Detail	Total Area of lab/work shop in m^2	Major Equipment above 50,000/-
1	Testing of Materials laboratory I	74	1. Computerized Universal Testing Machine 2. Compression Testing Machine 3. Digitalized Tensile Testing Machine
2	Testing of Materials laboratory II	81	1. Computerized Compression Testing Machine 2. Rebound Hammer 3. Universal Testing Machine 4. Concrete permeability test apparatus
3	Surveying lab	68	1. Total station 2. 1" Theodolite 3. Electronic distance measuring device
4	Fluid Mechanics Lab I	96	1. Pelton wheel turbine 2. Francis turbine
5	Fluid Mechanics II	90	3. Wind tunnel digitalized
6	Geo-technical Engineering Lab	147	1. Digitalized Triaxial shear testing machine 2. Standard penetration test apparatus 3. Plate load test Apparatus
7	Transportation Engineering lab	81	Ductility test machine
8	Engineering Geology Lab	96	Aqua meter
9	Environmental Engineering Lab	66	1. Spectrophotometer, 2. Auto exhausts analyzer, 3. High volume sampler, 4. BOD incubator.
10	Engineering Mechanics Lab I	81	-
11	Engineering Mechanics Lab I	81	-
12	Computer Lab	108	LCD Projector 03 Nos

DEPARTMENT OF Biotechnology

Details of Major Equipments of Laboratory

NAME OF THE DEPARTMENT: - Biotechnology

Sr. No.	Name of the Laboratory	Lab/Major Equipments	Investment till date Rs.	Building Name	Building Number
01	Lab-1 Microbiology	Rotary Flask Shaker, Vacuum Oven	662952/-	Lab	238
02	Lab-2 Biochemistry	Double Distillation Water Plant	31011/-	Lab	239
03	Lab-3 Fermentation Biotechnology	Fermenter Sartorious B-Lite	755358/-	Lab	242
04	Lab-4 Bioprocess Engineering	Orbital Shaking, Incubator, Microcentrifuge	173759/-	Lab	241
05	Lab-5 Bioprocess Modeling & Simulation/ Computer Lab	KVA UPS	789865/-	Lab	243
06	Lab-6 Immunology Lab/ Molecular Biology and Genetic Engineering	Deep Freezer, UV Transilluminator	286317/-	Lab	235
07	Lab-7 Project Lab	Incubator, Electronic Balance, Lab Batch Crystallizer	122605/-	Lab	234
08	Lab-8Plant Tissue Culture Lab	Laminar Air Flow	122278/-	Lab	245
09	Lab-9 Bioinformatics	Computer 16 No.	272196/-	Lab	111
10	Lab 10 Down Stream Processing Lab	Electronic Balance	74075/-	Lab	M001A
11	Lab-11 Research Lab	Lyophilizer, UV visible Spectrophotometer	711792/-	Lab	227

NAME OF COURSE: - CHEMICAL ENGINEERING.
NAME OF THE DEPT: - CHEMICAL ENGG.
NAME OF SUBJECT: - LAB CHEMICAL ENGINEERING MATERIALS [S.E.]

Subject wise and laboratory wise list of material, machinery, equipments and instruments required to perform prescribed practical and term work.
Facilities for conducting practical in the laboratory.

Sr. no.	Expt. Title	Name of eqpt,M/c, inst, etc.Required to conduct the expt	Requ.	Avail.	Whether ExptCan be conducted.
1	Microstructure observation and study of metals and alloys. (Minimum five) low carbon steel, medium carbon steel, high carbon Steel, tin, bronze, brass, phosphor bronze.	Microscope	01	01	Yes
2	Different types of hardness test on metals. i.e. Rockwell hardness test, Brinell hardness test.	Hardness Tester	01	01	Yes
3	Izod and Charpy impact test on mild steel, copper, brass and aluminum	Izod Charpy test apparatus	01	01	Yes
4	Macrostructure observation: (flow lines observation in forging by macro etching sulphur printing of steel.)	Sulphur Print Test Kit	01	01	Yes
5	Study experiments based on, i) Dye penetration ii) Rubber lining iii) Heat treatments. iv) Ultrasonic Test	Dye Penetration Kit	01	01	Yes
6	Tension test on mild steel for studying stress, strain & Young's modulus	Universal Testing Machine	01	01	Yes
7	Bending test on steel sheets	Universal Testing Machine	01	01	Yes
8	Bending test on copper sheets	Universal Testing Machine	01	01	Yes

NAME OF COURSE: - CHEMICAL ENGINEERING.
NAME OF THE DEPT: - CHEMICAL ENGG.
NAME OF SUBJECT: - LAB FLUID FLOW OPERATION [S.E.]

Sr. no.	Expt. Title	Name of eqpt,M/c, inst, etc.Required to conduct the expt	Requ.	Avail.	Whether ExptCan be conducted.
1	Study of Bernouillis theorem	Bernouillis Setup.	01	01	Yes
2	Measurement of coefficient of discharge for venturimeter	Venturimeter	01	01	Yes
3	Measurement of coefficient of discharge for orificemeter	Orificemeter	01	01	Yes
4	Measurement of coefficient of discharge for notch	Notch Setup	01	01	Yes
5	Study of Reynolds experiment	Reynolds Apparatus	01	01	Yes
6	Study of characteristics of centrifugal pump	Centrifugal pump	01	01	Yes
7	Study of characteristics of reciprocating pump	Reciprocating pump	01	01	Yes
8	Study of Rotameter	Rotameter	01	01	Yes
9	Study of manometers	Manometers	01	01	Yes

NAME OF COURSE: - CHEMICAL ENGINEERING.
NAME OF THE DEPT: - CHEMICAL ENGG.
NAME OF SUBJECT: - LAB APPLIED INORGANIC CHEMISTRY [S.E.]

Sr. no.	Expt. Title	Name of eqptM/c, inst, etc.Required to conduct the expt.	Requ.	Avail.	Whether Expt,Can be conducted.
1	To find strength of solution in g/l & in normal terms	Burette. Pipette. Conical flask	10 10 10	10 10 10	Yes
2	Determination of amount of Magnesium volumetrically by using disodium EDTA.	Burette. Pipette. Conical flask.	10 10 10	10 10 10	Yes
3	Determination of amount of Manganese by Volhards Method	Volum. Flask. Burette. Pipette. Conical flask.	10 10 10 10	10 10 10 10	Yes
4	Estimation of Manganese dioxide in pyrolusite ore	Volum. Flask. Burette. Pipette. Conical flask.	10 10 10 10	10 10 10 10	Yes
5	Gravimetric determination of Fe as Fe_2O_3	Volum. Flask Funnel Crucible. Muffle furnace	10 10 10 01	10 10 10 01	Yes
6	Gravimetric estimation of Nickel as Ni- DMG.	Volum. Flask. Beakers Suction pump. Laboratory Oven.	10 10 01 01	10 10 01 01	Yes
7	Determination of amount of Copper(II) volumetrically from the given solution of CuSO4	Burette. Pipette. Conical flask. Funnel.	10 10 10 10	10 10 10 10	Yes
8	Preparation of tetramine copper (II) sulphate	Beaker watch glass Suction pump	10 10 01	10 10 01	Yes
9	Preparation of tris-ethylenediamine nickel(II) thiosulphate	Beaker Tripod stand Wire gauge Suction pump	10 10 10 01	10 10 10 01	Yes
10	Preparation of potassium tri-oxalato aluminate tri-hydrate	Beaker Porcelain dish	10 10	10 10	Yes

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NAME OF COURSE: - CHEMICAL ENGINEERING.
NAME OF THE DEPT: - CHEMICAL ENGG.
NAME OF SUBJECT: - LAB APPLIED ORGANIC CHEMISTRY [S.E.]

Sr. no.	**Expt. Title**	**Name of eqpt,M/c, inst, etc.Required to conduct the expt**	**Requ.**	**Avail.**	**Whether ExptCan be conducted.**
1	Purification of organic compound by crystallization	Beaker Funnel Tripod Stand	10 10 10	10 10 10	Yes
2	Purification of organic compound by distillation	Distillation Assembly	04	04	Yes
3	Estimation of Acetone	Burette, Pipette, Conical flask, stopper bottles.	10 10 10	10 10 10	Yes
4	Estimation of Glucose	Burette, pipette, Conical flask, stopper bottles.	10 10 10	10 10 10	Yes
5	Preparation of p-nitro acetanilide from acetanilide.	Beakers, Suction pump. Buchner funnel	10 01 02	10 01 02	Yes
6	Preparation of Quinone from hydroquinone.	Beakers, Suction pump. Buchner funnel	10 01 02	10 01 02	Yes
7	Preparation of Urea Formaldehyde resin.	Beakers Glass rod	10 10	10 10	Yes
8	Preparation of acetyl derivative of –NH2 / -OH group.	Conical flask Suction pump. Buchner funnel	10 01 02	10 01 02	Yes
9	Preparation of benzoyl derivative of –NH2 / -OH group.	Conical flask Suction pump. Buchner funnel	10 01 02	10 01 02	Yes
10	Preparation of 2:4 dinitro-phenyl hydrazone (2,4 DNP) derivative of –CHO / -CO group.	Conical flask Suction pump. Buchner funnel	10 01 02	10 01 02	Yes

NAME OF COURSE: - CHEMICAL ENGINEERING.
NAME OF THE DEPT: - CHEMICAL ENGG.
NAME OF SUBJECT: - LAB COMPUTER APPLICATION [S.E.]

Sr. no.	Expt. Title	Name of eqpt,M/c, inst, etc.Required to conduct the expt	Requ.	Avail.	Whether ExptCan be conducted.
1	To solve Matrices using Matrix Inversion Method	Pentium-IV, digital computer	20	20	Yes
2	To solve Matrices using Gauss Elimination method.	Pentium-IV, digital computer	20	20	Yes
3	To solve Differential equation of first order by Taylor's series method	Pentium-IV, digital computer	20	20	Yes
4	To solve Differential equation of first order by Modified Euler's method	Pentium-IV, digital computer	20	20	Yes
5	To solve Differential equation of first order by Picards method	Pentium-IV, digital computer	20	20	Yes
6	To solve Differential equation of first order by Runge Kutta's 4th order method	Pentium-IV, digital computer	20	20	Yes
7	To solve Numerical Integration by Weddle's rule.	Pentium-IV, digital computer	20	20	Yes
8	To solve Numerical Integration by Trapezoidal Rule	Pentium-IV, digital computer	20	20	Yes
9	To solve Numerical Integration by Simpson's 1/3rd Rule	Pentium-IV, digital computer	20	20	Yes
10	To solve Numerical Integration by Simpson's 3/8th rule	Pentium-IV, digital computer	20	20	Yes

NAME OF COURSE: - CHEMICAL ENGINEERING.
NAME OF THE DEPT: - CHEMICAL ENGG.
NAME OF SUBJECT: - LAB CHEMICAL PROCESSES [S.E.]

Sr. no.	Expt. Title	Name of eqptM/c, inst, etc.Required to conduct the expt.	Requ	Avail	Whether Expt,Can be conducted.
1	Determination of the Na_2CO_3 content of washing soda	Burette, pipette, conical flask	10	10	Yes
2	To determine the loss per gram and the percentage purity of the given sample of sodium bicarbonate by heating.	Crucible, Pipe clay triangle	10	10	Yes
3	Estimation of available chlorine in bleaching powder.	Burette, pipette, stand, conical flask.	10	10	Yes
4	Preparation of sodium thiosulphate.	Evaporating dish. Buckner funnel, water bath.	10 01	10 01	Yes
5	Preparation of biuret from urea	Test tubes, Beaker	10	10	Yes
6	Preparation of soap	Beaker Glass rod	10 10	10 10	Yes
7	Preparation of drug aspirin	Conical flask Measuring cylinder Suction pump. Buchner funnel	10 10 01 02	10 10 01 02	Yes
8	Estimation of formaldehyde.	Burette. Pipette. Conical flask	10 10 10	10 10 10	Yes
9	Determination of TFM in soap	Beaker, glass rod	10	10	Yes
10	Preparation of acetaldehyde by the oxidation of ethanol	Conical Flask Beaker Funnel	10 10 10	10 10 10	Yes

NAME OF COURSE: - CHEMICAL ENGINEERING.
NAME OF THE DEPT: - CHEMICAL ENGG.
NAME OF SUBJECT: - LAB MECHANICAL OPERATION [S.E.]

Sr. no.	Expt. Title	Name of eqptM/c, inst, etc.Required to conduct the expt.	Requ.	Avail.	Whether Expt,Can be conducted.
1	To study the separation of solids by sedimentation.	Batch sedimentation assembly.	01	01	Yes
2	To study the differential and cumulative screen analysis of sand. (Sieve analysis)	Sieve shaker	01	01	Yes
3	To verify the laws of crushing and grinding by ball mill	Ball mill	01	01	Yes
4	To verify the laws of crushing and grinding by Jaw crusher	Jaw Crusher	01	01	Yes
5	To determine the rate of filtration, cake resistance and filter medium resistance.	Plate & Frame Filter Press	01	01	Yes
6	To determine the rate of filtration by vacuum filter	Rotary Vacuum Filter	01	01	Yes
7	To study the behavior of the bed during fluidization and to calculate minimum fluidization velocity.	Fluidization equipment	01	01	Yes
8	To study the sigma Kneader Mixer	Sigma Kneader Mixer	01	01	Yes
9	To study the operating behavior of cyclone separator and to find out its efficiency	Cyclone separators	01	01	Yes
10	To study the Ribbon Blender and to find out the mixing index	Ribbon blender	01	01	Yes

NAME OF COURSE: - CHEMICAL ENGINEERING.
NAME OF THE DEPT: - CHEMICAL ENGG.
NAME OF SUBJECT: - LAB APPLIED PHYSICAL CHEMISTRY [S.E.]

Sr. no.	Expt. Title	Name of eqpt,M/c, inst, etc.Required to conduct the expt	Requ.	Avail.	Whether ExptCan be conducted.
1	Determination of equivalent weight of metal eudiometrically	Eudiometer Evaporating dish Measuring cylinder	10 10 02	10 10 02	Yes
2	Detrmination of atomic weight of the metal using Dulong-Petit law	Crucible Electronic balance	10 01	10 01	Yes
3	Determination of surface tension of liquids by Stalagmometer	Stalagmometer Beaker	10 10	10 10	Yes
4	Determination of rate constant of hydrolysis of methyl acetate by dilute HCl & to show that the reaction is of first order	Stopper bottle 5 ml pipette Water bath Laboratory Oven Conical flask Burette	10 10 02 01 10 10	10 10 02 01 10 10	Yes
5	Determination of rate constant of hydrolysis of ethyl acetate by NaOH & to show that the reaction is of second order	Stopper bottle 25 ml pipette Water bath Conical flask Burette	10 10 02 10 10	10 10 02 10 10	Yes
6	Determination of energy of activation for the reaction between potassium pursulphate and potassium iodide	Stopper bottle 25 ml pipette Water bath Conical flask Burette	10 10 02 10 10	10 10 02 10 10	Yes
7	Determination of heat of solution of KNO_3	Hard glass tube Beaker Thermometer	10 10 10	10 10 10	Yes
8	Determination of water equivalent of copper calorimeter & heat of neutralization of strong acid & strong base by calorimeter	Cu-calorimeter Wooden box with insulation & Cu stirrer setup Measuring cylinder	10 04	10 04	Yes
9	To determine ΔH, ΔG, ΔS of a reaction.	Thermos flask Thermometer Measuring cylinder	05 05 05	05 05 05	Yes

10	Determination of molecular weight of substance by depression in freezing point method.	Hard glass tube Beaker Thermometer	10 10 10	10 10 10	Yes

NAME OF COURSE: - CHEMICAL ENGINEERING.
NAME OF THE DEPT: - CHEMICAL ENGG.
NAME OF SUBJECT: - LAB PROCESS HEAT TRANSFER [T.E.]

Sr. no.	Expt. Title	Name of eqpt, M/c, inst, etc. Required to conduct the expt.	Quantity		Whether Expt, Can be conducted.
			Requ	Avail	
1	Diffusion in Still Air: To estimate mass transfer coefficient for given system at room temperature.	Compressor, linear scale, glass tube with fluid, stand.	3 sets	3 sets	Yes
2	Determination of thermal conductivity of metals rod	Metal rod ,heater coil, Digital temp indicator, Dimmerstat Voltmeter, Ammeter, Measuring flask, stop watch, supporting structure,	1 set	1 set	Yes
3	To determine heat flux through composite walls	Heater,voltmeter,temperature indicator and supporting structure	1 set	1 set	Yes
4	Determination of heat transfer coefficient in natural/ forced convection.	Brass Tube,Pipe, temperature indicator, Ammeter, Voltmeter, dimmerstat, blower.	1 set	1 set	Yes
5	Determination of temperature distribution, fin efficiency in natural and forced convection	Duct, fins, Temp indicator, Dimmerstat, Heater, Voltmeter, Ammeter	1 set	1 set	Yes
6	Determination of emissivity of a test surface.	Emmisivity of test plates, temperature indicator, Ammeter, Voltmeter, dimmerstat.	1set	1set	Yes
7	Determination of Stefan Boltzmann constant.	Stefan Boltzman apparatus	1 set	1 set	Yes
8	Determinations of log mean temperature difference and over all heat transfer coefficient of Parallel and counter flow heat exchanger	Parallel/Counter flow heat exchanger , Temperature indicator, rotameter.	1 set	1 set	Yes

9	Study and calculate the efficiency of a fin in natural convection.	Duct, fins, Temp indicator, Dimmerstat, Heater, Voltmeter, Ammeter	1 set	1 set	Yes
10	To find out overall heat transfer coefficient by drop wise and film wise condensation.	Dropwise and filmwise condensation apparatus	1 set	1 set	Yes

NAME OF COURSE: - CHEMICAL ENGINEERING.
NAME OF THE DEPT: - CHEMICAL ENGG.
NAME OF SUBJECT: - LAB INSTRUMENTATION & INSTRUMENTAL ANALYSIS [T.E.]

Sr. no.	Expt. Title	Name of eqpt, M/c, inst, etc. Required to conduct the expt.	Quantity		Whether Expt, Can be conducted.
			Requ.	Avail.	
1	To study the response of bimetallic thermometer.	Bimetallic thermometer, mercury thermometer, beaker.	01	01	Yes
2	To study the response of thermocouple.	Thermocouple, mercury thermometer, beaker.	01	01	Yes
3	To measure the pH of given solution.	pH meter	01	01	Yes
4	To measure the conductance of given solution.	Conductivity meter	01	01	Yes
5	To investigate the conductometric titration of strong acid and strong base	Conductivity meter	01	01	Yes
6	To determine concentration of given solution by colorimeter	Colorimeter	01	01	Yes
7	To study separation of components present in given mixture by thin layer chromatography	TLC apparatus.	04	04	Yes
8	To study separation of components present in given sample by paper chromatography	Paper chromatography apparatus	04	04	Yes
9	To determine refractive index of liquids by Abbey's refractometer	Abbey's Refractometer	01	01	Yes
10	To identify the given sample by FTIR.	FTIR Spectrophotometer	01	01	Yes

NAME OF COURSE: - CHEMICAL ENGINEERING.
NAME OF THE DEPT: - CHEMICAL ENGG.
NAME OF SUBJECT: - LAB MASS TRANSFER-I [T.E.]

Sr. no.	Expt. Title	Name of eqpt, M/c, inst, etc. Required to conduct the expt.	Quantity		Whether Expt, Can be conducted.
			Requ	Avail	
1	Diffusion in Still Air: To estimate mass transfer coefficient for given system at room temperature.	Beakers, Weighing Balance	3 sets	3 sets	Yes
2	Liquid – Liquid Diffusion: To determine diffusion coefficient for given system as function of concentration	Standard porous pot with covering glass vessels, weighing balance, vernier caliper, measuring scale	3 unit	9 unit	Yes
3	Solid – Liquid Diffusion: To determine mass transfer coefficient for dissolution of given system without chemical reaction.	Glasswares, stirrer with speed control, stand, vernier caliper	1 unit	1 unit	Yes
4	Solid in Air Diffusion: To calculate mass transfer coefficient for vaporization of given solid in air using packed bed.	Solid in Air Diffusion Apparatus	1 unit	1 unit	Yes
5	Wetted Wall Column: To determine mass transfer coefficient for air – water system	Wetted wall column with rotameter, temperature measuring system, compressor.	1 unit	1 unit	Yes
6	Cooling Tower: To determine volumetric mass transfer coefficient for air – water system.	Cooling tower with air blower, centrifugal pump, water storage tank, Rotameter, heater, temperature sensors, tower with packing material, physical chart.	1 unit	1 unit	Yes
7	Crystallization: To determine percentage yield of crystallization without and with seeding	Beaker, Weighing Balance, Heating Mantle, Stirrer etc.	1 unit	1 unit	Yes

8	Natural Drying: To obtain drying curve for batch drying operation.	Pan dryer, Electronic balance, etc.	1 unit	1 unit	Yes
9	Fluidized Bed Dryer: To determine the rate of drying and to obtain mass transfer coefficient for the given material.	Fluidized bed dryer with heat controller.	1 unit	1 unit	Yes

NAME OF COURSE: - CHEMICAL ENGINEERING.
NAME OF THE DEPT: - CHEMICAL ENGG.
NAME OF SUBJECT: - LAB CHEMICAL REACTION ENGINEERING-I [T.E.]

Sr. no.	Expt. Title	Name of eqpt, M/c, inst, etc. Required to conduct the expt.	Quantity		Whether Expt, Can be conducted.
			Requ.	Avail.	
1	To determine the reaction rate constant {k} for given reaction.	Batch Reactor /CSTR/ SemiBatch / PFR.	01	01	Yes
2	To determine the effect of temperature on reaction rate constant.	Batch Reactor/CSTR/ Semi Batch / PFR.	01	01	Yes
3	To determine the activation energy {e} for the given reaction.	Batch Reactor/CSTR/ Semi Batch / PFR.	01	01	Yes
4	To draw C [t], E [t] & f [t] curve & to calculate the mean residence time {tm} variance {r^2} & skew ness {s^3} for plug flow reactor.	Plug flow Reactor [Straight tube type]	01	01	Yes
5	To draw C [t], E [t] & f [t] curve & to calculate the mean residence time {tm} variance {r^2} & skew ness {s^3} for packed Bed reactor.	Packed Bed Reactor.	01	01	Yes
6	To study the cascaded CSTR	Cascaded CSTR	01	01	Yes
7	To draw C [t], E [t] & f [t] curve & to calculate the mean residence time {tm} variance {r^2} & skew ness {s^3} for Annular reactor.	Annular reactor	01	01	Yes
8	To study the kinetic in tubular flow reactor [coiled tube] for the given reaction.	Plug flow Reactor (Coil type)	01	01	Yes

NAME OF COURSE: - CHEMICAL ENGINEERING.
NAME OF THE DEPT: - CHEMICAL ENGG.
NAME OF SUBJECT: - LAB MASS TRANSFER-II [T.E.]

Sr. no.	Expt. Title	Name of eqpt, M/c, inst, etc. Required to conduct the expt.	Quantity		Whether Expt, Can be conducted.
			Requ.	Avail.	
1	Simple Distillation: To verify Rayleigh's equation for simple distillation	Batch distillation.	01	01	Yes
2	To plot the vapor liquid equilibrium curve for a binary mixture.	Vapor liquid equilibrium set up apparatus	01	01	Yes
3	Determination of HTU, HETP and NTU.	Distillation Assembly	01	01	Yes
4	Ternary Diagram: To construct ternary diagram for given system.	Beaker, Conical Flask, Burette, Pipette etc.	01	01	Yes
5	Tie Lines	Beaker, Conical Flask, Burette, Pipette etc.	01	01	Yes
6	Liquid – Liquid Extraction: To study and determine the efficiency of cross current liquid- liquid extraction.	Liquid- liquid extraction Setup	01	01	Yes
7	Spray Column	Spray Column	01	01	Yes
8	Leaching: To calculate efficiency of cross current leaching operation	Solid liquid extraction setup.	01	01	Yes
9	Adsorption: To study adsorption of acetic acid on activated charcoal	Adsorption column.	01	01	Yes
10	Ion Exchange	Ion Exchange Column	01	01	Yes

NAME OF COURSE: - CHEMICAL ENGINEERING.
NAME OF THE DEPT: - CHEMICAL ENGG.
NAME OF SUBJECT: - LAB PROCESS DYNAMIC & CONTROL [B.E.]

Sr. no.	Expt. Title	Name of eqpt, M/c, inst, etc. Required to conduct the expt.	Quantity		Whether Expt, Can be conducted.
			Requ.	Avail.	
1	To study dynamic response of first order system {mercury thermometer.}	Thermometer, heater, stopwatch.	01	01	Yes
2	To study dynamic behaviour of single tank system.	Single tank, pump, level indicator, weighing machine	01	01	Yes
3	Dynamic behaviour of two tank non-interacting system.	Non-interacting system, stopwatch, pump, weighing machine	01	01	Yes
4	Dynamic behaviour of two tank interacting system.	Interacting system, stopwatch, pump, weighing machine	01	01	Yes
5	Study of pneumatic controllers.	PI controller, compressor.	01	01	Yes
6	Dynamic behaviour of second order system	Mercury Manometer, stopwatch.	01	01	Yes
7	Study of characteristics & calibration of diaphragm actuated pneumatic control valve.	Pneumatically operated valve, compressor, Rota meter, and stopwatch.	01	01	Yes
8	Study of closed loop control system.	Closed loop control system consisting of valve, tank, recorder, and controller.	01	01	Yes
9	Study of temperature control trainer	Temperature control trainer	01	01	Yes
10	Study of pressure control trainer	Pressure control trainer	01	01	Yes
11	Study of flow control trainer	Flow control trainer	01	01	Yes

NAME OF COURSE: - CHEMICAL ENGINEERING.
NAME OF THE DEPT: - CHEMICAL ENGG.
NAME OF SUBJECT: - LAB CHEMICAL REACTION ENGINEERING-II [B.E.]

Sr. no.	Expt. Title	Name of eqpt, M/c, inst, etc. Required to conduct the expt.	Quantity		Whether Expt, Can be conducted.
			Requ.	Avail.	
1	To study the reaction of solid liquid system for an instantaneous reaction for benzoic acid NaOH & calculate the enhancement factor.	Solid liquid reactor.	01	01	Yes
2	To study the isothermal decomposition of ethyl alcohol in tubular reactor packed with activated alumina catalyst.	Catalytic packed bed reactor.	01	01	Yes
3	To improve the % purity of commercially used ethanol using reactive distillation.	Distillation assembly.	01	01	Yes
4	To improve the % purity of commercially used ethanol using extractive distillation.	Distillation assembly.	01	01	Yes
5	To carry out the catalytic reaction to convert the nitrobenzene to aniline in presence of iron filling/HCl catalyst in the reactor.	Rotating basket reactor.	01	01	Yes
6	To study the reaction of liquid liquid system for butyl acetate NaOH & to calculate the enhancement factor.	Stirrer, conical flask, beaker, pipette, burette	01	01	Yes

7	Absorption – to study the reaction of liquid gas system for NaOH –CO_2 % to determine rate of absorption.	Absorption column.	01	01	Yes
8	Adsorption- to study the adsorption of Acetic acid on charcoal	Adsorption column.	01	01	Yes

NAME OF COURSE: - CHEMICAL ENGINEERING.
NAME OF THE DEPT: - CHEMICAL ENGG.
NAME OF SUBJECT: - LAB COMPUTER AIDED PROCESS EQUIPMENT DESIGN MODELING & SIMULATION [B.E.]

Sr. no.	Expt. Title	Name of eqpt, M/c, inst, etc. Required to conduct the expt.	Quantity		Whether Expt, Can be conducted.
			Requ.	Avail.	
1	Computer aided design of shell & tube heat exchanger.	Computer (Window XP), digital computer.	15	15	Yes
2	Computer aided design of single effect evaporator.	Computer (Window XP), digital computer.	15	15	Yes
3	Computer aided design of rotary dryer.	Computer (Window XP), digital computer.	15	15	Yes
4	Simulation of ammonia production system.	Computer (Window XP), digital computer.	15	15	Yes
5	Simulation of temperature on surface catalyst.	Computer (Window XP), digital computer.	15	15	Yes
6	Simulation of Reactor Design	Computer (Window XP), digital computer.	15	15	Yes
7	Study of heat exchanger	Concentric pipe heat exchanger	01	01	Yes
8	Computer Aided Design of absorption column	Computer (Window XP), digital computer.	15	15	Yes

NAME OF COURSE: - CHEMICAL ENGINEERING.
NAME OF THE DEPT: - CHEMICAL ENGG.
NAME OF SUBJECT: - LAB INDUSTRIAL POLLUTION CONTROL [B.E.]

Sr. no.	Expt. Title	Name of eqpt, M/c, inst, etc. Required to conduct the expt.	Quantity		Whether Expt, Can be conducted.
			Requ.	Avail.	
1	Determination of biological oxygen demand	Burette Pipettes Measuring cylinder BOD bottles pH meter BOD Incubator	01 01 01 04 01 01	01 01 01 04 01 01	Yes
2	Determination of chemical oxygen demand	Burette Pipette Measuring cylinder beaker COD Digester COD Analyzer	01 01 01 04 01 01	01 01 01 04 01 01	Yes
3	Determination of dissolved oxygen	Burette Pipettes Measuring cylinder BOD bottles Conical flask Thermometer.	01 01 01 04 01 01	01 01 01 04 01 01	Yes
4	Determination of chloride ion in given water	Burette Pipettes Measuring cylinder Conical flask	01 01 01 01	01 01 01 01	Yes
5	Measurement of various types solids in a given sample	Crucibles Measuring cylinder Oven Muffle furnace Weighing Balance	02 01 01 01 01	02 01 01 01 01	Yes
6	Determination of turbidity in given sample	Turbidity meter	01	01	Yes
7	Determination of phenol	Distillation Assembly Separating funnel pH Meter	01 01 01	01 01 01	Yes
8	Determination of metal (any one) in waste water.	Burette Pipettes Measuring cylinder Conical flask Weighing Balance	01 01 01 02 01	01 01 01 02 01	Yes

B) List of Practicals which cannot be performed or conducted in the existing facilities actually available in the college.

Sr.No.	Name of the Department	Class	Title of Experiment	Name of Institute where the experiments are processed to conducted	When the deficiency in equipment will be fulfilled
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Department of Computer Engineering

Facilities for conducting practical in the laboratories

Name of course**: Computer Engineering** Class: **F.E**. Semester**: II**
Subject: **Introduction to "C" Programming**

Sr. No.	Experiment Title	Name of Equipment, machinery Instrument etc. required to conduct experiment	Quantity		Whether Expt. can be conducted
			Required	Available	
01	Program to find Even/Odd Using if else	PC,gcc	20	20	Yes
02	Program for Arithmetic Operation using switch case	PC,gcc	20	20	Yes
03	C Program using function (Square Root)	PC,gcc	20	20	Yes
04	Program for Sum of elements in given array	PC,gcc	20	20	Yes
05	Program to find length of string	PC,gcc	20	20	Yes

Facilities for conducting practical in the laboratories

Name of course**: Computer Engineering** Class: S.E. Semester: **I** Subject: **SOFT SKILL III**

Sr. No.	Experiment Title	Name of Equipment, machinery Instrument etc. required to conduct experiment	Quantity		Whether Expt. can be conducted?
			Required	Available	
01	To Perform Arithmetic Operations on number. To perform HCF & LCM To calculate Average and Mixture	-	10	10	Yes
02	To calculate Percentage To Measure Profit and Loss To solve Time and work Problems	-	10	10	Yes
03	To perform Permutations and Combinations To perform problems on probability To perform problems on time and distance	-	10	10	Yes
04	To perform examples on Analogies To perform examples on Classification To perform examples on Sequences	-	10	10	Yes
05	To perform examples on Analytical Puzzles To perform examples on Letter and number Series To perform examples on Coding and Decoding	-	10	10	Yes

Facilities for conducting practical in the laboratories

Name of course**: Computer Engineering** Class: S.E. Semester: **I** Subject: **DSGT**

Sr. No.	Experiment Title	Name of Equipment, machinery Instrument etc. required to conduct experiment	Quantity		Whether Expt. can be conducted?
			Required	Available	
01	A program for set operations: Union, Intersection, Difference, Symmetric difference.	PC, GCC	18	18	Yes
02	A program for generation of Power set of a given set.	PC, GCC	18	18	Yes
03	A program for generation of permutations.	PC, GCC	18	18	Yes
04	A program for generation of combinations	PC, GCC	18	18	Yes
05	A Program for Bubble sort.	PC, GCC	18	18	Yes
06	A Program for Matrix multiplication.	PC, GCC	18	18	Yes
07	A Program for Binary search.	PC, GCC	18	18	Yes
08	A program for implementation of Kruskal's algorithm.	PC, GCC	18	18	Yes
09	A program for implementation of Prim's algorithm.	PC, GCC	18	18	Yes
10	A program for Inter conversion of number system.	PC, GCC	18	18	Yes

Facilities for conducting practical in the laboratories

Name of course**: Computer Engineering** Class: S.E. Semester: **I** Subject: **MPMC Lab**

Sr. No.	Experiment Title	Name of Equipment, machinery Instrument etc. required to conduct experiment	Quantity		Whether Expt. can be conducted?
			Required	Available	
01	Study and execution of DOS/Windows Commands.	PC	20	20	Yes
02	Study of DOS & BIOS Interrupts and Assembler Directives.	PC, MASM software	20	20	Yes
03	8086 Assembly Language Program to display personal information using Macro.	PC, MASM software	20	20	Yes
04	8086 Assembly Language Program for Addition of two 8 bit HEX numbers using NEAR Procedure.	PC, MASM software	20	20	Yes
05	8086 Assembly Language Program for Multiplication of two 8 bit HEX numbers using NEAR Procedure.	PC, MASM software	20	20	Yes
06	8086 Assembly Language Program for Addition of two 8 bit HEX numbers using FAR Procedure.	PC, MASM software	20	20	Yes
07	8086 Assembly Language Program for Multiplication of two 8 bit HEX numbers using FAR Procedure.	PC, MASM software	20	20	Yes
08	8086 Assembly Language Program to find out Factorial of a number (Range 0 to 8).	PC, MASM software	20	20	Yes
09	8086 Assembly Language Program for Password Verification.	PC, MASM software	20	20	Yes

10	8086 Assembly Language Program for 2-digit BCD Addition.	PC, MASM software	20	20	Yes
11	8086 Assembly Language Program for 2-digit BCD to HEX Conversion.	PC, MASM software	20	20	Yes
12	8086 Assembly Language Program to generate Fibonacci Series (first 12 numbers).	PC, MASM software	20	20	Yes
13	Assembly Language Program to Calculate area of circle using 8087 instructions.	PC , MASM software	20	20	Yes
14	Assembly Language Program to calculate length of hypotenuse of right angled triangle using 8087 instructions.	PC,MASM software	20	20	Yes
15	Assembly Language Program to Generate sum of series of Squares of numbers using 8087 instructions.	PC,MASM software	20	20	Yes
16	Assembly Language Program to solve the Quadratic Equations using 8087 instructions.	PC,MASM software	20	20	Yes

Facilities for conducting practical in the laboratories

Name of course**: Computer Engineering** Class: S**.E.** Semester**: I**
Subject: **Objet Oriented Technology**

Sr. No.	**Experiment Title**	**Name of Equipment, machinery Instrument etc. required to conduct experiment**	**Quantity**		**Whether Expt. can be conducted**
			Required	Available	
01	Write a Program for Arithmetic Operation by class and Object.	PC, g++	20	20	Yes
02	Program for Parameterized Constructor for bank management system.	PC, g++	20	20	Yes
03	Implementation of function overloading for area of different objects	PC, g++	20	20	Yes
04	C++ Program for admission system using the unary operator overloading	PC, g++	20	20	Yes
05	Program for Factorial by Using Copy Constructor	PC, g++	20	20	Yes
06	Program for Matrix addition using Friend Function	PC, g++	20	20	Yes
07	Program in C++ for implementation of Payroll System by using multilevel Inheritance	PC, g++	20	20	Yes
08	Program in C++ for implementation of Student Result System by using Hybrid Inheritance.	PC, g++	20	20	Yes
09	Implement the function template for bubble sort method.	PC, g++	20	20	Yes
10	Implement the function template for	PC, g++	20	20	Yes

	swapping method.				

Facilities for conducting practical in the laboratories

Name of course**: Computer Engineering** Class: **S.E**. Semester**: II**
Subject: **Data Communication Lab**

Sr. No.	**Experiment Title**	**Name of Equipment, machinery Instrument etc. required to conduct experiment**	**Quantity**		**Whether Expt. can be conducted**
			Required	Available	
01	Comparative analysis of different types of network with Cables	-	20	20	Yes
02	Network related Commands	Terminal window	20	20	Yes
03	Network Connecting devices Specification and Configuration	-	20	20	Yes
04	Crimping of Cross wire & Straight through UTP Cable to interconnect two Computers	Crimping tool,cat6 Cable, cable tester	20	20	Yes
05	Interconnection of Computers in Local Area Network to Share resources	PC in lab connected with LAN	20	20	Yes
06	Implementation of Stop & wait protocol	GCC compiler	20	20	Yes
07	Implementation of internet Checksum	GCC compiler	20	20	Yes
08	I.T Infrastructure planning using network Connecting Devices	Cisco Packet Tracer	20	20	Yes

Facilities for conducting practical in the laboratories

Name of course**: Computer Engineering** Class: S.E. Semester: **II** Subject: **MPMCI Lab**

Sr. No.	Experiment Title	Name of Equipment, machinery Instrument etc. required to conduct experiment	Quantity		Whether Expt. can be conducted?
			Required	Available	
01	Program for mouse interfacing.	PC, MASM software	18	18	Yes
02	Program for graphics editor.	PC, MASM software	18	18	Yes
03	Program for PC to PC communication using serial port.	PC, MASM software	18	18	Yes
04	Program for parallel printer interfacing.	PC, MASM software, Printer	2	2	Yes
05	Program for DAC interfacing with 8086.	PC, MASM software, 8086 kit, DAC Kit, CRO	2	2	Yes
06	Program for stepper motor interfacing with 8086	PC, MASM software 8086 kit, Stepper motor Kit	2	2	Yes
07	Program for interfacing LEDs with 8051	PC, Keil software, RS232, 8051 kit, LED panel	2	2	Yes
08	Program for interfacing 7-	PC, Keil software, RS232, 8051 kit, 7	2	2	Yes

	segment displays with 8051	Segment Kit			
09	Program for keyboard interfacing with 8051	PC, Keil software, RS232, 8051 kit with keyboard	2	2	Yes
10	Program for stepper motor interfacing with 8051	PC, Keil software, RS232, 8051 kit, steper motor kit	2	2	Yes

Facilities for conducting practical in the laboratories

Name of course**: Computer Engineering** Class: **S.E.** Semester: **II**
Subject: **Data Structures Lab**

Sr. No.	Experiment Title	Name of Equipment, machinery Instrument etc. required to conduct experiment	Quantity		Whether Expt. can be conducted
			Required	Available	
01	Implementation of stack using array.	PC, Gcc	17	17	Yes
02	Implementation of queue using array	PC, Gcc	17	17	Yes
03	Implementation of circular queue using array	PC, Gcc	17	17	Yes
04	Conversion of infix to postfix expression.	PC, Gcc	17	17	Yes
05	Conversion of postfix expression to infix expression	PC, Gcc	17	17	Yes
6	Implementation of doubly linked list insertion, deletion & searching.	PC, Gcc	17	17	Yes
7	Program for creation of binary tree and nonrecursive tree traversal on binary tree.	PC, Gcc	17	17	Yes

8	Implementation of Hashing Function with Linear Probing	PC, Gcc			
9	Implementation of Quick Sort	PC, Gcc	17	17	Yes
10	Implementation of Radix Sort	PC, Gcc	17	17	Yes

Facilities for conducting practical in the laboratories

Name of course**: Computer Engineering** Class: S.E. Semester: **II**
Subject: **Computer Graphics Lab**

Sr. No.	**Experiment Title**	**Name of Equipment, machinery Instrument etc. required to conduct experiment**	**Quantity**		**Whether Expt. can be conducted ?**
			Required	**Available**	
01	Line Generation using DDA line drawing Algorithm	PC, gcc	15	15	Yes
02	Differential Line Style using Bresenham s Algorithm	PC, gcc	15	15	Yes
03	Circle generation using Bresenham s algorithms	PC, gcc	15	15	Yes
04	Program for Polygon Filling using Flood fill algorithm and Boundary fill algorithm.	PC, gcc	15	15	Yes
05	Program for Segmentation.	PC, gcc	15	15	Yes
06	Program for 2D Transformation.	PC, gcc	15	15	Yes

07	Program for 3D Rotation.	PC, gcc	15	15	Yes
08	Program for Parallel projections.	PC, gcc	15	15	Yes
09	Program for Perspective projections.	PC, gcc	15	15	Yes
10	Program for Animation.	PC, gcc	15	15	Yes

Facilities for conducting practical in the laboratories

Name of course**: Computer Engineering** Class: **T.E.** Semester: **I**
Subject: **Software Engineering Lab**

Sr. No.	Experiment Title	Name of Equipment, machinery, instrument etc. required to conduct experiment	Quantity		Whether Experiment can be conducted?
			Required	Available	
01	To Design an ATM System	Pentium IV and Any Open Source CASE Tool for Analysis & Design (Umbrello)	18	18	Yes
02	To Design Library Management System	Pentium IV and Any Open Source CASE Tool for Analysis & Design (Umbrello)	18	18	Yes
03	To Design Railway Reservation System	Pentium IV and Any Open Source CASE Tool for	18		Yes

		Analysis & Design (Umbrello)		18	
04	To Design Hospital Management System	Pentium IV and Any Open Source CASE Tool for Analysis & Design (Umbrello)	18	18	Yes
05	To Design Vehicle Navigation System	Pentium IV and Any Open Source CASE Tool for Analysis & Design (Umbrello)	18	18	Yes

Facilities for conducting practical in the laboratories

Name of course**: Computer Engineering** Class: **T. E**. Semester**: I**
Subject: **Linux Lab**

Sr. No.	**Experiment Title**	**Name of Equipment, machinery Instrument etc. required to conduct experiment**	**Quantity**		**Whether Expt. can be conducted**
			Required	Available	
01	Installation of Linux OS.	PC,Ubuntu 10.04	18	20	Yes
02	Study and execution of various Linux Commands.	PC,Ubuntu 10.04	18	20	Yes
03	Study of vi editor.	PC,Ubuntu 10.04	18	20	Yes
04	Configuration of Linux Server (FTP and WEB Server)	PC,Ubuntu 10.04	18	20	Yes
05	Shell script for finding out factorial of a number.	PC,Ubuntu 10.04	18	20	Yes

06	Shell script for finding out file type and displaying list of a directory.	PC,Ubuntu 10.04	18	20	Yes
07	Write shell script for displaying user process and system related information using environment variables.	PC,Ubuntu 10.04	18	20	Yes
08	Write a shell script to find the largest among the 3 given numbers.	PC,Ubuntu 10.04	18	20	Yes
09	Write a shell script to reverse the contents of a String.	PC,Ubuntu 10.04	18	20	Yes
10	Shell script to perform arithmetic operations.	PC,Ubuntu 10.04	18	20	Yes

Facilities for conducting practical in the laboratories

Name of course**: Computer Engineering** Class: **T.E.** Semester: **I**
Subject: **Computer Network Lab**

Sr. No.	**Experiment Title**	**Name of Equipment, machinery Instrument etc. required to conduct experiment**	**Quantity**		**Whether Expt. can be conducted?**
			Required	**Available**	
1	Implementation of Character count/Bit-Stuffing/Byte stuffing framing methods.	PC, Gcc	18	18	Yes
2	Socket programming for TCP.	PC, JAVA	18	18	Yes
3	Socket programming for UDP.	PC, JAVA	18	18	Yes
4	Encryption/Decryption using XOR symmetric-key	PC, JAVA	18	18	Yes

5	Encryption/Decryption using RSA asymmetric-key cryptography algorithm.	PC, JAVA	18	18	Yes
6	Implementation of RLE data compression algorithm.	PC, Gcc	18	18	Yes
7	Simulate the Ethernet LAN for wired networks.	PC, Ns2 Simulator	18	18	Yes
8	Simulate the point-to-point wired network.	PC, Ns2 Simulator	18	18	Yes

Facilities for conducting practical in the laboratories

Name of course**: Computer Engineering** Class: **T.E**. Semester**: I**
Subject: **System Programming Lab**

Sr. No.	**Experiment Title**	**Name of Equipment, machinery Instrument etc. required to conduct experiment**	**Quantity**		**Whether Expt. can be conducted**
			Required	Available	
01	Develop an application to simulate first pass of 2-pass assembler	PC,GCC	16	16	Yes
02	Develop an application to simulate second pass of 2-pass assembler.	PC,GCC	16	16	Yes

03	Develop an application to simulate first passof Macro assembler.	PC,GCC	16	16	Yes
04	Develop an application to create simple text editor.	PC,GCC	16	16	Yes
05	Develop an application for Lexical Analysis phase of compiler	PC,GCC	16	16	Yes
06	Develop an application for simulating Syntax Analysis phase of Compiler.	PC,GCC	16	16	Yes

Facilities for conducting practical in the laboratories

Name of course**: Computer Engineering** Class: T.E. Semester: **I**
Subject: **JAVA Programming LAB**

Sr. No.	**Experiment Title**	**Name of Equipment, machinery Instrument etc. required to conduct experiment**	**Quantity**		**Whether Expt. can be conducted ?**
			Required	**Available**	
01	Program for string operation in java.	PC, ubuntu OS, default Jdk 1.6.	15	15	Yes
02	Program for package creation and use in program.	PC, ubuntu OS, default Jdk 1.6.	15	15	Yes

03	Program for Threads in java.	PC, ubuntu OS, default Jdk 1.6.	15	15	Yes
04	Program to demonstrate the abstract class and abstract method.	PC, ubuntu OS, default Jdk 1.6.	15	15	Yes
05	Program that illustrates the concepts of Java class that include constructor with and without parameters, Overloading methods and Overriding methods	PC, ubuntu OS, default Jdk 1.6.	15	15	Yes
06	Program that demonstrate inheritance by creating suitable classes	PC , ubuntu OS, default Jdk 1.6.	15	15	Yes
07	Program that demonstrates implementing interfaces and extending interfaces	PC, ubuntu OS, default Jdk 1.6.	15	15	Yes
08	Write a program using Applet.	PC, ubuntu OS, default Jdk 1.6.	15	15	Yes
09	Write programs for using Graphics class.	PC, ubuntu OS, default Jdk 1.6.	15	15	Yes
10	Write a program for exception handling	PC, ubuntu OS, default Jdk 1.6.	15	15	Yes

Facilities for conducting practical in the laboratories

Name of course**: Computer Engineering** Class: T.E. Semester: **II**
Subject: **Operating System Lab**

Sr. No.	**Experiment Title**	**Name of Equipment, machinery Instrument etc. required to conduct experiment**	**Quantity**		**Whether Expt. can be conducted?**
			Required	**Available**	
01	Study of Commercial and open source OS (Linux OS)	PC, Linux OS	18	18	Yes
02	Implementation of command interpreter using system calls.	PC, GCC	18	18	Yes

03	Implementation of CPU scheduling algorithms.	PC, GCC	18	18	Yes
04	Implementation of solution for critical section problem.	PC, GCC	18	18	Yes
05	Implementation of Memory management.	PC, GCC	18	18	Yes
06	Simulation of page replacement algorithms.	PC, GCC	18	18	Yes
07	Implementation of Banker algorithm.	PC, GCC	18	18	Yes
08	Implementation of Disk scheduling algorithm.	PC, GCC	18	18	Yes

Facilities for conducting practical in the laboratories

Name of course**: Computer Engineering** Class: **T.E.** Semester: **II**
Subject: **Object Oriented Modeling and Design Lab**

Sr. No.	Experiment Title	Name of Equipment, machinery Instrument etc. required to conduct experiment	Quantity		Whether Expt. can be conducted
			Required	Available	

01	Design ATM system using Structural and Behavioral UML diagram	PC, Rational Rose /StarUML Software	16	16	Yes
02	Design Library Management system using Structural and Behavioral UML diagram	PC, Rational Rose/StarUML Software	16	16	Yes
03	Design Railway Reservation system using Structural and Behavioral UML diagram	PC, Rational Rose/StarUML Software	16	16	Yes
04	Design Hospital Management system using Structural and Behavioral UML diagram	PC, Rational Rose/StarUML Software	16	16	Yes
05	Design Online Shopping system using Structural and Behavioral UML diagram	PC, Rational Rose/StarUML Software	16	16	Yes
06	Design Hotel Management system using Structural and Behavioral UML diagram	PC, Rational Rose/StarUML Software	16	16	Yes

Facilities for conducting practical in the laboratories

Name of course**: Computer Engineering** Class: T.E. Semester: **II**
Subject: **Database Management System Lab**

Sr. No.	**Experiment Title**	**Name of Equipment, machinery**	**Quantity**	**Whether Expt. can be conducted?**

		Instrument etc. required to conduct experiment	Required	Available	
01	Creating a sample database using any client server RDBMS (Oracle/Open Source Database) package using SQL DDL queries. This will include constraints (Primary key, Foreign key, Unique, Not Null, and Check) to be used while creating tables.	PC, MYSQL5.0	18	18	Yes
02	SQL DML queries: Use of SQL DML queries to retrieve, insert, delete and update the database created in experiment No. 1.	PC, MYSQL5.0	18	18	Yes
03	SQL Queries: The queries should involve SQL feature such as aggregate functions, group by, having, order by the database created in experiment No. 1.	PC, MYSQL5.0	18	18	Yes
04	SQL Queries: The queries should involve Set Operations and Set Comparisons the database created in experiment No. 1	PC, MYSQL5.0	18	18	Yes
05	Screen design and Report generation: Sample forms and reports should be generated using any front end tools.	PC, MYSQL5.0	18	18	Yes
06	Write a program to demonstrate different types of JOIN.	PC, MYSQL5.0	18	18	Yes
07	Write a program to demonstrate use of Trigger	PC, MYSQL5.0	18	18	Yes
08	Write a program to demonstrate view.	PC, MYSQL5.0	18	18	Yes
09	Write a program to demonstrate PL/SQL block	PC, MYSQL5.0	18	18	Yes
10	Write a program to demonstrate stored function.	PC, MYSQL5.0	18	18	Yes
11	Write a program to demonstrate stored procedure.	PC, MYSQL5.0	18	18	Yes

Facilities for conducting practical in the laboratories

Name of course**: Computer Engineering** Class: T**.E**. Semester**: II**
Subject: **Web Programming Lab**

Sr. No.	Experiment Title	Name of Equipment, machinery Instrument etc. required to conduct experiment	Quantity		Whether Expt. can be conducted
			Required	Available	
01	Develop a complete web page using HTML basic tags, CSS, Table and Layout	PC,Ubuntu 10.04	18	20	Yes
02	Design a page web using JavaScript to demonstrate, if statement, if...else statement and Switch statement	PC,Ubuntu 10.04	18	20	Yes
03	Design a page web using JavaScript to demonstrate, Alert box Alert box with line breaks, Confirm box and Prompt box	PC,Ubuntu 10.04	18	20	Yes
04	Design a page web using JavaScript to demonstrate, Call a function ,Function with an argument, Function that returns a value	PC,Ubuntu 10.04	18	20	Yes
05	Design a page web using JavaScript to demonstrate, For loop, While loop, Do While loop, Break a loop, Break and continue a loop	PC,Ubuntu 10.04	18	20	Yes
06	Design a page web using JavaScript to demonstrate, Sort an array (alphabetically and ascending), Sort numbers (numerically and ascending), Sort numbers (numerically and descending)	PC,Ubuntu 10.04	18	20	Yes
07	Design a page web using PHP to demonstrate, variables, echo/print, data types, string functions and operators	PC,Ubuntu 10.04	18	20	Yes

08	Installation and configuration of any web server like IIS, Apache, WAMP, XAMP etc.	PC,Ubuntu 10.04	18	20	Yes
09	Design a page web using PHP to demonstrate, date, file, file upload, cookies and sessions	PC,Ubuntu 10.04	18	20	Yes
10	Design a page web using PHP to demonstrate, MySQL connect, create DB/Table, insert into, select, where, order by, update and delete	PC,Ubuntu 10.04	18	20	Yes

Facilities for conducting practical in the laboratories

Name of course**: Computer Engineering** **Class**: B.E Semester: **I** Subject: **AI**

Sr. No.	Experiment Title	Name of Equipment, machinery Instrument etc. required to conduct experiment	Quantity		Whether Expt. can be conducted
			Required	Available	
1.	To develop Mini-Expert System (Medical Expert System) in PROLOG /TC	C or C++ Compiler, PROLOG,PC	15	15	Yes
2.	To develop Parsing Method in PROLOG	C or C++ Compiler, PROLOG,PC	15	15	Yes
3.	To Implement Single Perception Training Algorithm (AND Gate)	C or C++ Compiler, PROLOG,PC	15	15	Yes
4.	Application development using Neural Network: implementation of intelligent perceptron system (X-OR Gate)	C or C++ Compiler, PROLOG,PC	15	15	Yes
5.	To Implement Unification Algorithm	C or C++ Compiler, PROLOG,PC	15	15	Yes
6.	Program for Dynamic Database Management	C or C++ Compiler, PROLOG,PC	15	15	Yes

Facilities for conducting practical in the laboratories

Name of course**: Computer Engineering** Class: **B.E.** Semester: **I**
Subject: **Advance Computer Network Lab**

Sr. No.	Experiment Title	Name of Equipment, machinery Instrument etc. required to conduct experiment	Quantity		Whether Expt. can be conducted
			Required	Available	
01	Setting up wireless network without) infrastructure support (ad-hoc).	Access Point, P-IV Machines	15	15	Yes
02	Setting up wireless network with infrastructure support.	Access Point, P-IV Machines	15	15	Yes
03	Configuring Access Point with bridging mode (Point to Point and Point to Multi Point).	Router , P-IV machines	15	15	Yes
04	Configuring Security in wireless network with and without infrastructure support.	Router , P-IV machines	15	15	Yes
05	Configuring Routing between wired and wireless Networks.	Router , P-IV machines	15	15	Yes
06	Define a topology with four nodes using ns/2.	NS2 software, P-IV machines	15	15	Yes
07	Dynamic network where the routing adjusts to a link failure using ns/2.	NS2 software, P-IV machines	15	15	Yes
08	Creating output files for Xgraph using ns/2.	NS2 software, P-IV machines	15	15	Yes

Facilities for conducting practical in the laboratories

Name of course**: Computer Engineering** Class: B**.E**. Semester**: II**
Subject: **Compiler Design Lab**

Sr. No.	**Experiment Title**	**Name of Equipment, machinery Instrument etc. required to conduct experiment**	**Quantity**		**Whether Expt. can be conducted**
			Required	Available	
1	Implement a lexical analyzer for a subset of C using LEX Implementation should support Error handling	Linux OS with Flex and Bison package	12	12	Yes
2	Implement a lexical analyzer of identification of numbers (Numbers can be binary, octal, decimal, hexadecimal, float or exponential)	Linux OS with Flex and Bison package	12	12	Yes
03	Implement a Calculator using LEX and ACC.	Linux OS with Flex and Bison package	12	12	Yes
04	Implementation of Context Free Grammar	Linux OS with Flex and Bison package	12	12	Yes
5	Implementation of code generator	Linux OS with Flex and Bison package	12	12	Yes
06	Implement Deterministic Finite Automata	Linux OS with Flex and Bison package	12	12	Yes

Facilities for conducting practical in the laboratories

Name of course**: Computer Engineering** Class: **B.E.** Semester: **VII**
Subject: **Embedded Systems**

Sr. No.	Experiment Title	Name of Equipment, machinery Instrument etc. required to conduct experiment	Quantity		Whether Expt. can be conducted
			Required	Available	
01	Write a C program for blinking of LEDs to perform I/O operation	ARM 7 board with complete set, PC, Triton IDE	06 Set	06 Set	Yes
02	Write a C program to demonstrate interfacing of keyboard and display key pressed on LCD	ARM 7 board with complete set, PC, Triton IDE	06 Set	06 Set	Yes
03	Write a C program to demonstrate how communication is done between processor and EEPROM using I2C protocol	ARM 7 board with complete set, PC, Triton IDE	06 Set	06 Set	Yes
04	Write a C program to demonstrate how stepper motor is interfacing with ARM 7	ARM 7 board with stepper motor, PC, Triton IDE	06 Set	06 Set	Yes
05	Writing a scheduler / working with using RTOS for 4 tasks with priority	ARM 7 board with complete set, PC, Triton IDE	06 Set	06 Set	Yes
06	Implement a semaphore for any given task switching using RTOS on microcontroller board	ARM 7 board with complete set, PC, Triton IDE	06 Set	06 Set	Yes
07	Write a C program for task creation	ARM 7 board with complete set, PC, Triton IDE	06 Set	06 Set	Yes
08	Program for process creation in Real Time Linux	ARM 7 board with complete set, PC, Triton IDE	06 Set	06 Set	Yes

Facilities for conducting practical in the laboratories

Name of course**: Computer Engineering** Class: B**.E**. Semester**: I**
Subject: **Advanced Unix Programming**

Sr. No.	Experiment Title	Name of Equipment, machinery Instrument etc. required to conduct experiment	Quantity		Whether Expt. can be conducted
			Required	Available	
01	Develop a program for file management in Linux	Linux (Ubuntu 10.4), PC	18	20	Yes
02	Program for Simulation of various commands.	Linux (Ubuntu 10.4), PC	18	20	Yes
03	Develop a program using atexit function	Linux (Ubuntu 10.4), PC	18	20	Yes
04	Program for process creation using fork() and vfork function.	Linux (Ubuntu 10.4), PC	18	20	Yes
05	Program for process creation using function. II Named Pipe	Linux (Ubuntu 10.4), PC	18	20	Yes
06	Develop Daemon process in Linux Unix.	Linux (Ubuntu 10.4), PC	18	20	Yes
07	Program for client/server implementation using Socket Programming.	Linux (Ubuntu 10.4), PC	18	20	Yes
08	Program for interprocess communication Message Queue	Linux (Ubuntu 10.4), PC	18	20	Yes

Facilities for conducting practical in the laboratories

Name of course**: Computer Engineering** Class: **T.E.** Semester: **II**
Subject: **Object Oriented Modeling and Design Lab**

Sr. No.	Experiment Title	Name of Equipment, machinery Instrument etc. required to conduct experiment	Quantity		Whether Expt. can be conducted
			Required	Available	
01	Design ATM system using Structural and Behavioral UML diagram	PC, Umbrello CASE Tool	18	18	Yes
02	Design Library Management system using Structural and Behavioral UML diagram	PC, Umbrello CASE Tool	18	18	Yes
03	Design Railway Reservation system using Structural and Behavioral UML diagram	PC, Umbrello CASE Tool	16	16	Yes
04	Design Hospital Management system using Structural and Behavioral UML diagram	PC, Umbrello CASE Tool	18	18	Yes
05	Design Online Shopping system using Structural and Behavioral UML diagram	PC, Umbrello CASE Tool	18	18	Yes
06	Design Hotel Management system using Structural and Behavioral UML diagram	PC, Umbrello CASE Tool	18	18	Yes

Facilities for conducting practical in the laboratories

Name of course**: Computer Engineering** Class: **B.E.** Semester: **II**
Subject: **DWM.**

Sr. No.	Experiment Title	Name of Equipment, machinery Instrument etc. required to conduct experiment	Quantity		Whether Expt. can be conducted
			Required	Available	
01	Develop a program to construct a multidimensional data model (Star, Snowflake or Fact constellations)	PC,Ubuntu 10.4	18	20	Yes
02	Develop a program to implement Data Preprocessing Techniques.	PC,Ubuntu 10.4	18	20	Yes
03	Implement Apriori algorithm for frequent item set.	PC,Ubuntu 10.4	18	20	Yes
04	Develop a program to implement Data Generalization and Summarization techniques.	PC,Ubuntu 10.4	18	20	Yes
05	Develop a program for classification of data.	PC,Ubuntu 10.4	18	20	Yes

Department of Computer Engineering
Facilities for conducting practical in the laboratories

Name of course**: Computer Engineering** Class: **B.E**. Semester**: II**
Subject: **Software Metrics and Quality Assurance**

Sr. No.	**Experiment Title**	**Name of Equipment, machinery Instrument etc. required to conduct experiment**	**Quantity**		**Whether Expt. can be conducted**
			Required	Available	
01	Program for Calculating the Size of Program. (Line of Code Measure)	PC,T urbo c	18	18	Yes
2	Develop a program for implementation of COCOMO model	PC,T urbo c	18	18	Yes
3	Implementation of program for measuring size of program using Albrecht's Function Point method.	PC,T urbo c	18	18	Yes
4	Preparation for Project plan using Gantt Chart.	Planner	18	18	Yes
5	Study of Software Testing Tool J-Meter.	Jmeter	18	18	Yes

Item No.26

A) Facilities for conducting Practicals in the Laboratories

Name of Course:- E&TC Class:- F.E. Subject:- Elements of Electronics Engineering.

Name of the Department / Section :- Electronics and Telecommunication

Subjectwise & laboratorywise Lists of material, machinery, equipment & Instrument required to perform prescribed Practicals

Sr.No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt can be conducted
			Required	Available	
1	Diode Characteristics	a. Multimeter b. Power Supply	01 01	01 01	Yes
2	LED Characteristics	a. Power Supply b. Multimeter	01 01	01 01	Yes
3	BJT Q-point	a. Power Supply b. Multimeter	01 01	01 01	Yes
4	Inverting & Non Inverting amplifier using OPAMP	c. Power Supply a. Function Generator b. CRO	01 01 01	01 01 01	Yes
5	Basic Logic Gates	a. Multimeter b. Power Supply	01	01	Yes
6	Introduction to PCB Design	a. Etching Solution bottle b. Drilling machine	01 01	01 01	Yes

A) Facilities for conducting Practicals in the Laboratories

Name of Course : E&TC Class:- S.E. Subject:- Solid State Devices & Circuits-I.

Name of the Department / Section :- Electronics and Telecommunication

Subjectwise & laboratorywise Lists of material, machinery, equipment & Instrument required to perform prescribed Practical's

SR No	Name of Experiment	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt can be conducted
			Required each	Available each	
1	To find load regulation of full wave Bridge wave rectifier circuit with capacitor filter.	a. Multimeter b. CRO	02 01	02 01	Yes
2	To Plot DC Load Line Q. point for IJFET	a. Multimeter b. Power supply	02 01	02 01	Yes
3	To Plot DC Load Line for BJT (Voltage Divider biasing circuit).	a. Multimeter b. Power supply	02 01	02 01	Yes

4	To plot the frequency response of CS-FET Amplifier	a. Power Supply b. Function generator c. CRO	01 01 01	01 01 01	Yes
5	Plot frequency response of CE-CE Cascade amplifier.	a. Power Supply b. Function generator c. CRO	01 01 01	01 01 01	Yes
6	To plot Frequency Response of CE-CC Cascade Amplifier	a. Power Supply b. Function generator c. CRO	01 01 01	01 01 01	Yes
7	Square Wave Testing of Amplifier	a. Power supply b. CRO c. Function generator	01 01 01	01 01 01	Yes
8	Study the effect of bypass capacitor on frequency response of single stage CE amplifier	a. Power supply b. Function generator c. CRO	01 01 01	01 01 01	Yes

A) Facilities for conducting Practicals in the Laboratories

Name of Course : E&TC Class:- S.E. Subject:- Network Analysis & Synthesis.

Name of the Department / Section :- Electronics and Telecommunication

Subjectwise & laboratorywise Lists of material, machinery, equipment & Instrument required to perform prescribed Practicals

Sr.No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt can be conducted
			Required each	Available each	
1	Determine transfer / driving point Impedance function of given two port reactive network.	Multimeters DRB Exprimental kit/Bread Board Power Supply	01 01 01 01	01 01 01 01	Yes
2	Study of Series and parallel resonance, find BW and Q- factor.	a. CRO b. Multimeters c. Function Genetator d. Exprimental kit/Bread Board	01 01 01 01	01 01 01 01	Yes
3	Determine Z parameter of networks connected in series.	a) Power supply b) Exprimental kit/Bread Board c) Multimeters	01 01 01	01 01 01	Yes
4	Determine Y parameter of networks connected in parallel.	a. Multimeter b. Power supply c. Exprimental kit/Bread Board	01 01 01	01 01 01	Yes
5	Determine transmission parameter of networks connected in cascaded form..	a. Multimeter b. Power supply c. Exprimental kit/Bread Board	01 01 01	01 01 01	Yes

6	Frequency response of constant k- low pass filters and find out cut of frequency.	a. Function generator b. Exprimental kit/Bread Board c. CRO	01 01 01	01 01 01	Yes
7	Design and Test m-derived low pass filter.	a. CRO b. Function generator c. Exprimental kit/Bread Board	01 01 01	01 01 01	Yes
8	Design and test symmetrical T- type attenuator	a. CRO b. Power supply c. Exprimental kit/Bread Board d. Multimeters e. Function generator	01 01 01 01 01	01 01 01 01 01	Yes

A) Facilities for conducting Practicals in the Laboratories

Name of Course: E&TC Class:- S.E. Subject:- Digital Techniques and Applications.

Name of the Department / Section :- Electronics and Telecommunication

Subjectwise & laboratorywise Lists of material, machinery, equipment & Instrument required to perform prescribed Practicals

Sr.No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt can be conducted
			Required each	Available each	
1	Boolean function using NAND gate	a. IC 7400 b. Power supply c. Bread board	01 01 01	01 01 01	Yes
2	Segement display using IC 7447.	a. IC 7447 b. Power supply c. Bread board	01 01 01	01 01 01	Yes
3	Binary- Gray code conv.	a. IC 7486 b. Power supply c. Bread board	01 01 01	01 01 01	Yes
4	Four bit binary adder using IC 7483	a. IC 7483 b. Power supply c. Bread board	01 01 01	01 01 01	Yes
5	Verification of Mux& Demux	a. IC 74151 & 74154 b. Power supply c. Bread board	01 01 01	01 01 01	Yes
6	Implementation of given expression by using MUX	a. IC 74151 b. Power supply c. Bread board	01 01 01	01 01 01	Yes
7	Implementation of given expression by using Demux	a. IC 74154 b. Power supply c. Bread board	01 01 01	01 01 01	Yes
8	Decade Counter using IC 7490	a. IC 7490 b. Power supply c. Bread board	01 01 01	01 01 01	Yes

A) Facilities for conducting Practicals in the Laboratories

Name of Course: E&TC Class:- S.E. Subject:- Electrical Circuits & Machines

Name of the Department / Section :- Electronics and Telecommunication

Subjectwise & laboratorywise Lists of material, machinery, equipment & Instrument required to perform prescribed Practicals

Sr.No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt can be conducted
			Required	Available	
1	Load test on DC Shunt motor	a. Motor generator set b. Ammeter c. Voltmeter d. Load bank e. Techometer f. Rheostat	01 02 02 01 01	01 02 02 01 01	Yes
2	Load test on DC Series motor	a. Motor generator set b. Ammeter c. Voltmeter d. Load bank e. Techometer f. Set series g. Rheostat	01 02 02 01 01 - 1	01 02 02 01 01 - 1	Yes
3	Load test on 3 phase I.M.	a. Motor generator set b. Ammeter c. Voltmeter d. Load bank e. Techometer f. Watt meter g. Rheostat	01 02 02 01 01 02 1	01 02 02 01 01 02 1	Yes
4	Speed control of DC shunt motor.	a. Motor generator set b. Ammeter c. Voltmeter d. Techometer e. Rheostat	01 01 01 01 02	01 01 01 01 01	Yes
5	Measurement of active power by 2 watt meter method	a. Watt meter b. Ammeter c. Voltmeter d. Load bank e. Rheostat	02 01 02 01 1	02 01 02 01 1	Yes
6	Study of starters	a. Starter	01	01	Yes
7	Open circuit & short circuit test on 1-phase Xmer	a. Transformer b. Ammeter c. Voltmeter d. Wattmeter	01 01 01 01	01 01 01 01	Yes
8	Study of Single Phase Motor	a. Induction Motor b. Universal Motor	1 1	1 1	Yes

A) Facilities for conducting Practicals in the Laboratories

Name of Course : E&TC Class:- S.E. Subject:- Communication Systems-I.

Name of the Department / Section :- Electronics and Telecommunication

Subjectwise & laboratorywise Lists of material, machinery, equipment & Instrument required to perform prescribed Practicals

Sr.No	Experiment Title Group A	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt can be conducted
			Required each	Available each	
1 2	AM Modulator & AM Demodulator	a. Exp. Kit, b. CRO, c. Function Generator, d. Power Supply (Optional)	01 01 02 01	02 01 02 01	Yes
3	FM Transmitter	a. Exp. Kit, b. CRO, c. Function Generator, d. Power Supply (Optional)	01 01 02 01	02 01 02 01	Yes
4	FM Discriminator	a. Exp. Kit, b. CRO, c. Power Supply (Optional)	01 01 01	02 01 01	Yes
5	Gain of RF/IF Amplifier with and without AGC	a. Exp. Kit, b. CRO, c. Function Generator d. Power Supply (Optional)	01 01 01 01	02 01 01 01	Yes
6	Super Heterodyne receiver	a. Exp. Kit, b. CRO, c. Function Generator, d. Power Supply (Optional)	01 01 01 01 01	02 01 01 01 01	Yes
7	PAM Modulator/ Demodulator	a. Exp. Kit, b. CRO, c. Function Generator, d. Power Supply (Optional)	01 01 01 01 01	01 01 01 01 01	Yes
8	PWM Modulator/ Demodulator	a. Exp. Kit, b. CRO, c. Function Generator	01 01 01	02 01 02	Yes

A) Facilities for conducting Practicals in the Laboratories

Name of Course : E& TC **Class:- S.E.** **Subject:-** Microprocessors.

Name of the Department / Section :- Electronics and Telecommunication

Subjectwise & laboratorywise Lists of material, machinery, equipment & Instrument required to perform prescribed Practicals

Sr.No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	**Quantity**		**Whether expt can be conducted**
			Required each	**Available each**	

1	Addition of two 8 bit numbers.	a. 8085 microprocessor kit b. Power supply c. Keyboard d. Computer with 8085 simulation	01 01 01 01	01 01 01 01	Yes
2	Addition of two 16 bit numbers.	a. 8085 microprocessor kit b. Power supply c. Keyboard d. Computer with 8085 simulation	01 01 01 01	01 01 01 01	Yes
3	Multiplication of two 8 bit numbers.	a. 8085 microprocessor kit b. Power supply c. Keyboard d. Computer with 8085 simulation	01 01 01 01	01 01 01 01	Yes
4	Division of two 8 bit numbers	a. 8085 microprocessor kit b. Power supply c. Keyboard d. Computer with 8085 simulation	01 01 01 01	01 01 01 01	Yes
5	Program for block transfer of data bytes.	a. 8085 microprocessor kit b. Power supply c. Keyboard d. Computer with 8085 simulation	01 01 01 01	01 01 01 01	Yes
6	Program to implement decimal up/down counter	a. 8085 microprocessor kit b. Power supply c. Keyboard d. Computer with 8085 simulation	01 01 01 01	01 01 01 01	Yes
7	BCD to Hex / Hex to BCD Conversion	a. 8085 microprocessor kit b. Power supply c. Keyboard d. Computer with 8085 simulation	01 01 01 01	01 01 01 01	Yes
8	Interfacing of 8253/54 Timer with 8085 Microprocessor and generate the square wave.	a. 8085 microprocessor kit b. Power supply c. Keyboard d. Computer with 8085 simulation	01 01 01 01	01 01 01 01	Yes

A) Facilities for conducting Practicals in the Laboratories

Name of Course : E.& TC Class:- S.E. Subject:- Solid State Devices & Circuits -II

Name of the Department / Section :- Electronics and Telecommunication

Subjectwise & laboratorywise Lists of material, machinery, equipment & Instrument required to perform prescribed Practicals

Sr.No	Experiment Title GROUP A	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt can be conducted
			Required each	Available each	
1	Emitter Coupled Differential Amplifiers Calculation of CMRR using emitter resistance & compare it with constant current source	a. CRO, b. Function Generator, c. Dual Power Supply, d. Digital multimeter	01 01 01 01	01 01 01 01	Yes
2	Determine period and frequency of oscillation of astable multivibrator	a. Power Supply b. Multimeter c. CRO	01 01 01	01 01 01	Yes
3	Plot frequency response of single tuned amplifiers	a. CRO, b. Function Generator, c. Power Supply,	01 01 01	01 01 01	Yes
4	Measure the response of Schmitt trigger circuit for a sine wave input observe Hysteresis characteristics, calculation of UTP, LTP	a. CRO, b. Function Generator, c. Power supply d. Multimeter	01 01 01 01	01 01 01 01	Yes
5	Plot regulation characteristics of series voltage regulator	a. Auto transformer, b. multimeter	01 02	01 02	Yes
6	Plot frequency response of voltage series / voltage shunt feedback amplifiers calculation of bandwidth with and without feedback	CRO, Function Generator, Power supply	01 01 01	01 01 01	Yes
7	Study of oscillators circuits L C oscillators, Hartley, Clapp/Colpitts	CRO, Power Supply,	01 01	01 01	Yes
8	To observe and elimination of crossover distortion in complimentary symmetry class B amplifier	a. CRO, b. Function Generator c. Power Supply, d. Multimeter	01 01 01 01	01 01 01 01	Yes
9	Effect of feedback on Ri, Ro and Av for voltage series feedback amplifier	a. CRO, b. Function Generator, c. Power Supply, d. Kit	01 01 01 01	01 01 01 01	Yes
10	Q point, Ad, Ac and CMRR measurement for BJT differential amplifier	a. CRO, b. Function Generator, c. Power Supply, d. Digital multimeter e. Kit	01 01 01 01 01	01 01 01 01 01	yes
11	Low and High voltage measurement and regulation characteristics using LM723	a. CRO, b. Auto transformer, c. Decade box, d. Power Supply e. multimeter	01 01 01 01 02	01 01 01 01 02	Yes
12	IC 317 for fixed o/p & Adj voltage Regulator	a. Auto transformer, b. Decade box, c. Power Supply d. multimeter	1 1 1 1	1 1 1 1	Yes

13	Voltage Doubler Circuit	a. Function Generator, b. DRB c. Digital multimeter	1 1 1	1 1 1	Yes

A) Facilities for conducting Practicals in the Laboratories

Name of Course:- E&TC Class:- S.E. Subject:- Computer Programming-II.

Name of the Department / Section :- Electronics and Telecommunication

Subjectwise & laboratorywise Lists of material, machinery, equipment & Instrument required to perform prescribed Practicals

Sr.No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt can be conducted
			Required	Available	
1	Installation of Linux (Ubuntu 10.04)	a. PC b. Ubuntu 10.04	01 01	01 01	Yes
2	Study & Execution of Linux Commands	a. PC b. Ubuntu 10.04	01 01	01 01	Yes
3	Program for Arithmatic operations on two digits.	a. PC b. Ubuntu 10.04	01 01	01 01	Yes
4	Program for reverse number	a. PC b. Ubuntu 10.04	01 01	01 01	Yes
5	Program for Matrix multiplication	a. PC b. Ubuntu 10.04	01 01	01 01	Yes
6	Program foe counting digits in given number	a. PC b. Ubuntu 10.04	01 01	01 01	Yes
7	Program to convert Decimal to Binary	a. PC b. Ubuntu 10.04	01 01	01 01	Yes
8	Program to perform bitwise operations	a. PC b. Ubuntu 10.04	01 01	01 01	Yes
9	Program to swap two numbers using pointer	a. PC b. Ubuntu 10.04	01 01	01 01	Yes
10	Program for queue using array	a. PC b. Ubuntu 10.04	01 01	01 01	Yes

A) Facilities for conducting Practicals in the Laboratories

Name of Course:- E&TC Class:- S.E. Subject:- Computer Programming-III

Name of the Department / Section :- Electronics and Telecommunication

Subjectwise & laboratory wise Lists of material, machinery, equipment & Instrument required to perform prescribed Practicals

Sr.No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt can be conducted
			Required	Available	
1	Study of creation of Arrays	a.PC b.MATLAB Software	01 01	01 01	Yes
2	Study of various operations on matrices	a.PC b.MATLAB Software	01 01	01 01	Yes
3	To plot sinusoidal, triangular& square signal	a.PC b.MATLAB Software	01 01	01 01	Yes
4	To find the pole zero plot of the given n/w.	a.PC b.MATLAB Software	01 01	01 01	Yes
5	To find the Polar /Nyquist plot of the given n/w.	a.PC b.MATLAB Software	01 01	01 01	Yes
6	Modelling of any one differential equation	a.PC b.MATLAB Software	01 01	01 01	Yes
7	To find the radiation pattern of antennas & study the effect of varing parameters	a.PC b.MATLAB Software	01 01	01 01	Yes
8	Modelling & Simulation of single pulse rectifier & study the effect of R & RL Load	a.PC b.MATLAB Software	01 01	01 01	Yes

A) Facilities for conducting practicals in the Laborateries

Name of course : E&TC Class: T.E. Subject: Application software

Name of Department/Section :- Electronics and Telecommunication

Subject wise & labrotariwise list of Materials ,Machinery and Instruments required to perform the prescribed practical.

Sr.No	Experiment Title	Name of equipment ,Machinary	Quantity	Whether experiment

		Instruments etc required to conduct Experiment	Required	Available in each	to be conducted
1	Installation of OScad on Ubuntu and windows	OscaD software ,PC	01	01	Yes
2	Study of Architecture of Oscad	OscaD software ,PC	01	01	Yes
3	Study of schematic ,creation ,simulation and PCB design	OscaD software ,PC	01	01	Yes
4	Simulation of Teypical circuit using a)Rc b) Diode	OscaD software ,PC	01	01	Yes
5	Simulation and PCB design of typical circuit using two stage Amplifier	OscaD software ,PC	01	01	Yes
6	Simulation and PCB design of simple DC power supply	OscaD software ,PC	01	01	Yes
7	Simulation and PCB design of a typical 741 opamp IC.	OscaD software ,PC	01	01	Yes
8	`Simulation and PCB design of typical circuit using 74 xx series IC.	OscaD software ,PC	01	01	Yes

A) Facilities for conducting Practicals in the Laboratories

Name of the Course : E & TC Class:- T.E. Subject:- Communication System – II.

Name of the Department / Section :- Electronics and Telecommunication

Subjectwise & laboratorywise Lists of material, machinery, equipment & Instrument required to perform prescribed Practicals

Sr.No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt can be conducted
			Required	Available	

1	Sampling Thm	a. CRO b. Kit c. Functional Generator	1 1 1	1 1 1	Yes
2	Delta Modulation	a. CRO b. Kit c. Functional Generator	1 1 1	1 1 1	Yes
3	Adaptive Delta Modulation	a. CRO b. Kit c. Functional Generator	1 1 1	1 1 1	Yes
4	Line Coding & decoding	a. Kit b. Functional Generator	1 1	1 1	Yes
5	Frequency Shift keying	a. Kit b. Functional Generator	1 1	1 1	Yes
6	Binary Phase Shift Keying	a. Kit b. Functional Generator	1 1	1 1	Yes
7	Quadrature Phase Shift Keying	a. CRO b. Kit c. Functional Generator	1 1 1	1 1 1	Yes
8	Quadrature Amplitude Modulation	a. CRO b. Kit c. Functional Generator	1 1 1	1 1 1	Yes

A) Facilities for conducting Practicals in the Laboratories

Name of the Course : E & TC Class:- S.E. Subject:- Linear Integrated Circuits.

Name of the Department / Section :- Electronics and Telecommunication

Subjectwise & laboratorywise Lists of material, machinery, equipment & Instrument required to perform prescribed Practicals

Sr.No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt can be conducted
			Required	Available	
1	Op-amp Integrator /Differentiator	a.Function Gen b.Dual P/S c.CRO d.Kit	1 1 1 1	1 1 1 1	Yes
2	Precision Half Wave Rectifier & Full Wave Rectifier	a. Function gen b. Dual P/S c. CRO d. Kit	1 1 1 1	1 1 1 1	Yes
3	Op-amp Clamper Circuit	a. Function gen b. Dual P/S c. CRO d. Kit	1 1 1 1	1 1 1 1	Yes
4	Square Wave/ Traingular Wave Generator	a. Dual P/S b. CRO c. Kit	2 1 1	2 1 1	Yes
5	Schmitt Trigger using OP-amp	a. Function Gen b. Dual P/S c. CRO d. Kit	1 1 1 1	1 1 1 1	Yes

6	IC-555 as a Astable & Monostable Multivibrator	a. Function Gen b. Single p/s c. CRO d. Kit	1 1 1 1	1 1 1 1	Yes
7	To design & test second order Butterworth LP/HP filter.	a. Function Gen b. Dual P/S c. CRO d. Kit	1 1 1 1	1 1 1 1	Yes
8	To study Op-amp parameters	a. Function generator b. Dual Power supply c. Multimeter d. CRO e. Kit	1 1 1 1 1	1 1 1 1 1	Yes

A) Facilities for conducting Practicals in the Laboratories

Name of the Course : E & TC Class:- T.E. Subject:- Microcontroller & Peripheral Interface Controller.

Name of the Department / Section :- Electronics and Telecommunication

Subjectwise & laboratorywise Lists of material, machinery, equipment & Instrument required to perform prescribed Practicals

Sr.No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt can be conducted
			Required	Available	
1	Write and Execute program to flash LED.	a. 8085 microcontroller kit b. Peripheral kits c. Power Supply	1 1 1	1 1 1	Yes
2	Write and Execute program to display 0 to 9 continuously on 7-Segment display	a. 8085 microcontroller kit b. Peripheral kits c. Power Supply	1 1 1	1 1 1	Yes
3	Write and Execute program to demonstrate interfacing of 4 X 4 matrix Key-Board.	a. 8085 microcontroller kit b. Peripheral kits c. Power Supply	1 1 1	1 1 1	Yes
4	Write and Execute program to demonstrate interfacing of multiplexed 7-Segment display.	a. 8085 microcontroller kit b. Peripheral kits c. Power Supply	1 1 1	1 1 1	Yes
5	Write and Execute program to demonstrate interfacing of Liquid Crystal display.	a. 8085 microcontroller kit b. Peripheral kits c. Power Supply	1 1 1	1 1 1	Yes
6	Write and Execute program to demonstrate interfacing of DAC.	a. 8085 microcontroller kit b. Peripheral kits c. Power Supply	1 1 1	1 1 1	Yes

7	Write and Execute program to demonstrate interfacing of ADC.	a. 8085 microcontroller kit b. Peripheral kits c. Power Supply	1 1 1	1 1 1	Yes
8	Write and Execute program to demonstrate interfacing of Stepper Motor.	a. 8085 microcontroller kit b. Peripheral kits c. Power Supply	1 1 1	1 1 1	Yes
9	Write and Execute program to demonstrate Serial data Transmission.	a. 8085 microcontroller kit b. Peripheral kits c. Power Supply	1 1 1	1 1 1	Yes
10	Write and Execute program to demonstrate Serial data Reception.	a. 8085 microcontroller kit b. Peripheral kits c. Power Supply	1 1 1	1 1 1	Yes

A) Facilities for conducting Practicals in the Laboratories

Name of the Course : E & TC Class:- T.E. Subject:- Application Software – II.

Name of the Department / Section :- Electronics and Telecommunication

Subjectwise & laboratorywise Lists of material, machinery, equipment & Instrument required to perform prescribed Practicals

Sr.No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt can be conducted
			Required	Available	
1	To find voltage & current of given network using simulation tool.	PC, ORCAD Software.	01	01	Yes
2	To find transfer / driving point impedance of two port network.	PC, ORCAD Software.	01	01	Yes
3	To design & test active filter.	PC, ORCAD Software.	01	01	Yes
4	To find the pole zero plot of the given network.	PC, MATLAB Software.	01	01	Yes
5	To find the polar / Nyquist plot of the given network.	PC, MATLAB Software.	01	01	Yes
6	To obtain transient response & characteristics of any given network.	PC, ORCAD Software.	01	01	Yes
7	To find the Radiation pattern of antenna &study the effect of varying parameters.	PC, MATLAB Software.	01	01	Yes

A) Facilities for conducting Practicals in the Laboratories

Name of Course : E.& TC Class:- T.E. Subject:- Electronics Measurement.

Name of the Department / Section :- Electronics and Telecommunication

Subjectwise & laboratorywise Lists of material, machinery, equipment & Instrument required to perform prescribed Practicals

Sr.No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt can be conducted
			Required	Available	
1	LCR Q-Meter	a. LCR Q meter Kit. b. Components.	01	01	Yes
2	Study of Digital Multimeter	a. DMM Kit. b. Power Supply. c. Function Generator& Componenets	01 01 01	01 01 01	Yes
3	Frequency Counter	a. CRO. b. Digital Freq Counter. c. Function Generator.	01 01 01	01 01 01	Yes
4	Study of Digital Tachometer	a. Digital Tachometer. b. AC/DC Motor.	01	01	Yes
5	Harmonic Distortion factor meter	a. Distortion factor meter. b. CRO. c. Function Generator	01 01 01	01 01 01	Yes
6	Study of Spectrum Analyzer	a. Spectrum Analyzer. b. Function Generator.	01 01	01 01	Yes Yes
7	To study CRO	a. CRO. b. Function Generator. c. Components.	01 01	01 01	Yes
8	Digital storage oscilloscope	a. DSO. b. Function Generator.	01 01	01 01	Yes

A) Facilities for conducting Practicals in the Laboratories

Name of the Course : E & TC Class:- T.E. Subject:- Electronic Circuit Design.

Name of the Department / Section :- Electronics and Telecommunication

Subjectwise & laboratorywise Lists of material, machinery, equipment & Instrument required to perform prescribed Practicals

Sr.No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt can be conducted
			Required	Available	
1	Design & implementation of series regulated power supply	a. Designed Components b. Multimeter c. CRO	- 1 1	- 1 1	Yes
2	Design &Implementation of single stage inverting amplifier using BJT	a. Function gen b. Single P/S c. Multimeter d. CRO	1 1 1 1	1 1 1 1	Yes

3	Design &Implementation of Single Tuned amplifier using BJT	a. Designing Component b. Single P/S c. Multimeter d. Function Generator e. CRO	- 1 1 1 1	- 1 1 1 1	Yes
4	Design &Implementation of Astable Multivibrator	a. Single P/S b. CRO c. Multimeter	1 1 1	1 1 1	Yes
5	Design & implementation of Schmitt Trigger	a. Designing Component b. Single P/S c. Multimeter d. Function Generator e. CRO	- 1 1 1 1	- 1 1 1 1	Yes
6	Design & implementation of Phase Shift Oscillator	a. Designing Component b. Dual P/S c. Multimeter d. FG e. CRO	- 1 1 1 1	- 1 1 1 1	Yes

Note :- For all above practical consumable component like capacitor, Inductor , Resistor, BJT,IC etc are required which is available as per requirement & the practicals are performed on Bread board

A) Facilities for conducting Practicals in the Laboratories

Name of the Course : E&TC **Class: - T.E.** **Subject:-Power Electronics**

Name of the Department / Section :- Electronics and Telecommunication

Subjectwise & laboratorywise Lists of material, machinery, equipment & Instrument required to perform prescribed Practicals

Sr.No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt can be conducted
			Required	Available	
1	Triggering circuits for SCR using R, RC, firing ckt	a. Kit b. Multimeter c. Powerscope, load(100w)	1 1 1	1 1 1	Yes
2	To study UJT triggering ckt	a. Kit b. Multimeter c. Powerscope, load(100w)	1 1 1	1 1 1	Yes
3	Study of 1- ϕ full controlled bridge converter with R & R-L load	a. Kit b. Multimeter c. Powerscope	1 1 1	1 1 1	Yes
4	Study of I- ϕ Half controlled Bridge with R & R-L Load	a. Kit b. Multimeter c. Powerscope	1 1 1	1 1 1	Yes
5	Study of step-up dc-dc converter	a. Kit b. CRO	1 1	1 1	Yes
6	Study of step-down dc –dc converter	a. Kit b. CRO	1 1	1 1	Yes

7	Study of Series inverter	a. Kit b. CRO	1 1	1 1	Yes
8	Study of parallel inverter	a. Kit b. Multimeter c. CRO d. load(25W)	1 1 1 1	1 1 1 1	Yes
9	DIAC Characteristics	a. Kit b. DMM	1 1	1 1	Yes
10	Study of 1- ϕ AC controller	a. kit b. CRO c. Load(200 W)	1 1 1	1 1 1	Yes

A) Facilities for conducting Practicals in the Laboratories

Name of the Course : E&TC Class:- T.E. Subject:- Feedback Control Systems.

Name of the Department / Section :- Electronics and Telecommunication

Subjectwise & laboratorywise Lists of material, machinery, equipment & Instrument required to perform prescribed Practicals

Sr.No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt can be conducted
			Required	Available	
1	Study of synchros to observe angular displacement	a. Experimental Kit b. Multimeter	01 01	01 01	Yes
2	Study of flow control using PID controller.	a. Experimental Kit b. Multimeter	01 01	01 01	Yes
3	Transient response of RLC electrical network	a. Experimental Kit b. Multimeter c. CRO	01 01 01	01 01 01	Yes
4	Study of stepper motor	Experimental Kit	-	-	Yes
5	Find zeta, wn &Mp of the response to unit step for given system	Matlab Software	-	-	Yes
6	Unit step response of second order syst.	Matlab Software	-	-	Yes
7	Sketch the Bode plot for given system	Matlab Software	-	-	Yes
8	Sketch the Nyquist plot for given system	Matlab Software	-	-	Yes

A) Facilities for conducting Practicals in the Laboratories

Name of Course: E&TC **Class:- B.E.** **Subject:- VLSI Design**.

Name of the Department / Section :- Electronics and Telecommunication

Subjectwise & laboratorywise Lists of material, machinery, equipment & Instrument required to perform prescribed Practicals

Sr. no.	NAME OF PRACTICALS	Name of equipments	Quantity		Whether conducted
			Required	available	
1	Simulation and Implementation Write VHDL code to realize all the logic gates.	a. Computer b. kit	01	01	Yes
2	Simulation and Implementation Write a VHDL program for the following combinational designs a. 2- bit comparator b. 3 to 8 decoder c. 4 to 1 multiplexer d. 4 bit binary to gray converter	a. Computer b. kit	01	01	Yes
3	Simulation and Implementation Write a VHDL code to describe the functions of a Full Adder Using all modeling styles.	a. Computer b. kit	01	01	Yes
4	Simulation and Implementation Develop the VHDL codes for the following flip-flops, SR, D, JK, T.	a. Computer b. kit	01	01	Yes
5	Simulation and Implementation Design 4 bit binary, BCD counters	a. Computer b. kit	01	01	Yes
6	Simulation and Implementation 8 – Bit Left / Right Shift Register.	a. Computer b. kit	01	01	Yes
7	Simulation and Implementation Write a model for 4 bit ALU using the schematic	a. Computer b. kit	01	01	Yes
8	Interfacing : Write VHDL code to control speed, direction of DC and Stepper motor	a. Computer b. kit	01	01	Yes

A) Facilities for conducting Practicals in the Laboratories

Name of Course: E&TC Class:- B.E. Subject:- Digital Signal Processing.

Name of the Department / Section :- Electronics and Telecommunication

Subjectwise & laboratorywise Lists of material, machinery, equipment & Instrument required to perform prescribed Practicals

Sr.No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity each		Whether expt can be conducted
			Required Each	Available Each	
1	To determine the response of the given system for step input signal.	a. Computer b. Code Composer Studio Software	01	01	Yes
2	To determine the response of the given system for Ramp input signal.	c. Computer d. Code Composer Studio Software	01	01	Yes
3	To determine the response of the given system for Impulse input signal.	e. Computer f. Code Composer Studio Software	01	01	Yes
4	To determine the response of given system for linear convolution between two sequences.	g. Computer h. Code Composer Studio Software	01	01	Yes
5	To determine the response of given system for Circular convolution between two sequences.	i. Computer j. Code Composer Studio Software	01	01	Yes
6	To determine the response of given system for discrete fourier transform	k. Computer l. Code Composer Studio Software	01	01	Yes
7	To determine the response of given system for Inverse discrete fourier transform	m. Computer n. Code Composer Studio Software	01	01	Yes
8	To determine the response of given system for Z-transform	o. Computer p. Code Composer Studio Software	01	01	Yes
9	To study the DSP processor & generate the sinusoidal signal by using DSP Processor	a. Computer b. DSP Kit	01	01	Yes

A) Facilities for conducting Practicals in the Laboratories

Name of Course: E&TC Class:- B.E. Subject:- Radiation & Microwave Technique.

Name of the Department / Section :- Electronics and Telecommunication

Subjectwise & laboratorywise Lists of material, machinery, equipment & Instrument required to perform prescribed Practicals

Sr.No	Experiment Title	Name of Equipment, Machinery Instrument etc.	Quantity each	Whether expt can be

		Required to Conduct Experiment	Required	Available	conducted
1	Active device (Gunn diode) characteristics measurement	a. Gunn diode set up b. VSWR meter	01	02	Yes
2	Active device (Reflex klystron) characteristics measurement	a. Reflex klystron set up b. CRO c. VSWR meter	01	02	Yes
3	Study of fixed and variable Attenuator	a. Reflex klystron set up b. Fixed & variable attenuator c. VSWR meter	01	02	Yes
4	Study of circulator and isolator	a. Reflex klystron set up b. Circulator c. Isolator d. VSWR meter	01	02	Yes
5	Study of Microwave junction	a. Reflex klystron set up b. Magic Tee c. VSWR meter	01	02	Yes
6	Study of directional coupler	a. Reflex klystron set up b. Directional coupler c. VSWR meter	01	02	Yes
7	Radiation pattern & Beamwidth of Horn Antenna	a. Horn antenna set up b. VSWR meter	01	02	Yes
8	Frequency &wavelength measurement of reactangular waveguide	a. Reflex klystron set up b. VSWR meter c. CRO	01	02	Yes
9	VSWR Measurement using Double Minima Method	a. Reflex klystron set up b. VSWR meter c. CRO	01	02	Yes

A) Facilities for conducting Practicals in the Laboratories

Name of Course : E&TC Class:- B.E. Subject:- Fiber Optic Communication.

Name of the Department / Section :- Electronics and Telecommunication

Subjectwise & laboratorywise Lists of material, machinery, equipment & Instrument required to perform prescribed Practicals

Sr.No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity each		Whether expt can be conducted
			Required	Available	
1	Electrical characteristics of LED/ID	a. Power supply b. OFC Kit c. CRO d. Ammeter e. voltmeter	01	01	Yes
2	Photometrics characterics of LED/ID	a. Power supply b. OFC Kit c. CRO d. Ammeter e. voltmeter	01	01	Yes

3	Numerical aperture measurment of GI fibre.	a. Power supply b. OFC Kit c. CRO d. Ammeter e. voltmeter	01	01	Yes
4	Attenuation measurment of Fibre.	a. Power supply b. OFC Kit c. CRO d. Ammeter e. voltmeter	01	01	Yes
5	Spectral characteristics of LED/ID	a. Power supply b. OFC Kit c. CRO d. Ammeter e. voltmeter	01	01	Yes
6	Fibre Optics transmitter receiver parameter measurment.	a. Power supply b. OFC Kit c. CRO d. Ammeter e. voltmeter	01	01	Yes
7	Study of fibre optic connectors.	a. Power supply b. OFC Kit c. CRO d. Ammeter e. voltmeter	01	01	Yes
8	Study of PWM	a. OFC Kit b. CRO	01	01	Yes

A) Facilities for conducting Practicals in the Laboratories

Name of Course : E&TC **Class:- B.E.** **Subject:- Telematics**.

Name of the Department / Section :- Electronics and Telecommunication

Subjectwise & laboratorywise Lists of material, machinery, equipment & Instrument required to perform prescribed Practicals

Sr.No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity each		Whether expt can be conducted
			Required	Available	
1	Study of Telephone Exchange	Visit to BSNL	--	--	Yes
2	Study of Mobile Hand Set Demonstrator Model.	Block diagram study	--	--	Yes
3	Study of Teleprinter Demonstrator Model.	Visit to BSNL	--	--	Yes
4	Study of FAX Machine Demonstrator Model.	Fax machine	01	01	Yes
5	Study of EPABX system	EPBX system	01	01	Yes
6	Study of subscriber Instrument set.	Subscriber Instrument set CRO	01	01	Yes
7	Study of cordless Telephone set Demonstrator Model.	Block diagram	--	--	Yes

8	Modem Demonstrator Model.	FSK Modeus kit CRO	01	01	Yes

A) Facilities for conducting Practicals in the Laboratories

Name of Course : E&TC **Class:- B.E.** **Subject:- Embedded Systems.**

Name of the Department / Section :- Electronics and Telecommunication

Subjectwise & laboratorywise Lists of material, machinery, equipment & Instrument required to perform prescribed Practicals

Sr.No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity each		Whether expt can be conducted
			Required	Available	
1	C-programs for interrupts	a. Computer b. ARM 7 Kit	01 01	01 01	Yes
2	Program to demonstrate I2C Protocol.	a. Computer b. ARM 7 Kit	01 01	01 01	Yes
3	Program to interface LCD	a. Computer b. ARM 7 Kit	01 01	01 01	Yes
4	Program to demonstrate RF communication OR Program to implement AT commands and interface of GSM modem	a. Computer b. ARM 9 Kit	01 01	01 01	Yes
5	Writing a scheduler / working with using RTOS for 4 tasks with priority. The tasks may be keyboard, LCD, LED etc. and porting it on microcontroller/ microprocessor.	a. Computer b. ARM 7 Kit	01 01	01 01	Yes
6	Create two tasks, which will print some characters on the serial port, Start the scheduler and observe the behavior.	a. Computer b. ARM 7 Kit	01 01	01 01	Yes Yes
7	Program for exploration of (Process creation, Thread creation) using Embedded Real Time Linux	a. Computer b. ARM 7 Kit	01 01	01 01	Yes
8	Program for exploring Message Queues using Embedded Real Time Linux.	a. Computer b. ARM 9 Kit	01 01	01 01	Yes

A) Facilities for conducting Practicals in the Laboratories

Name of Course:- E&TC Class:- S.E. Subject:- Computer Programming-II.

Name of the Department / Section :- Electronics and Telecommunication

Subjectwise & laboratorywise Lists of material, machinery, equipment & Instrument required to perform prescribed Practicals

Sr.No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt can be conducted
			Required	Available	
1	Installation of Linux (Ubuntu 10.04)	a. PC b. Ubuntu 10.04	01 01	01 01	Yes
2	Study & Execution of Linux Commands	a. PC b. Ubuntu 10.04	01 01	01 01	Yes
3	Program for Arithmatic operations on two digits.	a. PC b. Ubuntu 10.04	01 01	01 01	Yes
4	Program for reverse number	a. PC b. Ubuntu 10.04	01 01	01 01	Yes
5	Program for Matrix multiplication	a. PC b. Ubuntu 10.04	01 01	01 01	Yes
6	Program foe counting digits in given number	a. PC b. Ubuntu 10.04	01 01	01 01	Yes
7	Program to convert Decimal to Binary	a. PC b. Ubuntu 10.04	01 01	01 01	Yes
8	Program to perform bitwise operations	a. PC b. Ubuntu 10.04	01 01	01 01	Yes
9	Program to swap two numbers using pointer	a. PC b. Ubuntu 10.04	01 01	01 01	Yes
10	Program for queue using array	a. PC b. Ubuntu 10.04	01 01	01 01	Yes

A) Facilities for conducting Practicals in the Laboratories

Name of Course:- E&TC Class:- S.E. Subject:- Computer Programming-III

Name of the Department / Section :- Electronics and Telecommunication

Subjectwise & laboratory wise Lists of material, machinery, equipment & Instrument required to perform prescribed Practicals

Sr.No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt can be conducted
			Required	Available	
1	Study of creation of Arrays	a.PC b.MATLAB Software	01 01	01 01	Yes
2	Study of various operations on matrices	a.PC b.MATLAB Software	01 01	01 01	Yes
3	To plot sinusoidal, triangular& square signal	a.PC b.MATLAB Software	01 01	01 01	Yes
4	To find the pole zero plot of the given n/w.	a.PC b.MATLAB Software	01 01	01 01	Yes
5	To find the Polar /Nyquist plot of the given n/w.	a.PC b.MATLAB Software	01 01	01 01	Yes
6	Modelling of any one differential equation	a.PC b.MATLAB Software	01 01	01 01	Yes
7	To find the radiation pattern of antennas & study the effect of varing parameters	a.PC b.MATLAB Software	01 01	01 01	Yes
8	Modelling & Simulation of single pulse rectifier & study the effect of R & RL Load	a.PC b.MATLAB Software	01 01	01 01	Yes

Item No.

A) Facilities for conducting Practicals in the Laboratories

Name of Course:- E&TC Class:- B.E Subject:- Satellite & Mobile Communication.

Name of the Department / Section :- Electronics and Telecommunication

Subjectwise & laboratorywise Lists of material, machinery, equipment & Instrument required to perform prescribed Practicals

Sr. No	Name of Experiment	Name of Equipment	Quantity		Whether expt can be conducted
			Required	Available	

1	To Setup Active Satellite Link	a.DTH	01	01	YES
2	To Understand the Shape of Earth. Measurement of Latitude & Longitude	Demostration kit	01	01	YES
3	Study of Satellite Transponder	Demostration kit	01	01	YES
4	To Understand the Principle of PRN Code in GPS	Demostration kit	01	01	YES
5	Study of GSM Architechture	Demostration kit	01	01	YES
6	Study of GSM AT Commands	a.GSM Kit	01	01	YES
7	Study of Mobile Transmitter & Receiver	a.Demostration kit of Mobile TX & RX	01	01	YES
8	Study of Cordless Telephone	a.Cordless Telephone	01	01	YES

Item No.

A) Facilities for conducting Practicals in the Laboratories

Name of Course:- E&TC Class:- B.E Subject:- Satellite & Mobile Communication.

Name of the Department / Section :- Electronics and Telecommunication

Subjectwise & laboratorywise Lists of material, machinery, equipment & Instrument required to perform prescribed Practicals

Sr. No	Name of Experiment	Name of Equipment	Quantity		Whether expt can be conducted
			Required	Available	
1	To Setup Active Satellite Link	a.DTH	01	01	YES
2	To Understand the Shape of Earth. Measurement of Latitude & Longitude	Demostration kit	01	01	YES
3	Study of Satellite Transponder	Demostration kit	01	01	YES
4	To Understand the Principle of PRN Code in GPS	Demostration kit	01	01	YES
5	Study of GSM Architechture	Demostration kit	01	01	YES
6	Study of GSM AT Commands	a.GSM Kit	01	01	YES
7	Study of Mobile Transmitter & Receiver	a.Demostration kit of Mobile TX & RX	01	01	YES
8	Study of Cordless Telephone	a.Cordless Telephone	01	01	YES

APPENDIX-15

ELECTRICAL ENGINEERING DEPARTMENT

A) Facilities for conducting Practicals in the Laboratories

Name of the Department / Section :-

Subject wise & laboratory wise Lists of material, machinery, equipment & Instrument required to perform prescribed Practical

Name of Course: Electrical Engineering Class- FE Sem-I

Subject:- Introduction of Electrical Engg.

S.N.	Experiment Title	Name of Equipment, Machinery, Instrument required to Conduct Experiment	Quantity		Whether Experiment can be conducted
			Required	Available	
1	Study and representation of electrical components / equipment's	Electrical equipment Multimeter	01 01	01 01	Yes
2	Verification of Thevenin's theorems.	Thevenin's kit Connecting wires Multimeter Voltmeter Ammeter resistor Power supply	01 01 01 01 01 01	01 01 01 01 01 01	Yes
3	Verification of Superposition theorems.	Superposition kit Connecting wires Voltmeter Ammeter resistor Multimeter Power supply	01 01 01 01 01 01	01 01 01 01 01 01	Yes
4	Verification of Maximum power transfer theorems.	Maximum power transfer kit Connecting wires Multimeter Voltmeter Ammeter resistor Power supply	01 01 01 01 01 01	01 01 01 01 01 01	Yes
5	Measurement of current, voltage and power in R-L series exited by single phase AC supply.	Inductive load Resistive load Single phase dimmerstat	01 01 01	01 01 01	Yes
7	Measurement of power in single-phase circuit.	1 phase load Wattmeter Ammeter Voltmeter Connecting wires	01 01 01 01	01 01 01 01	Yes
8	Measurement of power in three-phase circuit.	3 phase load Wattmeter Ammeter Voltmeter Connecting wires	01 01 01 01	01 01 01 01	Yes

9	Determination of transformation ratio of a single-phase transformer. .	1 phase transformer 1 phase dimmerstat Ammeter Voltmeter Connecting wires	01 01 01 01	01 01 01 01	Yes
10	Measurements of light output in lumens and energy bill calculation for different lamps.	Lamps Ac supply Lux meter	04 01 01	04 01 01	Yes
11	Study of MCB, RCCB and ELCB.	study	01	01	Yes
12	Study of different earthing systems	study	01	01	Yes

A) Facilities for conducting Practicals in the Laboratories

Name of the Department / Section :-

Subject wise & laboratory wise Lists of material, machinery, equipment & Instrument required to perform prescribed Practical

Name of Course: Electrical Engineering Class- SE Sem-I

Subject- Electrical Workshop

S.N.	Experiment Title	Name of Equipment, Machinery, Instrument required to Conduct Experiment	Quantity		Whether Experiment can be conducted
			Required	Available	
1	Study of different electrical symbols.	Electrical Symbol Charts	01	01	Yes
2	Electrical shocks and safety precautions	Safety precautions charts	01	00	Yes
3	Study of different Cables: a. Classification of cable, Types of three Phase cable b. Cable standards and specifications c. Insulating materials for cables, Cable joining d. Coaxial cable, twisted pair cable, Flat ribbon cable.	Different types of Cables as a study Practical	--	--	Yes
4	Study of different wires a. Size selection of wires b. Standard wires TRC and CTS wires c. Weather proof wires, Flexible wires.	TRC Wires CTS Wires Weather proof wires Flexible wire	01 01 01 01	00 00 01 01	Yes
5	Study of wiring accessories a. Types of switches	Switch Lamp holder Ceiling rose	01 01 01	01 01 01	Yes

	b. Types of lamp holders, ceiling rose, mounting blocks, socket outlets plugs, wooden boards c. main switches (ICDP/ICTP/MCB), Junction boxes, Distribution boxes, fuse boards.	Socket outlet plugs Wooden boards ICDP/ICTP Distribution boxes Fuse	01 01 01 01 01	01 01 01 01 01	
6	Study and use of: a. DC/AC voltmeter and ammeter. b. Analog multi-meter and Digital multi-meter for the measurement of electrical quantities. c. Megger, Clip-on meter. d. Power factor meter.	Dc voltmeter Ac voltmeter analog multimeter digital multimeter Megger Power Factor Meter	01 01 01 01 01 01	01 01 01 01 01 01	Yes Yes Yes Yes
7	Domestic wiring and Lamp circuits a. Simple circuit, series and parallel circuit, b. Fluorescent lamp circuits, domestic switch board wiring.	Wires Switch Lamps Lamp holder Fuse	01 01 01 01 01	01 01 01 01 01	Yes
8	Industrial visit	Visit Substation Electrical workshops Industries	Visit	Visit	Yes

Name of Course: Electrical Engineering Class- SE Sem –I

Subject- Electrical Measurement- I

S.N.	Experiment Title	Name of Equipment, Machinery, Instrument required to Conduct Experiment	Quantity		Whether Experiment can be conducted
			Required	Available	
1	Measurement of active power in three phase circuit by two wattmeter method.	3 Ph power supply ammeter, voltmeter, Wattmeter, Load	01 01 01 02 01	02 01 01 02 01	Yes
2	Measurement of reactive power by two wattmeter and single wattmeter.	3 Ph power supply ammeter, voltmeter, Wattmeter, Load	01 01 01 02 01	02 01 01 02 01	Yes

3	Calibration of single phase Energy meter at different. Power factor	1 Phase Energy meter, ammeter, voltmeter, Wattmeter Load	01 01 01 01 01	01 01 01 01 01	Yes
4	Calibration of three phase two element energy meter at different P.F.'s.	3 Phase Energy meter, ammeter, voltmeter, Wattmeter, Load	01 01 01 01 01	01 01 01 01 01	Yes
6	Kelvin's double bridge: Measurement of low resistance.	Kelvin Bridge Kit, Multimeter	01 01	01 01	Yes
7	Measurements of phase angle error and ration error of current Transformer	Phase angle error and ratio error measurement kit	01	01	Yes
8	Measurements of phase angle error and ration error of Potential Transformer.	Phase angle error and ratio error measurement kit	01	01	Yes
9	Epstein Squire	Epstein Squire	01	00	No
10	Measurement of Earth Resistance	Earth Testing Kit	01	01	Yes
11	Measurement of insulation resistance by Megger	Megger	01	01	Yes

Name of Course: Electrical Engineering Class- SE Sem-I

Subject- Electrical Engineering Material

S.N.	**Experiment Title**	**Name of Equipment, Machinery, Instrument required to Conduct Experiment**	**Quantity**		**Whether Experiment can be conducted**
			Required	**Available**	
1	Testing of Insulating Oil as per IS	Oil testing Set	01	01	Yes
2	Testing of Solid Insulating Material as per IS	Solid Insulating Kit Material	01 01	01 01	Yes
3	Testing of Power Capacitor as per IS	3 Phase Induction Motor Power Capacitor Wattmeter AC Ammeter AC Voltmeter Belt and Balance set	01 01 02 01 01 01	01 01 02 01 01 01	Yes
4	Measurement of resistivity of conducting Materials	Conducting wire AC Ammeter Multimeter Load Bank	01 01 01 01	01 01 01 01	Yes
5	Measurement of resistivity of resistive Material	Resistive wire AC Ammeter	01 01	01 01	Yes

		Multimeter Load Bank	01 01	01 01	
6	To Study Seeback and Peltier effects	Seeback & Peltier Kit	01	00	No
7	Study of Hysterias Loop of Ferromagnetic material s	DC Shunt motor Generator set DC Ammeter DC Voltmeter Speedometer	01 01 01 01	01 01 01 01	Yes
8	Study of various insulating materials	Various Insulating Material	03	03	Yes

Name of Course: Electrical Engineering Class- SE Sem-II

Subject - CP/ MATLAB.

S.N.	**Experiment Title**	**Name of Equipment, Machinery, Instrument required to Conduct Experiment**	**Quantity**		**Whether Experiment can be conducted**
			Required	**Available**	
1	Bisection method program	Computer C –Compiler Printer	01 01 01	01 01 01	Yes
2	Secant method prgram	Computer C –Compiler Printer	01 01 01	01 01 01	Yes
3	Newton raphson method program	Computer C –Compiler Printer	01 01 01	01 01 01	Yes
4	Gauss elimination method program	Computer C –Compiler Printer	01 01 01	01 01 01	Yes
5	Gauss seidal method program	Computer C –Compiler Printer	01 01 01	01 01 01	Yes
6	Simpson`s 1/3 rd and 3/8 th rule program.	Computer C –Compiler Printer	01 01 01	01 01 01	Yes
7	Arithmetic operations on matrix using MATLAB.	Computer Matlab Software Printer	01 01 01	01 01 01	Yes
8	Plot the simple, 2-D and 3-D plots using MATLAB.	Computer Matlab Software Printer	01 01 01	01 01 01	Yes
9	Finding roots of polynomial using MATLAB.	Computer Matlab software Printer	01 01 01	01 01 01	Yes
10	Find eigen values and eigenvectors, LU factorization.	Computer Matlab software Printer	01 01 01	01 01 01	Yes

Name of Course: Electrical Engineering Class- SE Sem-II
Subject- Analog and Digital Electronics

S.N.	Experiment Title	Name of Equipment, Machinery, Instrument required to Conduct Experiment	Quantity		Whether Experiment can be conducted
			Required	Available	
1	Op-amp as square & sine wave generator using IC 741.	1. CRO 2.Dual Power Supply 3. kit	01 01 01	01 01 01	Yes
2	Op-amp as comparator & Schmitt trigger IC 741.	1. CRO 2.Function Generator 3. Dual Power Supply 4.Multimeter	01 01 01 01	01 01 01 01	Yes
3	Instrumentation amplifier using 3 Op-amps	1. CRO 2.Function Generator 3. Dual Power Supply 4.Multimeter	01 01 01 01	01 01 01 01	Yes (performed on bread board)
4	IC 555 application – Astable, Monostable, Square wave generator, Square counter.	1. CRO 2.Function Generator 3.Power Supply 4.Multimeter	01 01 01 01	01 01 01 01	Yes (performed on bread board)
5	Study of IC 723 as low / high voltage regulator	1. CRO 2.Function Generator 3.Power Supply 4.Multimeter	01 01 01 01	01 01 01 01	Yes (performed on bread board)
6	IC 7805 used as fixed voltage regulator, elevated voltage and current, constant current source	1. CRO 2.Function Generator 3.Power Supply 4.Multimeter	01 01 01 01	01 01 01 01	Yes (performed on bread board)
7	Study of JK flip flop IC 7476.	1. CRO 2.Function Generator 3.Power Supply 4.Multimeter	01 01 01 01	01 01 01 01	Yes (performed on bread board)
8	Study of binary counter using IC 7493	1.CRO 2.Function Generator 3.Power Supply 4.Multimeter	01 01 01 01	01 01 01 01	Yes (performed on bread board)

Name of Course: Electrical Engineering Class- SE Sem-II

Subject:- Network Analysis

Sr. No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt. can be conducted
			Required	Available	
1	Verifications of Thevenin's Theorem for two port network.	A 470 ohm resistor B 680 ohm resistor C multimeter D connecting probes	2 1 2	2 1 2	Yes
2	Verification of Norton's Theorem for two port network.	A 470 ohm resistor B 680 ohm resistor C multimeter D connecting probes E dual power supply	2 1 2 1	2 1 2 1	Yes
3	Verification of Superposition Theorem for two port network.	A 470 ohm resistor B 680 ohm resistor C multimeter D connecting probes E dual power supply	2 1 2 2	2 1 2 2	Yes
4	Pole & Zero plot of one port network	Study	--	--	Yes
5	Measurement of Z-parameter of two port network	A 470 ohm resistor B 680 ohm resistor C multimeter D connecting probes E dual power supply	2 1 2 1	2 1 2 1	Yes
6	Measurement of Y-parameter of two port network	A 470 ohm resistor B 680 ohm resistor C multimeter D connecting probes E dual power supply	2 1 2 1	2 1 2 1	Yes
7	Measurement of ABCD-parameter of two port network	A 470 ohm resistor B 680 ohm resistor C multimeter D connecting probes E dual power supply	2 1 2 1	2 1 2 1	Yes
8	To plot frequency response of series RLC circuit.	A 470 ohm resistor B 680 ohm resistor C multimeter D connecting probes E dual power supply	2 1 2 1	2 1 2 1	Yes

9	To plot frequency response of parallel RLC circuit.	A 470 ohm resistor B 680 ohm resistor C multimeter D connecting probes E dual power supply	2 1 2 1	2 1 2 1	Yes
10	Study of filters	Study			Yes

Name of Course: : Electrical Engineering Class- SE Sem-II

Subject- Electrical Machines-I

S.N.	Experiment Title	Name of Equipment, Machinery, Instrument required to Conduct Experiment	Quantity		Whether Experiment can be conducted
			Required	Available	
1	Determination of magnetization, external , internal characteristics and critical field resistance of d. c. shunt generator	DC Shunt Generator DC Shunt Motor Set DC Ammeter DC Voltmeter Rheostats Speedometer Load Bank	01 02 01 02 01 01	01 02 01 02 01 01	Yes
2	Determination of external characteristics of d.c. compound generator as i) differential compound, ii) cumulative compound generator.	DC Compound Generator DC Shunt Motor Set DC Ammeter DC Voltmeter Rheostats Speedometer Load Bank	01 02 01 02 01 01	01 02 01 02 01 01	Yes
3	Speed control of D.C shunt motor by armature and field control.	DC Shunt Motor DC Ammeter DC Voltmeter Rheostats Speedometer	01 02 01 02 01	01 02 01 02 01	Yes
4	i) Study of 3 and 4 point starters. ii) Reversal of motor rotation of D. C. motor.	3 and 4 point Starters Rheostats Speedometer	02 02 01	02 02 01	Yes
5	Determination of performance characteristic of DC series motor by direct load.	DC Series Generator Generator Set DC Ammeter DC Voltmeter Rheostats Speedometer Load Bank	01 02 01 02 01 01	01 02 01 02 01 01	Yes
6	Swinburne's test on DC shunt Motor: Determination of losses & efficiency.	DC Shunt Motor DC Ammeter DC Voltmeter	01 02 01	01 02 01	Yes

		Rheostats Speedometer	02 01	02 01	
7	Polarity and Ratio test on single phase transformer/three phase transformer.	1 Ph Transformer 3 Ph transformer AC Ammeter AC Voltmeter 1 Phase auto transformer	01 01 02 02 01	01 01 02 02 01	Yes
8	Determination of performance of single phase transformer by direct load test.	1 Ph Transformer Load bank AC Ammeter AC Voltmeter Wattmeter	01 01 02 02 01	01 01 02 02 01	Yes
9	Determination of performance of single phase transformer by conducting Open circuit and short circuit test.	1 Ph Transformer AC Ammeter AC Voltmeter Wattmeter 1 Phase auto transformer	01 02 02 01 01	01 02 02 01 01	Yes
10	Parallel operation of two single phase transformer.	1 Ph Transformer AC Ammeter AC Voltmeter Wattmeter 1 Phase auto transformer	02 02 02 01 01	02 02 02 01 01	Yes
11	Study of phaser and vector group of three phase transformer.	3 Phase transformer	01	01	Yes
12	Scott connection of two single phase transformer on no load and at balanced load.	1 Ph Transformer AC Ammeter AC Voltmeter Wattmeter 1 Phase auto transformer	02 02 02 01 01	02 02 02 01 01	Yes

Name of Course: Electrical Engineering Class- SE Sem-IV

Subject- Electrical Installation, Estimation and Distribution

S.N.	Experiment Title	Name of Equipment, Machinery, Instrument required to Conduct Experiment	Quantity		Whether Experiment can be conducted
			Required	Available	
1	Transmission line components : Five insulators –one piece pin, three piece pin type , suspension insulator (one disc) string insulator (one disc), shackle insulator; towers for single circuit and double circuit lines; lightening arrestor,	Study & Drawing Sheets	--	--	Yes

	stays, clamps, pin; typical pole including service mains, HT, LT lines supporting pole ‘H’ type pole.				
2	Distribution substation; Two views (front view and side view) of distribution substation layout ; single line diagram, pipe earthing , plate earthing.	Study & Drawing Sheets	--	--	Yes
3	Wiring diagrams and symbols: minimum 25 symbols as per IS standards. Any one circuit diagram out of the following: 1) Rotor resistance starter, 2) Automatic star /delta starter, 3)Maximum demand indicator.	Study & Drawing Sheets	--	--	Yes
4	Project on illumination design of laboratory / workshop or small scale industrial establishment along with estimation.	Study & Drawing Sheets	--	--	Yes
5	Project on electrification of given area showing distributors, feeders and substations. The drawing sheet along with report on each topics.	Study & Drawing Sheets	--	--	Yes

A) Facilities for conducting Practicals in the Laboratories

Name of the Department / Section: - Electrical
Subject wise & laboratory wise Lists of material, machinery, equipment & Instrument required performing prescribed Practical

Name of Course: Electrical Engineering Class- TE Sem-I

Subject:- Electrical Machine -II

Sr. No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt. can be conducted
			Required	Available	
1	Determination of voltage regulation and efficiency of three phase alternator by direct load test.	D.C. Shunt Motor as P.M. Ammeter (0-10A) Voltmeter (0-600V) Lamp bank as Resistive Load Tachometer D.C. Ammeter (0-1A) Rheostats (800,1.2A)	1 1 1 1 1 1 2	1 1 1 1 1 1 2	Yes
2	Open and short circuit test on three phase alternator: determination of its regulation by e.m.f. method and m.m.f. method.	D.C. Shunt Motor as P.M./3Ph. Synchronous. Motor as P.M. Ammeter (0-10A) Voltmeter (0-600V) Lamp bank as Resistive Load Tachometer D.C. Ammeter (0-1A) Rheostats (800,1.2A)	1 1 1 1 1 1 2	1 1 1 1 1 1 2	Yes
3	Zero power factor test on three phase alternator: determination of regulation by Potier trangle method.	D.C. Shunt Motor as P.M. Ammeter (0-10A) Voltmeter (0-600V) 3Ph inductive load Tachometer D.C. Ammeter (0-1A) Rheostat (800,1.2A)	1 1 1 1 1 1 2	1 1 1 1 1 1 2	Yes
4	Determination of direct axis and quadrature axis reactance by slip test on synchronous machine. Determination of voltage regulation by two reactance theory.	Dc shunt motor as PM 3Ph Auto Transformer (10A,600V) Voltmeter (0-600V) Ammeter (0-5A) Tachometer	1 1 1 1 1	1 1 1 1 1	Yes
5	Synchronizing alternators: lamp methods and use of synchroscope.	Practical set of Synchronous machine on infinite bus including synchronscope	1	1	Yes

6	Synchronous alternator on infinite bus: behavior of machine under change in mechanical power and excitation	Practical set of Synchronous machine on infinite bus including synchronscope	1	1	Yes
7	Characteristic of synchronous motor at constant load and variable excitation.	3Ph alternator as load on synchronous motor ammeter(0-10A) Voltmeter(0-600V) DC ammeter (0-2A) Rheostats (400,1.2A) 2 Wattmeter(600V/10A) Synchronous motor with direct loading arrangment and Synchronising pannel	1 1 1 1 1 2 1	2 1 1 1 1 1	Yes Yes
8	Characteristic of synchronous motor at constant excitation and variable load.	Voltmeter (0-300V) Ammeter (0-10A) 1ph Auto transformer (10A/270V) Alt as a load Synchronous motor with direct loading arrangment and Synchronising pannel	1 1 1 1 1	1 1 1 1 1	Yes Yes
9	Determination of performance of three phase induction motor by direct load test.	3 Ph Auto transformer Voltmeter Ammeter Wattmeter Tachometer Brake Load	01 01 01 02 01 01	01 01 01 02 01 01	Yes
10	Determination of performance of three phase induction motor by no load, blocked rotor test and construction of circle diagram.	3 Ph Auto transformer Voltmeter Ammeter Wattmeter Tachometer	01 01 01 02 01	01 01 01 02 01	Yes
11	No load and blocked rotor tests on capacitor start single phase induction motor and determination of parameters of equivalent circuit.	Voltmeter(0-300V) Ammeter(0-10A) 1 ph Auto transformer Wattmeter(300V/10A	1 1 1 1	1 1 1 1	Yes
12	Load test on single phase induction motor.	Voltmeter(0-300V) Ammeter(0-10A) Auto transformer Wattmeter(300V/10A	1 1 1 1	1 1 1 1	Yes

13	Speed control of three phase Slip Ring Induction Motor.	3 ph Slip Ring Induction motor Voltmeter Ammeter Tachometer	1 1 1 1	1 1 1 1	Yes

Name of Course: Electrical Engineering Class- TE Sem-V

Subject:-Power System II

Sr. No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt. can be conducted
			Required	Available	
1	Measurement of ABCD parameters of a medium transmission line.	Medium Transmission Line Kit	1	1	Yes
2	Measurement of ABCD parameters of a long transmission line.	400Km Transmission line study unit	1	1	Yes
3	Plotting of receiving end circle diagram to evaluate performance of medium transmission line.	Medium Transmission Line Kit	1	1	Yes
4	Study of the effect of VAR compensation on the profile of receiving end voltage using capacitor bank.	DC shunt motor or synchronous. Motor as PM Voltmeter (0-600V) Ammeter(0-10A) Capacitor bank	1 2 2 1	1 2 2 1	Yes
5	Static measurement of sub-transient reactance of a salient-pole alternator.	Synchronous Generator coupled with motor Ammeter(0-10A) 1ph Auto transformer	1 1 1	1 1 1	Yes
6	Measurement of sequence reactance of a synchronous machine	3 ph synchronous motor 3 ph synchronous generator wattmeter voltmeter ammeter 1 ph transformer	1 1 2 1 1 1	1 1 2 1 1 1	Yes
7	Determination of steady state power limit of a transmission line.	400Km Transmission line study unit	1	1	Yes
8	Unsymmetrical fault analysis for LL,LG, LLG FAULT ON A.C / D.C network analyzer	400Km Transmission line study unit	1	1	Yes

9	Formulation and calculation of Y- bus matrix of a system using software.	Computer 400Km Transmission line study unit	1 1	1 1	Yes
10	Solution of a load flow problem using Gauss-Seidal method using a software.	Computer Matlab software	1 1	1 1	Yes
11	Solution of a load flow problem using Newton-Raphson method using software.	Computer Matlab software	1 1	1 1	Yes
12	Unsymmetrical fault analysis of a 3-bus system using a software.	Computer Matlab software	1 1	1 1	Yes
13	Calculation of inductance and capacitance for symmetrical and unsymmetrical configuration of transmission line using software.	Computer Matlab software	1 1	1 1	Yes

Name of Course: Electrical Engineering Class- TE Sem-I

Subject:-Power Electronics

Sr. No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt. can be conducted
			Required	Available	
1	Triggering Circuit of SCR	Triggering circuit of SCR	01	01	YES
2	Commutation circuit class C, class D	Commutation circuit class C & class D	01	01	YES
3	Single phase full wave controlled rectifiers R, R-L characters tics	Single phase full wave controlled rectifiers R, R-L, LOAD CHAR	01	01	YES
4	Single phase semi-converter	Single phase semi converter	01	01	YES
5	Three phase full wave controlled rectifiers	Three phase full wave controlled rectifiers	01	01	YES
6	Step up chopper	Step up chopper	01	01	YES
7	Step down chopper	Step down chopper	01	01	YES
8	Series and parallel inverter	Series inverter & Parallel inverter	01	01	YES
9	Three phase inverter	Three phase inverter. MOSFET	01	01	YES

Name of Course: : Electrical Engineering Class- TE Sem-I

Subject:-Electrical and Electronics Workshop

Sr.No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt. can be conducted
			Required	Available	
1	Details and Layout of DC Armature Windings.	Study & DC Machine Cross Section Demonstration	01	01	Yes
2	Details and Layout of AC Armature Windings.	Study & AC Machine Cross Section Demonstration	01	01	Yes
3	Study of substation equipment: a. Classification and use of Lightening arrester b. Different type of isolators. c. Substation earthing	Visit to Substation to study substation equipment and study	--	--	Yes
4	Transformer a. Standard rating, vector group of power transformer. b. Standard rating of instrument transformer a. Class of accuracy for instrument transformer.	Study & Model of 3 phase, 315 kVA, 11/0.433Kv, 50 Hz Distribution Transformer and Instrument Transformer	01	01	Yes
5	Study of Starters: a. Three phase induction motor starter. b. Study of three phase induction motor reverse forward starter.	Study and model of three phase starter	01	01	Yes
6	Study of different contactor ,relay and timer with switching demonstration.	Model of Different relays & as a Study Practical	01	01	Yes
7	Study of automatic star delta and soft starter for three phase induction motor.	As a Study Practical	--	--	Yes
8	Study and Testing of: a. Diode b. BJT c. MOSFET d. IGBT	As a Study Practical & multimeter	01	01	Yes
9	Study of Electronic ballast and fan regulator:	Demonstration	--	--	Yes

Name of Course: : Electrical Engineering Class- TE Sem-I

Subject:-Software Application-I

Sr. No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt. can be conducted
			Required	Available	
1	A. Simple Arithmetic Calculation: Perform simple arithmetic calculations:Addition, subtraction, multiplication, division and exponentiation. B. Assign values to variables. C. Suppress screen output. D. Control the appearance of floating point numbers on the screen.	Computer Matlab Printer	1 1 1	1 1 1	Yes
2	A. Compute the Y-Coordinates of line with given slope m and the intercept c at the x coordinates. B. Create a vector t with 10 elements: 1, 2, 3,……., 10 and compute the following quantities: X= t sin(t), Y=(t-1)/(t+1), Z=sin(t2)/ t2 C. Create Matrices, Vectors for finding the size of matrices and perform the addition, subtraction, multiplication, transpose and inverse operation.	Computer Matlab Printer	1 1 1	1 1 1	Yes
3	Create : Simple sine plot, line plot, an exponentially decaying sine plot, space curve, log scale plot, Overlay plot and Fancy plots.	Computer Matlab Printer	1 1 1	1 1 1	Yes
4	Create Polynomial curve fit and compare different fits.	Computer Matlab Printer	1 1 1	1 1 1	Yes

5	A. Create a line along with an explicit handle and then use set command to change the line style, its thickness, and values of some y-coordinates. B. Write some text at a specified position, create its handle, and then use the set command to change the font size, font, and string of the text.	Computer Matlab Printer	1 1 1	1 1 1	Yes
6	Study of different types of errors.	Study			Yes
7	Write program to find voltage and power in voltage divider circuit.	Computer Matlab Printer	1 1 1	1 1 1	Yes
8	Write a program to calculate voltage across any resistance in a circuit.	Computer Matlab Printer	1 1 1	1 1 1	Yes
9	Write a program to find transient response in RC circuit.	Computer Matlab Printer	1 1 1	1 1 1	Yes
10	Write a program to find transient response in RL circuit.	Computer Matlab Printer	1 1 1	1 1 1	Yes
11	Write a program to plot voltage and current in resistive circuit.	Computer Matlab Printer	1 1 1	1 1 1	Yes
12	Write a program to plot voltage and current in inductive and capacitive circuit.	Computer Matlab Printer	1 1 1	1 1 1	Yes

Name of Course: : Electrical Engineering Class- TE Sem-II

Subject:-Control System I

Sr. No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt. can be conducted
			Required	Available	
1	To determine Speed Torque characteristic of an AC Servomotor.	Ac servo motor kit,Multimeter	1 1	1 1	Yes

2	To study potentiometer as an error detector.	Potentiometer kit, Multimeter	1 1	1 1	Yes
3	To determine time response of second order control system	Second order system kit, Multimeter,CRO	1 1 1	1 1 1	Yes
4	To determine speed-torque characteristics of dc servomotor.	dc servo motor kit tachometer multimeter	1 1 1	1 1 1	Yes
5	Study of PID controller	PID controller CRO 	1 1	1 1	Yes
6	To study synchro-transmitter and receiver and obtain output V/S input Characteristics.	Kit of Synchros, Multimeter	1 1	1 1	Yes
7	To Study Stepper Motor.	stepper motor Tachometer Multimeter	1 1 1	1 1 1	Yes
8	To determine time domain response of a second order system for step input obtains performance parameters by using software.	Matlab Software	1	1	Yes
9	To plot root locus diagram of an open loop transfer function and determine range of gain ‘k’ for stability by using software.	Matlab Software	1	1	Yes
10	To plot a Bode diagram of an open loop transfer function by using software.	Matlab Software	1	1	Yes

Name of Course: : Electrical Engineering Class- TE Sem-II

Subject:-Electrical Measurement -II

Sr. No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt. can be conducted
			Required	Available	
1	Strain Measurement using strain gauge	strain Gauge measurement kit & Weights	1	1	Yes
2	Study of CRO & its different types and applications	CRO Function generator Probes	1 1 2	1 1 2	Yes

3	Measurement of temperature by RTD/Thermocouple.	Heater RTD Thermocouple Multimeter	1 1 1 1	1 1 1 1	Yes
4	Study of pressure transducer	pressure transducer kit compressor	1 1	1 1	Yes
5	Study of recorder	Strip chart recorder	1	1	Yes
6	Study of LVDT	LVDT Transducer unit with controller CRO Probes	1 1 3	1 1 3	Yes
7	Measurement of inductance by Andersons Bridge.	a. KIT Anderson b. Headphone	1 1	1 1	Yes
8	Measurement of capacitance and loss angle of capacitor by Schering bridge	Schering Kit multimeter	1 1	1 1	Yes
9	Step response of meter				No
10	Measurement of systematic errors of wattmeter.				No

Name of Course: Electrical Engineering Class- TE Sem-II

Subject:-Microprocessor and Microcontroller

Sr. No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt. can be conducted
			Required	Available	
1	Study of architecture and instructions of 8085 along with opcodes.	8085 micro-controller kit	-	-	YES
2	Study of architecture & instructions of 8051	8051 micro-controller kit	-	-	YES
3	8255 interfacing	8255Kit	02	02	YES
4	Memory interfacing	Study			YES
5	Microprocessor 8085 assembly language programs based on data transfer instruction	8085 Microprocessor Kit with 7 segment LED display	05	06	YES
6	Microprocessor 8085 assembly language programs based on arithmetic instruction	8085 Microprocessor Kit with 7 segment LED display	05	06	YES
7	Microprocessor 8085 assembly language programs based on logical instruction	8085 Microprocessor Kit with 7 segment LED display	05	06	YES

8	Applications of micro processor 8085 in Electrical drives and speed control for stepper motor.	Stepper Motor Kit	02	02	YES
9	Microcontroller 8051 assembly language programs based on data transfer instruction.	8051 Simulator	PC	PC	Yes
10	Microcontroller 8051 assembly language programs based on arithmetic and logical instructions.	8051 Simulator	PC	PC	Yes

Name of Course: Electrical Engineering Class- TE Sem-II

Subject: Software Application-II

Sr. No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt. can be conducted
1	Build a simple circuit with power system blocks and connect it to other Simulink blocks.	Computer Matlab Software Printer	01 01 01	01 01 01	Yes
2	Use the Powergui block and analyze static and frequency-domain response.	Computer Matlab Software Printer	01 01 01	01 01 01	Yes
3	Create an electrical subsystem, and discretize simple circuits.	Computer Matlab Software Printer	01 01 01	01 01 01	Yes
4	Single phase fully controlled converter using R and RL load using MATLAB/SIMULINK	Computer Matlab Software Printer	01 01 01	01 01 01	Yes
5	Single phase AC voltage regulator using MATLAB/SIMULINK	Computer Matlab Software Printer	01 01 01	01 01 01	Yes
6	Formation of Y bus matrix by inspection / analytical method using MATLAB Software	Computer Matlab Software Printer	01 01 01	01 01 01	Yes
7	Gauss Seidal load flow analysis using MATLAB Software	Computer Matlab Software Printer	01 01 01	01 01 01	Yes

8	Newton Raphson method of load flow analysis using MATLAB Software	Computer Matlab Software Printer	01 01 01	01 01 01	Yes

A) Facilities for conducting Practicals in the Laboratories

Name of the Department / Section: - Electrical

Subject wise & laboratory wise Lists of material, machinery, equipment & Instrument required performing prescribed Practical

Name of Course: Electrical Engineering Class- BE Sem-I

Subject: Industrial Drives and Control

Sr. No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt. can be conducted
			Required	Available	
1	Determination of Speed Torque characteristic of d.c motor controlled using single phase half controlled rectifier.	½ HP D.C Shunt Motor With Loading arrangement	1	1	Yes
2	Determination of Speed Torque characteristic of d.c motor controlled using single phase fully controlled rectifier.	½ HP D.C Shunt Motor With Loading arrangement	1	1	Yes
3	Performance analysis of one quadrant chopper control of d.c motor.	½ HP D.C Shunt Motor With Loading arrangement	1	1	Yes
4	Performance analysis of two quadrant chopper control of d.c motor.	½ HP D.C Shunt Motor With Loading arrangement	1	1	Yes
5	Speed control of single phase induction motor using ac voltage regulator.	1 HP Single Phase Induction motor.	1	1	Yes
6	Study of stepper motor drive circuit	Stepper Motor 2 phase , 3.5 Kg-cm, 12 volt	1	1	Yes
7	Speed control Universal motor	FHP AC/DC Universal Motor	1	1	Yes
8	Study of closed loop control of DC motor.	½ HP D.C Shunt Motor	1	1	Yes

9	Study of Vector control method for induction motor	3 HP/2.2 KW, 415 volt , 4 Pole , 50 Hz, 1440 RPM Induction Motor	1	1	Yes

Name of Course: : Electrical Engineering Class- BE Sem-I

Subject:- High Voltage Engineering.

Sr. No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt. can be conducted
			Required	Available	
1	Measurement of insulation resistance of 11KV/110 V.P.T by Megger.	Megger	1	1	Yes
2	Power frequency withstand test on 11KV, 10/5 amp CT.	--	--	--	No
3	Study of Corona Discharge	50 KVA C/70 KV DC HV testing kit corona cage 2-0-50 KV HV Transformer 3-0-70 KV Rectifier 4-0-70 KV Filter 5-Bedding Resistor (0-90 KV)	1 1 1 1 1	1 1 1 1 1	Yes
4	Determination of insulation break-down strength of solid, Liquid and gaseous dielectric media	Insulation Tester Set & Oil Tester	1	1	Yes
5	Power frequency high voltage withstand test on cable	--	--	--	No
6	Study of Impulse Generator	As Study Experiment	-	-	Yes
7	Dry & wet power freq. With stand test on insulator	HV testing kit 0-50 KV AC Transformer Insulator Artificial raining sys.	1 1 1 1	1 1 1 1	Yes
8	Flashover test on insulator	As a study experiment	1	1	Yes
9	Double voltage Double freq. With stand test on transformer.	Double voltage, double freq. Kit Transformer	1 1	1	Yes
10	Calibration of sphere gap	HV testing kit 0-50 KVAC HV transformer Sphere gap assembly	1 1 1	1 1 1	Yes

11	Study of 100KV high voltage testing set.	high voltage testing Kit	1	1	Yes

Name of Course: Electrical Engineering Class- BE Sem-I

Subject:-Industrial Electrical Engineering.

Sr. No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt. can be conducted
			Required	Available	
1	Performance characteristics of DC Series motor by load test.	DC shunt generator as load on DC motor Voltmeter (0-300V) Ammeter (0-10A) tachometer	1 1 1 1 1	1 1 1 1 1	Yes
2	Performance characteristics of DC Series motor by Field Test.	Ammeter ((0-10A) Voltmeter (0-300V) Tachometer, Loading arrangement DC Series motor coupled with DC generator	1 1 1 1	1 1 1 1	Yes
3	Performance characteristics of DC Shunt motor by direct load test.	Voltmeter (0-300V) Ammeter (0-10A) tachometer DC Shunt motor	1 1 1 1	1 1 1 1	Yes
4	Performance characteristics of single phase induction motor by direct load test.	Voltmeter (0-300V) Ammeter (0-10A) 1ph auto Transformer(270V,10A) Tachometer Load Balance single phase induction motor with loading arrangement	1 1 1 1 1 1	1 1 1 1 1 1	Yes
5	Performance characteristics of three phase induction motor by direct load test.	Voltmeter (0-600V) Ammeter (0-10A) Wattmeter(600v/10A) Tachometer Loading arrangement 3 ph auto transformer. Three phase induction motor	1 1 2 1 1 1	1 1 2 1 1 1	Yes

6	Speed control of DC Series Motor	Voltmeter (0-300V) Ammeter (0-10A) Tachometer Rheostats (100,5A) DC Series Motor	1 1 1 2 1	1 1 1 2 1	Yes
7	Speed control of three phase slip ring Induction Motor by rotor resistance method	Voltmeter (0-600V) Ammeter (0-10A) Tachometer three phase slip ring Induction Motor rotor resistance	1 1 1 1 1	1 1 1 1 1	Yes
8	Rheostatic breaking of DC Shunt Motor	Voltmeter (0-300V) Ammeter (0-5A) Rheostat (200,5A) Change over switch Stop watch DC Shunt Motor	1 1 1 1 1 1	1 1 1 1 1 1	Yes
9	Study of Air conditioning system.	By case study			Yes
10	Study of induction heating &Welding.	By case study			Yes
11	Study of Different type of Enclosures	Machine lab Enclosures			Yes

Name of Course: Electrical Engineering Class- BE Sem-II

Subject:-Power system stability

Sr. No	**Experiment Title**	**Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment**	**Quantity**		**Whether expt. can be conducted**
			Required	Available	
1	Determination of Parameters and time constants of synchronous machines.	DC shunt motor coupled with synchronous alternator Voltmeter Ammeter Wattmeter	1 1 1 1	1 1 1 1	Yes
2	Synchronous machine of infinite bus: Effect of Excitation	DC shunt motor coupled with synchronous alternator Synchronizing panel Voltmeter Ammeter Wattmeter	1 1 1 1	1 1 1 1	Yes

3	Effect of saturation and & determination of equivalent reactance of synchronous machines.	DC shunt motor coupled with synchronous alternator Voltmeter Ammeter Wattmeter	1 1 1 1	1 1 1 1	Yes
4	Retardation test on synchronous machines to find moment of inertia of rotating part and angular momentum.	As a study experiment.			Yes
5	To obtain power angle characteristics of lossy & lossless lines.	Transmission line kit	01	01	Yes
6	To study transient stability by point by point method.	Kit	01	01	Yes
7	To determine the steady state stability limit of short transmission line.	Short Transmission line kit	01	01	Yes
8	To determine SSSL of long transmission line.	Long Transmission line kit	01	01	Yes
9	Study of Clerk diagram	As study experiment.	----	----	Yes
10	Study of different types of automatic voltage regulator	As study experiment.	-----	----	Yes

Name of Course: Electrical Engineering Class- BE Sem-VIII

Subject:-Switchgear and Protection

Sr. No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt. can be conducted
			Required	Available	
1	To conduct and study of Arc extinction phenomenon: Application in air circuit breaker.	As a study experiment & Horn Gap Extinguisher kit	1	1	Yes
2	Study of relaying component and control circuit development	Switch gear testing kit MCB ,fuse wire	1	1	Yes
3	To conduct and plot the characteristic of rewirable fuses and MCB	Relay testing kit	1	1	Yes
4	To conduct and plot operating characteristics of Inverse time over current relay.	Microprocessor based over current relay	1	1	Yes

5	To conduct Over current & earth fault protection scheme for alternator.	Protection of three phase alternator kit	1	1	Yes
6	To conduct Protection of 3 phase transformer using differential relay (Merz-Price protection scheme)	Three phase transformer protection kit	1	1	Yes
7	Study of MHO distance relay to plot. a) R- X diagram b) Relay voltage Vs Admittance characteristic.	As a study experiment	1	1	Yes
8	Study of Static relay.	As a study Experiment	1	1	Yes
9	Demonstration of microprocessor base protection.	As a study experiment	1	1	Yes

Name of Course: Electrical Engineering Class- BE Sem-II

Subject:- Computer Aided Power System Analysis

Sr. No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt. can be conducted
			Required	Available	
1	Program for determination of the parameters of the equivalent circuit.breaker.	Computer Matlab Software Printer 2kVA Transformer	01 01 01 01	01 01 01 01	Yes
2	Program for building of Z Bus by addition of branch.	Computer Matlab Software Printer	01 01 01	01 01 01	Yes
3	Program for building of Z Bus by addition of link.	Computer Matlab Software Printer	01 01 01	01 01 01	Yes
4	Program for illustration of the Ferranti Effect.	Computer Matlab Software Printer Transmission line study unit	01 01 01	01 01 01	Yes
5	Program for the formation of Y Bus by Singular Transformation.	Computer Matlab Software Printer	01 01 01	01 01 01	Yes
6	Program for load flow by Newton Raphson Method.	Computer Matlab Software Printer	01 01 01	01 01 01	Yes
7	Program for Balanced Three phase short circuit.	Computer Matlab Software Printer	01 01 01	01 01 01	Yes

8	Program for Unbalanced short circuits.	Computer Matlab Software Printer	01 01 01	01 01 01	Yes
9	Program for Fault analysis of Power System network of an Electric Utility Company.	Computer Matlab Software Printer	01 01 01	01 01 01	Yes
10	Study of IEC and ANSI standards for Short circuit analysis.	AS a study practical	--	--	Yes
11	Introduction to PSCAD	Computer PSCAD Software Printer	01 01 01	01 01 01	Yes
12	Introduction to ETAP	Computer ETAP Software Printer	01 01 01	01 01 01	Yes

Name of Course: Electrical Engineering Class- BE Sem-II

Subject:- Power System Design & Practice

Sr. No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt. can be conducted
			Required	Available	
1	Draw the substation layout for 400KV.and design the three phase transmission line with electrical consideration.	Study & Drawing Sheets	--	--	Yes
2	Sag-Tension calculation	Study & Problem solving	--	--	Yes
3	Different busbar arrangement and isolating switches.	Study & Drawing Sheets	--	--	Yes
4	Different types of circuit breaker..	Study & Drawing Sheets	--	--	Yes
5	Different types of Lightning Arresters	Study & Drawing Sheets	--	--	Yes
6	Design of Earthing system for 132/400KV substation	Study & Drawing Sheets	--	--	Yes

List of Experimental Setup – Term-I

Name of Lab: - Lab no. 1/ Digital System and Microprocessor Lab

Sr. No.	Year and Branch	Subject	Experiment Title	Name of Equipment/ Software available to Conduct the Experiment
1	S.E. IT (Term – I)	Digital System and microprocessor	Verify the Truth table of logic gates and of Demorgance Theorem	Bread board, Power supply, connecting wires, IC 7400, 7408, 7402, 7486, 7404, 7432
2	S.E. IT (Term – I)	Digital System and microprocessor	Construction of basic gates using Universal gates	Bread board, Power supply, connecting wires, IC 7400,
3	S.E. IT (Term – I)	Digital System and microprocessor	Construction of Half Adder and Full Adder	Bread board, Power supply, connecting wires, IC 7486, 7408, 7432
4	S.E. IT (Term – I)	Digital System and microprocessor	Construction of Half and Full Substractor	Bread board, Power supply, connecting wires, IC 7486, 7408, 7404
5	S.E. IT (Term – I)	Digital System and microprocessor	Construct and implement various code converters	Bread board, Power supply, connecting wires, IC 7486, 7408, 7404
6	S.E. IT (Term – I)	Digital System and microprocessor	Program using MACRO	PC ,MASM
7	S.E. IT (Term – I)	Digital System and microprocessor	Program using NEAR and FAR procedure	PC ,MASM
8	S.E. IT (Term – I)	Digital System and microprocessor	Program for Password Verification	PC ,MASM
9	S.E. IT (Term – I)	Digital System and microprocessor	Program for BCD Addition	PC ,MASM
10	S.E. IT (Term – I)	Digital System and microprocessor	Program to display system time and date.	PC ,MASM

Sr. No	Year and Branch	Subject	Experiment Title	Name of Equipment, Software available to Conduct the Experiment
1	B.E. IT (Term – I)	Embedded Systems	Writing basic C-programs for I/O operations.	The complete IDE, ARM7 board, with on board LED, PC with minimum 256k RAM
2	B.E. IT (Term – I)	Embedded Systems	Program to interface LCD.	The complete IDE, ARM7 board, with on board LED, 7- segment, PC with minimum 256k RAM
3	B.E. IT (Term – I)	Embedded Systems	Program to interface Keyboard and display key pressed on LCD.	The complete IDE, ARM7 board, with on board LED, PC with minimum 256k RAM
4	B.E. IT (Term – I)	Embedded Systems	Program to interface stepper motor.	The complete IDE, ARM7 board, with on board LED, PC with minimum 256k RAM, JTAG Debugger.
5	B.E. IT (Term – I)	Embedded Systems	Interfacing 4 x 4 matrix keyboards and 16 x 2 character LCD display to microcontroller /Microprocessor and writing a program using RTOS for displaying a pressed key.	The complete IDE, ARM7 board, with on board LED, PC with minimum 256k RAM
6	B.E. IT (Term – I)	Embedded Systems	Writing a scheduler / working with using RTOS for 4 tasks with priority. The tasks may be keyboard LCD, LED etc. and porting it on microcontroller/ microprocessor.	The complete IDE, ARM7 board, with on board LED, GSM interface, PC with minimum 256k RAM
7	B.E. IT (Term – I)	Embedded Systems	Implement a semaphore for any given task switching using RTOS on microcontroller board.	The complete IDE, ARM7 board RTOS Support, with on board LED, 4 x 4 matrix keyboards and 16 x 2 character LCD display PC with minimum 256k RAM

8	B.E. IT (Term – I)	Embedded Systems	Create two tasks, which will print some characters on the serial port, Start the scheduler and observe the behavior.	The complete IDE, ARM7 board RTOS Support, with on board LED, LCD display PC with minimum 256k RAM, JTAG Debugger.

Name of Lab: - Lab no. 2/ Data Structure Lab

Sr. No	**Year and Branch**	**Subject**	**Experimental Title**	**Name of Equipment, Software available to Conduct the Experiment**
1.	T.E. IT (Term – I)	System Programming	Develop an application to simulate Assembler for 8086	PC, TC Compiler
2.	T.E. IT (Term – I)	System Programming	Design a simple loader	PC, TC Compiler
3.	T.E. IT (Term – I)	System Programming	Develop an application to create a simple text editor	PC, TC Compiler
4.	T.E. IT (Term – I)	System Programming	Develop an application for simulating Lexical phase of Compiler	PC, TC Compiler
5.	T.E. IT (Term – I)	System Programming	Develop an application for simulating Syntax Analysis phase of Compiler	PC, TC Compiler

Name of Lab: - Lab no. 3/ Programming Lab

Sr. No	Year and Branch	Subject	Experiment Title	Name of Equipment, Software available to Conduct the Experiment
1	S.E. IT (Term – I)	Object Oriented Technology Lab	Write a program for a simple class and object.	PC, C++ compiler
2	S.E. IT (Term – I)	Object Oriented Technology Lab	Write a program for parameterized constructor.	PC, C++ compiler
3	S.E. IT (Term – I)	Object Oriented Technology Lab	Write a program to find the area of rectangle, triangle and sphere using function overloading.	PC, C++ compiler
4	S.E. IT (Term – I)	Object Oriented Technology Lab	Write a program to overload binary operator using member function.	PC, C++ compiler
5	S.E. IT (Term – I)	Object Oriented Technology Lab	Write a program to overload binary + operator using member function for concatenation of two strings.	PC, C++ compiler
6	S.E. IT (Term – I)	Object Oriented Technology Lab	Write a program for virtual base classes.	PC, C++ compiler
7	S.E. IT (Term – I)	Object Oriented Technology Lab	Write a program to convert class type data to basic type data.	PC, C++ compiler
8	S.E. IT (Term – I)	Object Oriented Technology Lab	Write a program to format output using manipulators.	PC, C++ compiler
9	S.E. IT (Term – I)	Object Oriented Technology Lab	Write a program to read and write class objects from files.	PC, C++ compiler

10	S.E. IT (Term – I)	Object Oriented Technology Lab	Write a program for run time polymorphism using virtual Functions.	PC, C++ compiler

Sr. No	Year and Branch	Subject	Experiment Title	Name of Equipment, Software available to Conduct the Experiment
1	T.E. IT (Term – I)	Linux Lab	Installation of Linux OS.	Ubuntu 14.4
2	T.E. IT (Term – I)	Linux Lab	Study and execution of various Linux Commands.	Ubuntu 14.4
3	T.E. IT (Term – I)	Linux Lab	Study of vi editor	Ubuntu 14.4
4	T.E. IT (Term – I)	Linux Lab	Configuration of Linux Server	Ubuntu 14.4
5	T.E. IT (Term – I)	Linux Lab	Shell script for finding out factorial of a number	Ubuntu 14.4
6	T.E. IT (Term – I)	Linux Lab	Shell script for finding out file type and displaying list of a directory.	Ubuntu 14.4
7	T.E. IT (Term – I)	Linux Lab	Write a shell script to find the largest among the 3 given numbers.	Ubuntu 14.4
8	T.E. IT (Term – I)	Linux Lab	Write a shell script to reverse the contents of a String.	Ubuntu 14.4
8	T.E. IT (Term – I)	Linux Lab	Write a shell script to print date and time.	Ubuntu 14.4
8	T.E. IT (Term – I)	Linux Lab	Shell script to perform arithmetic operations.	Ubuntu 14.4

Sr. No	**Year and Branch**	**Subject**	**Experimental Title**	**Name of Equipment, Software available to Conduct the Experiment**
1.	S.E. IT (Term – I)	Information Theory Lab	Program for RSA Algorithm	Ubuntu 14.4
2.	S.E. IT (Term – I)	Information Theory Lab	Program for ceaser cipher	Ubuntu 14.4
3.	S.E. IT (Term – I)	Information Theory Lab	Program for vernam cipher (one time pad)	Ubuntu 14.4
4.	S.E. IT	Information Theory	Program for simple	Ubuntu 14.4

	(Term – I)	Lab	transposition technique	
5.	S.E. IT (Term – I)	Information Theory Lab	Program for electronic code book (ECB)	Ubuntu 14.4
6.	S.E. IT (Term – I)	Information Theory Lab	Study of digital signature	Ubuntu 14.4
7.	S.E. IT (Term – I)	Information Theory Lab	Study of JPEG standard	Ubuntu 14.4
8.	S.E. IT (Term – I)	Information Theory Lab	Study of adaptive Huffman coding technique	Ubuntu 14.4
9.	S.E. IT (Term – I)	Information Theory Lab	Program for Run length encoding	Ubuntu 14.4
10.	S.E. IT (Term – I)	Information Theory Lab	Program for Diffie-Hellman key exchange algorithm	Ubuntu 14.4

Name of Lab: - Lab no. 4/ Multimedia Lab

Name of Lab: - Lab no. 5/ Operating System Lab

Sr. No	Year and Branch	Subject	Experiment Title	Name of Equipment, Software available to Conduct the Experiment
1	B.E. IT (Term – I)	Artificial Intelligence Lab	Implementation of single perceptron training algorithm.	Ubuntu 14.4,Prolog
2	B.E. IT (Term – I)	Artificial Intelligence Lab	Implementation of Unification Algorithm.	Ubuntu 14.4,Prolog
3	B.E. IT (Term – I)	Artificial Intelligence Lab	Implementation of Game playing with Min/Max Search.	Ubuntu 14.4,Prolog
4	B.E. IT (Term – I)	Artificial Intelligence Lab	Implementation of A* Algorithm	Ubuntu 14.4,Prolog
5	B.E. IT (Term – I)	Artificial Intelligence Lab	Implementation of Dynamic database.	Ubuntu 14.4,Prolog
6	B.E. IT (Term – I)	Artificial Intelligence Lab	Development of Mini Medical Expert System	Ubuntu 14.4,Prolog
7	B.E. IT (Term – I)	Artificial Intelligence Lab	Development of Intelligent Perception System.	Ubuntu 14.4,Prolog
8	B.E. IT (Term – I)	Artificial Intelligence Lab	Implementation of basic learning neural learning algorithm	Ubuntu 14.4,Prolog

Sr. No	Year and Branch	Subject	Experiment Title	Name of Equipment, Software available to Conduct the Experiment
1	T.E. IT (Term – I)	Java Programming Lab	Write a program to demonstrate string operations.	Ubuntu 14.4
2	T.E. IT (Term – I)	Java Programming Lab	Write a program that demonstrate packages creation and use in program.	Ubuntu 14.4
3	T.E. IT (Term – I)	Java Programming Lab	Write a program that demonstrates inheritance by creating suitable classes.	Ubuntu 14.4
4	T.E. IT (Term – I)	Java Programming Lab	Write a program that demonstrates the concepts of constructor & overloading methods.	Ubuntu 14.4
5	T.E. IT (Term – I)	Java Programming Lab	Write a program that demonstrates implementing of interfaces & use of extending interfaces.	Ubuntu 14.4
6	T.E. IT (Term – I)	Java Programming Lab	Write a program using Applet.	Ubuntu 14.4
7	T.E. IT (Term – I)	Java Programming Lab	Write a program to implement the concept of threading.	Ubuntu 14.4
8	T.E. IT (Term – I)	Java Programming Lab	Write a program by using Graphics class.	Ubuntu 14.4

Sr. No	Year and Branch	Subject	Experimental Title	Name of Equipment, Software available to Conduct the Experiment
1.	S.E. IT (Term – I)	Information Theory Lab	Program for RSA Algorithm	Ubuntu 14.4
2.	S.E. IT (Term – I)	Information Theory Lab	Program for ceaser cipher	Ubuntu 14.4
3.	S.E. IT (Term – I)	Information Theory Lab	Program for vernam cipher (one time pad)	Ubuntu 14.4
4.	S.E. IT (Term – I)	Information Theory Lab	Program for simple transposition technique	Ubuntu 14.4
5.	S.E. IT (Term – I)	Information Theory Lab	Program for electronic code book (ECB)	Ubuntu 14.4
6.	S.E. IT (Term – I)	Information Theory Lab	Study of digital signature	Ubuntu 14.4
7.	S.E. IT (Term – I)	Information Theory Lab	Study of JPEG standard	Ubuntu 14.4

8.	S.E. IT (Term – I)	Information Theory Lab	Study of adaptive Huffman coding technique	Ubuntu 14.4
9.	S.E. IT (Term – I)	Information Theory Lab	Program for Run length encoding	Ubuntu 14.4
10.	S.E. IT (Term – I)	Information Theory Lab	Program for Diffie-Hellman key exchange algorithm	Ubuntu 14.4

Name of Lab: - Lab no. 6/ Computer Network Lab

Sr. No	Year and Branch	Subject	Experimental Title	Name of Equipment, Software Available to Conduct the Experiment
1.	T.E. IT (Term – I)	Computer Network Lab	Implementation of Bit-Stuffing Framing Method.	PC, openjdk
2.	T.E. IT (Term – I)	Computer Network Lab	Socket Programming for TCP.	PC, openjdk
3.	T.E. IT (Term – I)	Computer Network Lab	Socket Programming for UDP.	PC, openjdk
4.	T.E. IT (Term – I)	Computer Network Lab	Encryption/Decryption using XOR Symmetric-Key Cryptography Algorithm.	PC, openjdk
5.	T.E. IT (Term – I)	Computer Network Lab	Encryption/Decryption using RSA Asymmetric Key Cryptography Algorithm.	PC, openjdk
6.	T.E. IT (Term – I)	Computer Network Lab	Implementation of RLE Data Compression Algorithm.	PC, openjdk
7.	T.E. IT (Term – I)	Computer Network Lab	Simulate the Point to Point Wired Network	PC, ns2
8.	T.E. IT (Term – I)	Computer Network Lab	Simulate the Ethernet LAN for Wired Networks.	PC, ns2

Sr. No	Year and Branch	Subject	Experiment Title	Name of Equipment, Software available to Conduct the Experiment
1	B.E. IT (Term – I)	Advanced Unix Programming	Implementation of file management in UNIX.	Ubuntu 14.4
2	B.E. IT (Term – I)	Advanced Unix Programming	A Program For Simulation of Unix Commands.	Ubuntu 14.4
3	B.E. IT (Term – I)	Advanced Unix Programming	Program to display user & system information in UNIX	Ubuntu 14.4
4	B.E. IT (Term – I)	Advanced Unix Programming	Program for process creation using fork() and vfork() function.	Ubuntu 14.4
5	B.E. IT (Term – I)	Advanced Unix Programming	Program for Inter process Communication using Pipe	Ubuntu 14.4
6	B.E. IT (Term – I)	Advanced Unix Programming	Program for catching of Signals	Ubuntu 14.4
7	B.E. IT (Term – I)	Advanced Unix Programming	Program for Daemon Process	Ubuntu 14.4
8	B.E. IT (Term – I)	Advanced Unix Programming	Program for Multithreading	Ubuntu 14.4

Name of Lab: - Lab no. 7/ Database Management Lab

Sr. No	Year and Branch	Subject	Experiment Title	Name of Equipment, Software available to Conduct the Experiment
1	T.E. IT (Term – II)	Software Engineering Lab	Study of Unified Modeling Language (UML)	Study PC, Ubuntu, Umbrello
2	T.E. IT (Term – II)	Software Engineering Lab	To Design ATM System	PC, Ubuntu, Umbrello
3	T.E. IT (Term – II)	Software Engineering Lab	To Design a Library Management System	PC, Ubuntu, Umbrello
4	T.E. IT (Term – II)	Software Engineering Lab	To design the Railway Reservation System	PC, Ubuntu, Umbrello
5	T.E. IT (Term – II)	Software Engineering Lab	To design the College Management System	PC, Ubuntu, Umbrello
6	T.E. IT (Term – II)	Software Engineering Lab	To Design a Hospital Management System	PC, Ubuntu, Umbrello

Sr. No	Year and Branch	Subject	Experiment Title	Name of Equipment, Software available to Conduct the Experiment
1	S.E. IT (Term – I)	Soft Skill –III Lab	Assignment No1: - **Question on Numbers, HCF & LCM**	PC, Ubuntu
2	S.E. IT (Term – I)	Soft Skill –III Lab	Assignment No2: **Question on Arithmetic (Averages & Mixtures)**	PC, Ubuntu,
3	S.E. IT (Term – I)	Soft Skill –III Lab	Assignment No 3: **Question on Arithmetic (Percentages & Profit –Loss Concept)**	PC, Ubuntu,
4	S.E. IT (Term – I)	Soft Skill –III Lab	Assignment No4: **Question on Time & Work**	PC, Ubuntu,
5	S.E. IT (Term – I)	Soft Skill –III Lab	Assignment No 5: **Question on Permutation & Combination**	PC, Ubuntu,
6	S.E. IT (Term – I)	Soft Skill –III Lab	Assignment No6: **Question on Probability & Time & Distance**	PC, Ubuntu,

7	S.E. IT (Term – I)	Soft Skill –III Lab	Assignment No7: **Question on Non-verbal Reasoning (Analogies, Classification & Sequence)**	PC
8	S.E. IT (Term – I)	Soft Skill –III Lab	Assignment No8: **Question on Analytical Puzzles**	PC
9	S.E. IT (Term – I)	Soft Skill –III Lab	Assignment No9: **Question on Letter & Number Series**	PC
10	S.E. IT (Term – I)	Soft Skill –III Lab	Assignment No10: **Question on Coding& Decoding**	PC

Name of Lab: - Lab no. 8/ Software Engineering Lab

Sr. No	Year and Branch	Subject	Experimental Title	Name of Equipment, Software available to Conduct the Experiment
1.	T.E. IT (Term – I)	System Programming	Develop an application to simulate Assembler for 8086	PC, TC Compiler
2.	T.E. IT (Term – I)	System Programming	Design a simple loader	PC, TC Compiler
3.	T.E. IT (Term – I)	System Programming	Develop an application to create a simple text editor	PC, TC Compiler
4.	T.E. IT (Term – I)	System Programming	Develop an application for simulating Lexical phase of Compiler	PC, TC Compiler
5.	T.E. IT (Term – I)	System Programming	Develop an application for simulating Syntax Analysis phase of Compiler	PC, TC Compiler

Sr. No	Year and Branch	Subject	Experimental Title	Name of Equipment, Software available to Conduct the Experiment
1.	S.E. IT (Term – I)	Data Structure and Graph Theory	A Program For Logical Operations Using Bitwise	PC, TC Compiler

			Operators	
2.	S.E. IT (Term – I)	Data Structure and Graph Theory	A Program For Set Operations: Union, Intersection, Difference, Symmetric Difference	PC, TC Compiler
3.	S.E. IT (Term – I)	Data Structure and Graph Theory	A Program For Generation Of Permutations.	PC, TC Compiler
4.	S.E. IT (Term – I)	Data Structure and Graph Theory	A Program For Generation Of Combinations	PC, TC Compiler
5.	S.E. IT (Term – I)	Data Structure and Graph Theory	A Program For Bubble Sort.	PC, TC Compiler
6.	S.E. IT (Term – I)	Data Structure and Graph Theory	A Program For Matrix Multiplication	PC, TC Compiler
7.	S.E. IT (Term – I)	Data Structure and Graph Theory	A Program For Binary Search	PC, TC Compiler
8.	S.E. IT (Term – I)	Data Structure and Graph Theory	A Program For Implementation Of Kruskal's Algorithm	PC, TC Compiler
9.	S.E. IT (Term – I)	Data Structure and Graph Theory	Program For Implementation Of Prim's Algorithm	PC, TC Compiler
10.	S.E. IT (Term – I)	Data Structure and Graph Theory	A Program For Inter Conversion Of Number System	PC, TC Compiler

List of Experimental Setup – Term-II

Name of Lab: - Lab no. 1/ Digital System and Microprocessor Lab

5	SE I.T. (Term – II)	Microprocessor & Microcontroller Interfacing Lab	Study of digital to analog converter	8086 kit, keyboard, ADC kit
6	SE I.T. (Term – II)	Microprocessor & Microcontroller Interfacing Lab	Program for Stepper motor interfacing	8086 kit, stepper motor kit
7	SE I.T. (Term – II)	Microprocessor & Microcontroller Interfacing Lab	Program for interfacing LED’s with 8051	8051 kit, LED kit

8	SE I.T. (Term – II)	Microprocessor & Microcontroller Interfacing Lab	Program for interfacing 7-segment display with 8051	8051 kit, 7 segment kit
9	SE I.T. (Term – II)	Microprocessor & Microcontroller Interfacing Lab	Program for keypad interfacing	8051 kit, 4*4 keypad kit
10	SE I.T. (Term – II)	Microprocessor & Microcontroller Interfacing Lab	Program for stepper motor interfacing	8051 kit, stepper motor kit

Name of Lab: - Lab no. 2/ Data Structure & Files Lab

Sr. No	Year and Branch	Subject	Experiment Title	Name of Equipment, Software available to Conduct the Experiment
1	SE I.T. (Term – II)	Microprocessor & Microcontroller Interfacing Lab	Program for mouse interfacing	PC, MASM
2	SE I.T. (Term – II)	Microprocessor & Microcontroller Interfacing Lab	Program for graphics editor	PC, MASM
3	SE I.T. (Term – II)	Microprocessor & Microcontroller Interfacing Lab	Program for PC to PC communication	PC, MASM
4	SE I.T. (Term – II)	Microprocessor & Microcontroller Interfacing Lab	Program for printer interfacing	PC, MASM

Name of Lab: - Lab no. 3/ Programming Lab

Sr. No	Year and Branch	Subject	Experiment Title	Name of Equipment, Software available to Conduct the Experiment
1	B.E. IT (Term – II)	Software Metrices and Quality Assurance	Program for finding Length of program.	PC, TC Compiler

2	B.E. IT (Term – II)	Software Metrices and Quality Assurance	Implementation of program for finding Length of program using Lines of Code.	PC, TC Compiler
3	B.E. IT (Term – II)	Software Metrices and Quality Assurance	Program for measuring Size of program using Albrecht's Method	PC, TC Compiler
4	B.E. IT (Term – II)	Software Metrices and Quality Assurance	Implementation of program for measuring size of program using Function Point Calculation Albrecht's method.	PC, TC Compiler
5	B.E. IT (Term – II)	Software Metrices and Quality Assurance	Software testing using J-Meter testing tool.	PC, TC Compiler,J-Meter tool

Sr. No	Year and Branch	Subject	Experimental Title	Name of Equipment, Software available to Conduct the Experiment
1.	T.E. IT (Term – II)	Database Management Systems	Creating a sample database using any client server RDBMS (Oracle/ Open Source Database) package using SQL DDL queries. This will include constraints (Primary key, Foreign key, Unique, Not Null, and Check) to be used while creating tables.	MySql, OS -Ubuntu 14.04.
2.	T.E. IT (Term – II)	Database Management Systems	SQL DML queries: Use of SQL DML queries to retrieve, insert, delete and update the database created in experiment No. 1.	MySql, OS -Ubuntu 14.04.
3.	T.E. IT (Term – II)	Database Management Systems	SQL Queries: The queries should involve SQL feature such as aggregate functions, group by, having, order by the database created in experiment No. 1.	MySql, OS -Ubuntu 14.04.
4.	T.E. IT (Term – II)	Database Management Systems	SQL Queries: The queries should involve Set Operations and Set Comparisons the database created in experiment No. 1.	MySql, OS -Ubuntu 14.04.
5.	T.E. IT (Term – II)	Database Management	Screen design and Report generation: Sample forms and reports should be generated using any front end tools.	MySql, OS -Ubuntu 14.04.

		Systems		
6.	T.E. IT (Term – II)	Database Management Systems	Write a program to demonstrate different types of JOIN.	MySql, OS -Ubuntu 14.04.
7.	T.E. IT (Term – II)	Database Management Systems	Write a program to demonstrate use of Trigger.	MySql, OS -Ubuntu 14.04.
8.	T.E. IT (Term – II)	Database Management Systems	Write a program to demonstrate view.	MySql, OS -Ubuntu 14.04.

Name of Lab:-Lab no. 4/ Multimedia Lab

Name of Lab: - Lab no. 5/ Operating System Lab

Sr. No	Year and Branch	Subject	Experiment Title	Name of Equipment, Software available to Conduct the Experiment
1	S.E. IT (Term – II)	Data Structure	Implementation of Stack using Array.	Ubuntu 14.4
2	S.E. IT (Term – II)	Data Structure	Implementation of Queue using Array.	Ubuntu 14.4
3	S.E. IT (Term – II)	Data Structure	Implementation of Circular Queue using Array.	Ubuntu 14.4
4	S.E. IT (Term – II)	Data Structure	Program For Infix To Postfix Conversion.	Ubuntu 14.4
5	S.E. IT (Term – II)	Data Structure	Program For Postfix To Infix Conversion.	Ubuntu 14.4
6	S.E. IT (Term – II)	Data Structure	Program For Doubly Linked List.	Ubuntu 14.4
7	S.E. IT (Term – II)	Data Structure	Program For Binary Search Tree.	Ubuntu 14.4
8	S.E. IT (Term – II)	Data Structure	Implementation of Quick sort	Ubuntu 14.4
9	S.E. IT (Term – II)	Data Structure	Implementation of Radix sort	Ubuntu 14.4
10	S.E. IT (Term – II)	Data Structure	Implementation of Merge sort	Ubuntu 14.4

Sr. No.	Year and Branch	Subject	Experimental Title	Name of Equipment, Software available to Conduct the Experiment
1.	T.E. I.T (Term – II)	Operating System Lab	Study of commercial and open source operating system	Ubuntu 14.4
2.	T.E. I.T (Term – II)	Operating System Lab	Program for implementing CPU scheduling algorithms	Ubuntu 14.4
3.	T.E. I.T (Term – II)	Operating System Lab	Program for Memory management algorithms	Ubuntu 14.4
4.	T.E. I.T (Term – II)	Operating System Lab	Program to implement command interpreter using system calls	Ubuntu 14.4
5.	T.E. I.T (Term – II)	Operating System Lab	Program for implementation of concepts of threading	Ubuntu 14.4
6.	T.E. I.T (Term – II)	Operating System Lab	Write a program to implement page replacement algorithms	Ubuntu 14.4
7.	T.E. I.T (Term – II)	Operating System Lab	Write a program for Bankers algorithm	Ubuntu 14.4
8.	T.E. I.T (Term – II)	Operating System Lab	Write a program to demonstrate disk scheduling algorithms	Ubuntu 14.4

Name of Lab: - Lab no. 6/ Computer Network Lab

Sr. No	Year and Branch	Subject	Experiment Title	Name of Equipment, Software available to Conduct the Experiment
1	B.E. IT (Term – II)	Internet Security Lab	Implementation of Encryption/Decryption Using Caesar Cipher	PC, openjdk
2	B.E. IT (Term – II)	Internet Security Lab	Implementation of RSA Algorithm	PC, gcc
3	B.E. IT (Term – II)	Internet Security Lab	Implement Diffie-Hellman Key Exchange Algorithm	PC, gcc

4	B.E. IT (Term – II)	Internet Security Lab	Creation & Export of Digital Certificates	PC, Mozilla Firefox Web Browser
5	B.E. IT (Term – II)	Internet Security Lab	Implementation of Digital Signature	PC, openjdk

Sr. No	Year and Branch	Subject	Experiment Title	Name of Equipment, Software available to Conduct the Experiment
1	F.E. I-Section (Term – II)	Introduction to "C" Programming Lab	Write a C program to find area of circle, triangle, rectangle, square using switch statement.	PC, gcc
2	F.E. I-Section (Term – II)	Introduction to "C" Programming Lab	Write a C program to find the sum of a series (looping).	PC, gcc
3	F.E. I-Section (Term – II)	Introduction to "C" Programming Lab	Write a C program to accept a string and reverse it without using library functions. Display the original and reversed string. (String handling).	PC, gcc
4	F.E. I-Section (Term – II)	Introduction to "C" Programming Lab	Write a C program to read 'N' elements into an array and compute the sum of all the elements stored in an array using pointer. (Arrays and pointers).	PC, gcc
5	F.E. I-Section (Term – II)	Introduction to "C" Programming Lab	Write a C program to read 'N' students information and display the information with appropriate headings, where each student information consists of roll number, Name, total marks scored etc. (Structure handling).	PC, gcc

Name of Lab: - Lab no. 7 / Database Management System Lab

Sr. No	Year and Branch	Subject	Experiment Title	Name of Equipment, Software available to Conduct the Experiment
1	T.E. IT (Term – II)	Object Oriented Modelling & Design Lab	Design ATM system using Structural and Behavioral UML diagram	PC, Ubuntu, Umbrello
2	T.E. IT (Term – II)	Object Oriented Modelling & Design Lab	Design College Admission Process using Structural and Behavioral UML diagram	PC, Ubuntu, Umbrello
3	T.E. IT (Term – II)	Object Oriented Modelling & Design Lab	Design Library Management System using Structural and Behavioral UML diagram.	PC, Ubuntu, Umbrello
4	T.E. IT (Term – II)	Object Oriented Modelling & Design Lab	Design Hospital Management System using Structural and Behavioral UML diagram.	PC, Ubuntu, Umbrello
5	T.E. IT (Term – II)	Object Oriented Modelling & Design Lab	Design Railway Reservation System using Structural and Behavioral UML diagram.	PC, Ubuntu, Umbrello
6	T.E. IT (Term – II)	Object Oriented Modelling & Design Lab	Design Hotel Management System using Structural and Behavioral UML diagram.	PC, Ubuntu, Umbrello

Sr. No	Year and Branch	Subject	Experiment Title	Name of Equipment, Software available to Conduct the Experiment
1	S.E. IT (Term – II)	Data Communication Lab	Comparative analysis of different types of network cables with specifications	PC, Ubuntu,
2	S.E. IT (Term – II)	Data Communication Lab	- Network related commands such a as ARP, IFCONFIG, PING, TRACERT , IPTraf , NSLOOKUP, NETSTAT	PC, Ubuntu,

3	S.E. IT (Term – II)	Data Communication Lab	Network connecting devices specifications and configurations	PC, Ubuntu
4	S.E. IT (Term – II)	Data Communication Lab	I.T Infrastructure planning using Network Connecting Devices	PC, Ubuntu,
5	S.E. IT (Term – II)	Data Communication Lab	Implementation of Stop and Wait protocol	PC, Ubuntu,
6	S.E. IT (Term – II)	Data Communication Lab	Crimping of cross-wire and straight-through UTP cable to inter-connect two computers.	PC, Ubuntu,
7	S.E. IT (Term – II)	Data Communication Lab	Interconnections of computers in Local Area Network to share resources	PC , Ubuntu
8	S.E. IT (Term – II)	Data Communication Lab	Implementation of Interne Checksum	Pc , Ubuntu

Name of Lab: - Lab no. 8/ Software Engineering Lab

Sr. No	Year and Branch	Subject	Experiment Title	Name of Equipment, Software available to Conduct the Experiment
1	B.E. IT (Term – II)	Data Warehousing and Mining	Develop a program to construct a multidimensional data model (Star, Snowflake or Fact constellations).	PC, MYSQL.
2	B.E. IT (Term – II)	Data Warehousing and Mining	Develop a program to implement data pre-processing techniques.	PC, WEKA Tool

3	B.E. IT (Term – II)	Data Warehousing and Mining	Implement Apriori algorithm for frequent item set.	PC, WEKA Tool
4	B.E. IT (Term – II)	Data Warehousing and Mining	Develop a program to extract association mining rules.	PC, WEKA Tool
5	B.E. IT (Term – II)	Data Warehousing and Mining	Develop a program for classification of data.	PC, WEKA Tool
6	B.E. IT (Term – II)	Data Warehousing and Mining	Develop a program for implementing one of the clustering techniques	PC, WEKA Tool

Sr. No.	**Year and Branch**	**Subject**	**Experimental Title**	**Name of Equipment, Software available to Conduct the Experiment**
1.	T.E. I.T (Term – II)	Web Programming Lab	Develop a complete web page using HTML basic tags.	PC, Win-7, IIS, Wamp Server.
2.	T.E. I.T (Term – II)	Web Programming Lab	Web server installation and configuration.	PC, Win-7, IIS, Wamp Server.
3.	T.E. I.T (Term – II)	Web Programming Lab	Design a web page using PHP to demonstrate, variables, echo/print, data types, string, functions and operators.	PC, Win-7, IIS, Wamp Server.
4.	T.E. I.T (Term – II)	Web Programming Lab	Design a web page using PHP to demonstrate, conditional statements, for loop, functions and arrays.	PC, Win-7, IIS, Wamp Server.
5.	T.E. I.T (Term – II)	Web Programming Lab	Design a web page using PHP to demonstrate, form handling, form validation and form URL.	PC, Win-7, IIS, Wamp Server.
6.	T.E. I.T (Term – II)	Web Programming Lab	Design a web page using PHP to demonstrate, date, file, file upload.	PC, Win-7, IIS, Wamp Server.
7	T.E. I.T (Term – II)	Web Programming Lab	Design a page web using PHP to demonstrate, MySQL connect, create DB/Table, insert into, select, where, order by, update and delete.	PC, Win-7, IIS, Wamp Server.
8	T.E. I.T (Term – II)	Web Programming Lab	Design a web page using JavaScript to demonstrate, if statement, if...else statement and	PC, Win-7, IIS, Wamp Server.

			Switch statement.	
9	T.E. I.T (Term – II)	Web Programming Lab	Design a web page using javaScript to demonstrate Popup boxes.	PC, Win-7, IIS, Wamp Server.
10	T.E. I.T (Term – II)	Web Programming Lab	Design a Website with the help of HTML and PHP for SSBT's OET.	PC, Win-7, IIS, Wamp Server.

Sr. No	Year and Branch	Subject	Experiment Title	Name of Equipment, Software available to Conduct the Experiment
1	S.E. IT (Term – II)	Advanced Development Lab	Develop a complete web page for Department of Information Technology using HTML basic tags	PC, Notepad, Any Web Browser
2	S.E. IT (Term – II)	Advanced Development Lab	Develop a complete web page for College using CSS, Tables and Layouts	PC, Notepad, Any Web Browser
3	S.E. IT (Term – II)	Advanced Development Lab	Design a single page web site for a university containing a description of the courses offered, it should also contain some general information about the university such as its History, the campus and its unique features.	PC, Notepad, Any Web Browser
4	S.E. IT (Term – II)	Advanced Development Lab	Demonstration of Tables, Frames and Hyperlinks in an HTML Document	PC, Notepad, Any Web Browser
5	S.E. IT (Term – II)	Advanced Development Lab	Implementation of a simple calculator.	PC, Notepad, Any Javascript enabled Web Browser
6	S.E. IT (Term – II)	Advanced Development Lab	Program to sort the numbers in an array	PC, Notepad, Jdk 1.5 onwards
7	S.E. IT (Term – II)	Advanced Development Lab	Program to implement simple java application using Key Listener	PC, Notepad, Jdk 1.5 onwards

8	S.E. IT (Term – II)	Advanced Development Lab	Program to implement simple calculator in java using Applet	PC, Notepad, Jdk 1.5 onwards
9	S.E. IT (Term – II)	Advanced Development Lab	Program to implement student information Form using AWT	PC, Notepad/Java Editor, JDK 1.5
10	S.E. IT (Term – II)	Advanced Development Lab	Create a web page on CD Catalog in XML with external Style Sheet attached	PC, Macromedia Dreamweaver

Name of Lab: - Lab no. 9 Computer Graphics Lab

Sr. No	Year and Branch	Subject	Experimental Title	Name of Equipment, Software available to Conduct the Experiment
1.	T.E. IT (Term – I)	Computer Graphics	Study of Graphics commands	PC, TC Compiler
2.	T.E. IT (Term – I)	Computer Graphics	Program for line drawing using DDA	PC, TC Compiler
3.	T.E. IT (Term – I)	Computer Graphics	Program for line drawing using Bresenham's line drawing algorithm	PC, TC Compiler
4.	T.E. IT (Term – I)	Computer Graphics	Program for Circle drawing using Bresenham's Algorithm	PC, TC Compiler
5.	T.E. IT (Term – I)	Computer Graphics	Program for Polygon filling	PC, TC Compiler
6.	T.E. IT (Term – I)	Computer Graphics	Program for Polygon Clipping	PC, TC Compiler
7.	T.E. IT (Term – I)	Computer Graphics	Program for 3D Rotation	PC, TC Compiler
8.	T.E. IT (Term – I)	Computer Graphics	Program for Parallel projection	PC, TC Compiler
9.	T.E. IT (Term – I)	Computer Graphics	Program for Perspective projection	PC, TC Compiler

10.	T.E. IT (Term – I)	Computer Graphics	Program for Animation	PC, TC Compiler

Facilities for conducting Practical's in the Laboratories

Name of Course : MECHANICAL ENGINEERING

SEM - III
Class: - S.E (Mechanical) Subject: - **SS – III (TW – 50)**

Class: - S.E (Mechanical)
Subject: - **Engineering Thermodynamics Lab – TW - 25**

Sr. No.	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct	Quantity		Whether experiment can be conducted
			Required	Available	
1	Study and Demonstration of Pressure measuring devices.	Demo model/Apparatus	01		Yes
2	Study and Demonstration of Temperature measuring devices.	Demo model/Apparatus	01		Yes
3	Study and Demonstration of Centrifugal Pump.	Centrifugal pump	01	01	Yes
4	Study and Demonstration of Joule's paddle wheel experiment.	Demo model/Apparatus	01		Yes
5	Determination of Dryness fraction using separating throttling calorimeter.				No
6	Determination and Verification of SFEE for Nozzle.				No
7	Determination of actual Coefficient of performance of House hold refrigerator.	Vapour compression cycle	01	01	Yes
8	Numerical Assignment on Unit III (Minimum five Problems)	Study	01		Yes
9	Numerical Assignment on Unit IV. (Minimum five Problems)	Study	01		Yes
10	Numerical Assignment using steam	Study	01		Yes

	table/Mollier chart on Unit V. (Minimum five Problems)				

Class: - S.E (Mechanical)

Subject: - **Fluid Mechanics – TW – 25**

Sr. No.	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct	Quantity		Whether experiment can be conducted
			Required	Available	
1	Experiment on Red wood viscometer	Red wood viscometer	01	01	Yes
2	Experiment on Reynolds's apparatus	Reynolds's apparatus	01	01	Yes
3	Experiment on Bernoulli's theorem	Bernoulli's apparatus	01	01	Yes
4	Experiment on flow measurement by orifice meter	orifice meter apparatus	01	01	Yes
5	Experiment on flow measurement by venturi meter	venturi meter apparatus	01	01	Yes
6	Experiment on determination of metacentric height of a floating body	Demo model	01	01	Yes
7	Trial on centrifugal pumps				N0
8	Experiment on determination of major and minor losses for flow through pipes	Demo model	01	01	Yes
9	Study of sharp edged circular orifice / mouthpieces				N0
10	Study of velocity distribution in boundary layer and its thickness.				N0
11	Study of Manometers.	Manometers	01	01	Yes

Class: - S.E (Mechanical)

Subject: - **Material Science and metallurgy – 25**

Sr. No.	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct	Quantity		Whether experiment can be conducted
			Required	Available	
	GROUP A				
1	Tensile test, to compare tensile strength, yield point and ductility of three Metallic materials.	U.T.M	01	01	Yes
2	Brinell or Poldi hardness test on steel, cast iron, brass.	Hardness Tester	01	01	Yes
3	Vickers hardness test on steel, cast iron, brass.		01		No
4	Rockwell and Rockwell superficial hardness measurement.	Hardness Tester	01	01	Yes
5	Izod or Charpy impact test to compare impact values of cast iron and mild steel Or alluminium and brass.	mpact machine	01	01	Yes
6	Erichsen Cupping Test				No
7	Measurement Non-destructive tests: Dye penetrant test, Magnetic particle testing , ultrasonic testing ,eddy current test.(any two)	Dye penetrate kit	01	01	Yes
	GROUP B				
8	Micro Specimen Preparation and use of metallurgical microscope	Sample Microscope	01	01	Yes
9	Study and drawing microstructure of mild steel, medium carbon, eutectoid Steel, hypereutectoid steel.	Sample Microscope	01	01	Yes
10	Demonstration of Annealing,Normalising and				No

	Hardening of medium carbon Steel specimens and measurements of hardness and drawing icrostructures.				
11	Jominy Hardenability test.	Jominy Hardenability test.	01	01	Yes
12	Study and drawing microstructure of white, malleable, gray and ductile cast Iron or any four non-ferrous metals.	Sample Microscope	01	01	Yes
13	Observe and record the microstructures of heat affected zones of fusion welded Joint.	Sample Microscope	01	01	Yes

Class: - S.E (Mechanical)

Subject: - **Workshop Practice-III – 25**

Sr. No.	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct	Quantity		Whether experiment can be conducted
			Required	Available	
1	Carpentry shop	Wood lathe M/c			Yes
2	Foundry Shop	Furnace			Yes
3	Welding Shop	Spot, M.I.G, welding transformer			Yes
4	Machine shop-I (Turning Shop)	Lathe m/c			Yes

Class: - S.E (Mechanical)

Subject: - **Machine Drawing - TW – 50**

Sr. No.	Experiment Title	Name of Equipment,	Quantity		Whether experiment can
			Required	Available	

		Machinery Instrument etc. Required to Conduct			be conducted
1	Assembly and details of a machine unit.	Sample model	05		Yes
2	Assembly and details of a machine unit.	Sample model	05		Yes

Class: - S.E (Mechanical)

Subject: - **Basic Electrical Drives & Controls -TW -50**

Sr. No.	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct	Quantity		Whether experiment can be conducted
			Required	Available	
1	Speed control of DC Shunt motor by armature control and flux control Methods.	D.C .Ammeter, Multimeter	02,01	02,01	Yes
2	Load test on DC Shunt Motor.	Shunt motor	1	1	Yes
3	Load test on DC Series Motor.	Series motor	1	2	Yes
4	Measurement of active power in a three phase balanced inductive load Using two wattmeter methods.	Watt meter, Inductive load	02,01	4,2	Yes
5	Regulation of an alternator by synchronous impedance method.	Rheostat, Tachometer	1	1	Yes
6	Regulation of an alternator by Direct Loading method.	Watt meter	1	2	Yes
7	Load Test on three Phase Induction Motor	Ammeter, Voltmeter	2	2	Yes
8	Study of D.C. Motor Starters & Three Phase Induction Motor	Starters, & I.M	01	--	Yes

	Starter.				

Class: - S.E (Mechanical)

Subject: - **Applied Thermodynamics Lab - 25**

Sr. No.	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct	Quantity		Whether experiment can be conducted
			Required	Available	
	Following Three Compulsory				
1	Determination of heating value of a solid / liquid fuel using Bomb Calorimeter.	Bomb Calorimeter.	01	01	Yes
2	Exhaust gas analysis using Gas Analyzer OR Orsat Apparatus.	Orsat Apparatus	01	01	Yes
3	Determination of Isothermal and Volumetric efficiency of reciprocating air Compressor.	Reciprocating air Compressor	01	01	Yes
	Following any Five				No
4	Study of boiler draught.	Sample model	01		Yes
5	Study of High pressure boiler.	Sample model	01		Yes
6	Study of Steam condensers and cooling towers.	Sample model	01		Yes
7	Study of Steam Nozzles and diffusers.	Sample model	01		Yes
8	Study of Steam Power Plant.				No
9	Visit to any thermal power plant, prepare a detailed visit report.	Sample model	01		Yes
10	Evaluation of Boiler efficiency by Direct and Indirect Method				

	(Through Numerical).				

Class: - S.E (Mechanical)

Subject: - **Theory of Machines-I - 25**

Sr. No.	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct	Quantity		Whether experiment can be conducted
			Required	Available	
1	Drawing sheets on ICR method (2 problems), relative velocity and acceleration method (4 problems) and Klein's construction (2 problems)	Transparency	01	01	Yes
2	To study the various inversions of kinematic chains. (Assignment)	Transparency	01	01	Yes
3	To determine slip and creep for a belt- pulley combination.	Test rig of sleep & creep of belt	01	01	Yes
4	To determine mass moment of inertia of compound pendulum.	Vibration Lab, Test rig	01	01	Yes
5	To determine mass moment of inertia of rigid body by using bifilar or trifilar suspension method	Working model	01	01	Yes
6	To study the different types of clutches.(Assignment)	Transparency	01	01	Yes

Class: - S.E (Mechanical)

Subject: - **Workshop Practice-IV - 25**

Sr.	Experiment Title	Name of	Quantity	Whether

No.		Equipment, Machinery Instrument etc. Required to Conduct	Required	Available	experiment can be conducted
1	Machine shop-II				
2	CNC Lathe				
3	VMC (CNC Milling).				

Facilities for conducting Practical's in the Laboratories Name of Course :

MECHANICAL ENGINEERING Class: - T.E. Sem - V

Subject: **- Heat Transfer (25)**

Name of the Department / Section: - MECHANICAL ENGINEERING

Subject wise & laboratory wise Lists of material, machinery, equipment & Instrument required performing prescribed Practicals

Sr. No.	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct	Quantity		Whether experiment can be conducted
			Required	Available	
1	Determination of thermal conductivity of metal rod.	Thermal conductivity apparatus	01	01	Yes
2	Determination of thermal conductivity of insulating powder.	Insulating powder apparatus	01	01	Yes
3	Determination of thermal conductivity of composite wall.	Composite wall apparatus	01	01	Yes
4	Determination of heat transfer coefficient in natural convection.	natural convection apparatus	01	01	Yes
5	Determination of heat transfer coefficient in forced convection.	forced convection apparatus	01	01	Yes

6	Determination of temperature distribution, fin efficiency in natural and forced convection.	Pin.fin apparatus	01	01	Yes
7	Determination of emissivity of a test surface.	Emissivitymeasurement apparatus	01	01	Yes
8	Determination of Stefan Boltzmann constant	Stefan Boltzmann apparatus	01	01	Yes
9	Study of pool boiling phenomenon and determination of critical heat flux				No
10	Determination of LMTD, overall heat transfer coefficient and effectiveness of heat exchanger in parallel and counter flow arrangement.	Heat exchanger appratus	01	01	Yes
11	Determination of heat transfer from a heat pipe.				No
12	Calibration of thermocouple.				No

Class: - T.E (Mechanical)

Subject: - **Internal Combustion Engine - 25**

Sr. No.	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct	Quantity		Whether experiment can be conducted
			Required	Available	
1	Study of cooling systems.	Model &chart	01	01	Yes
2	Study of lubrication systems	Model &chart	01	01	Yes
3	Study of simple and Solex carburetors.	Model &chart	01	01	Yes

4	Study of fuel pump and fuel injector.	Model &chart	01	01	Yes
5	Trial on a petrol engine and calculation of air/fuel ratio, volumetric, thermal and mechanical efficiencies.	Petrol Engine	01	01	Yes
6	6) Trial of a Diesel engine and calculation of air/fuel ratio, volumetric, thermal and mechanical efficiencies.	Diesel Engine	01	01	Yes
7	Morse test and determination of bsfc and isfc	Petrol Engine	01	01	Yes
8	Study of combustion chambers of SI engines.	Model &chart	01	01	Yes
9	Study of combustion chambers of CI engines.	Model &chart	01	01	Yes
10	Study and demonstration of mechanical and Pneumatic governors.				N
11	Study and analysis of exhaust emission from the engine (PUC).				N

Class: - T.E (Mechanical)

Subject: **- Machine Design – I (25)**

Sr. No.	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct	Quantity		Whether experiment can be conducted
			Required	Available	
1	Total five assignments (One on each unit - only Numerical)				
2	Design Report: - The design project shall consist of assembly drawing with a part list and overall dimensions and the other sheet	Sample model	01		Yes

	involving drawing of individual components using AUTO CAD on A3 size paper. Manufacturing tolerances, surface finish symbols and geometric tolerances should be specified so as to make it working drawing.				

Class: - T.E (Mechanical)

Subject: - **Theory of Machine – II (25)**

Sr. No.	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct	Quantity		Whether experiment can be conducted
			Required	Available	
1	To determine the characteristic curves of the centrifugal governor and find its coefficient of insensitivity and stability.	Centrifugal governor	01	01	Yes
2	To study various types of gear boxes.	Sample model	01	01	Yes
3	To verify the principle of working of gyroscope.	Gyroscope	01	01	Yes
4	To study the static & dynamic balancing machine & balancing of masses in different planes	Balancing machine	01	01	Yes
5	To study graphical methods and prepare drawing sheets for – Drawing sheet 1:- Balancing of rotating masses and reciprocating				Yes

	masses. (2 Problems)				
6	To study graphical methods and prepare drawing sheets for Drawing sheet 2: Draw cam profile for various types of follower motion.				Yes

Class: - T.E (Mechanical, Term work – 50)

Subject: - **Computer Graphics**

Class: - T.E (Mechanical, Term work – 25) Subject: -

Industrial Training / EDP / SS

SEM - VI

Class: - T.E (Mechanical) Subject: **MD-II LAB (25)**

Sr. No.	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct	Quantity		Whether experiment can be conducted
			Required	Available	
1	Total five assignments (One on each unit - only Numerical)				Yes
2	Design Report: - The design project shall consist of two imperial size sheets- one involving assembly drawing with a part list and overall dimension and the other sheet involving drawing with of individual components & also using AUTO CAD on A3 size paper. Manufacturing tolerances, surface finish symbols and geometric tolerances should be specified so as to make it working drawing.	Sample model	01		Yes

Class: - T.E (Mechanical)

Subject: - **Metrology and Quality Control - 25**

Sr. No.	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct	Quantity		Whether experiment can be conducted
			Required	Available	
1	Determination of linear/angular dimensions of part using precision & non precision instrument.	Vernier, micrometer, Height gauge, slip gauge, sine bar, bevel	01	01	Yes
2	Machine tool alignment tests on any machine tool like Lathe, Drilling, Milling	Dial gauge	01	01	Yes
3	Interferometer-Study of surfaces using optical flat.	Optical flat, Interferometer	01	01	Yes
4	Surface finish measurement	Surface finish measurement apparatus	01	01	Yes
5	Measurement of roundness/circularity using mechanical comparator.	Vee block, Dial gauge	01	01	Yes
6	Measurement of screw parameters	Floating carriage, micrometer	01	01	Yes
7	Measurement of Gear parameters i) gear tooth thickness ii)constant chord iii)PCD	Gear tooth, Vernier Caliper	01	01	Yes
8	Study and applications of tool makers microscope	Tool makers microscope	01	01	Yes
9	Use of profile projector	Profile projector	01	01	Yes

10	Study and use of control charts	Charts	01	01	Yes

Class: - T.E (Mechanical)

Subject: - **Turbo M/C Lab – 25**

Sr. No.	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct	Quantity		Whether experiment can be conducted
			Required	Available	
1	Study of steam turbine power plant.	Charts	01		Yes
2	Study of steam turbine systems. a) Methods of compounding b) Methods of governing c) Losses in steam turbine d) Lubrication system.	Charts	01		Yes
3	Trial on steam turbine				No
4	Study of gas turbines	Charts	01		Yes
5	Study of hydraulic turbines.	Charts	01		Yes
6	Trial on pelton wheel.	Pelton turbine			Y
7	Trial on Francis turbine	Francis turbine			Y
8	Trial on Kaplan turbine.	Kaplan turbine			Y
9	Trial on gas turbine plant.				No
10	Study of various jet propulsion devices / engine.	Charts	01		Yes
11	Visit to hydraulic power plant.				No

Class: - T.E (Mechanical)

Subject: - **C/C++– 25**

Sr. No.	Experiment Title	Name of Equipment,	Quantity		Whether experiment can
			Required	Available	

		Machinery Instrument etc. Required to Conduct			be conducted
1	Modeling of any three Machine Component.	Software	15	15	Yes
2	To draw any two assembly of Mechanical Component 1)Assembly of Tool Holder 2)Assembly of Milling Jig	Software	15	15	Yes

Class: - T.E (Mechanical, Term work – 50)

Subject: - **Minor Project**

Class: - T.E (Mechanical, Term work - 25)

Subject: **Seminar-I**

Facilities for conducting Practical's in the Laboratories

Name of Course : MECHANICAL ENGINEERING

Class: - B.E. Sem - VII

Name of the Department / Section: - MECHANICAL ENGINEERING

Subject wise & laboratory wise Lists of material, machinery, equipment & Instrument required performing prescribed Practicals

Subject: **-Computer Aided Design and Computer Aided Manufacturing (25)**

Sr. No.	Experiment Title	Name of Equipment, Machinery Instrument etc.	Quantity		Whether experiment can be conducted
			Required	Available	

		Required to Conduct			
1	A. Introduction to Modeling (Using any CAD software). 1. 2D drawing using sketcher- 2 Drawings 2 Hrs. 2. 3D modeling using 3D features (Modeling of Screw jack, Brake Pedal, Clutch, Steering linkages, Carburetor, F.I.P., any four components) 3. Assembling and drafting (Any 2 above mentioned assemblies) with proper mating conditions and interference checking. 4. Surface Modeling (Any 2 of the above assemblies). 4 Hrs.	Software	15	15	Yes
2	B. Computer Aided Manufacturing 1. Manual Part programming on CNC Lathe and CNC Milling to generate tool Path, NC Code and optimization of tool path (to reduce machining time) Using any cam software. 4 Hrs.	Software	15	15	Yes

Class: - B.E (Mechanical, Term work – 25)

Subject: **Refrigeration and Air Conditioning**

Sr. No.	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct	Quantity		Whether experiment can be conducted
			Required	Available	
1	Trial On Air Conditioning Test Rig	Test Rig	1	1	Yes
2	Study of evacuation and charging of refrigeration system.	Chart (Visit	1	1	Yes
3	Study of expansion devices, solenoid Valve and safety devices used in vapor compression system.	Chart	1	1	Yes
4	Trial On Ice Plant	Test Rig	1	1	Yes
5	Study Of Hermetically Sealed Compressor	Compressor Model	1	1	Yes
6	Study Of Measuring Instrument’s	Chart	1	1	Yes

	And Various Tools Used In Refrigeration And Air Conditioning Systems				
7	Study and trial on vapour absorption refrigeration system.	Test Rig	1	1	Yes
8	Trial on vapour compression refrigeration system.	Test Rig	1	1	Yes

Class: - B.E (Mechanical, Term work – 25)

Subject: **Automobile Engineering – I**

Sr. No.	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct	Quantity		Whether experiment can be conducted
			Required	Available	
1	Study of layout of a chassis and it's different components of a vehicle	Chasis and Vehicle	1	1	Yes
2	To study modern trends in automobile	Automobile	1	1	Yes
3	Study of different types of Tyres, Tubes and their defects	Tyres	1	1	Yes
4	Study of troubleshooting in various suspension systems	Suspension System	1	1	Yes
5	Study of troubleshooting in power steering systems	Steering System	1	1	Yes
6	Study of impact on Steering geometry angle of vehicle	Steering System	1	1	Yes

Class: - B.E (Mechanical, Term work – 25)

Subject: Project-I

Class: - B.E (Mechanical, Term work – 25)

Subject: Seminar-II

Class: - B.E (Mechanical, Term work – 25)

Subject: Industrial Visit

Facilities for conducting Practical's in the Laboratories

Name of Course : **MECHANICAL ENGINEERING**

Class: - B.E. Sem - VIII

Name of the Department / Section: - MECHANICAL ENGINEERING

Subject wise & laboratory wise Lists of material, machinery, equipment & Instrument required performing prescribed Practicals.

Class: - B.E (Mechanical, Term work – 25)

Subject: - **Mechanical Vibration (25)**

Sr. No.	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct	Quantity		Whether experiment can be conducted
			Required	Available	
1	To study the longitudinal vibrations of helical spring & to determine the frequency or period of vibration (oscillation) theoretically& actually by experiment.	Spring, Accessories Masses	1	1	Yes
2	Study the Undamped free vibration of equivalent spring mass system.	Springs, Beam, Rotor Exciter Accessories masses.	1	1	Yes
3	To study the torsional vibration (undamped) of single Rotor shaft system.	Torsion wire, Disc, Clamp	1	1	Yes

4	To study the free vibrations of two rotor system and to determine the natural frequency of vibration theoretically and experimentally.	Torsion wire, 2 Discs	1	1	Yes
5	To study the forced vibrations of equivalent spring mass system.	Damper, Viscous Damper, Beam, Rotor Exciter, Dimmer Paper Roller	1	1	Yes

Class: - B.E (Mechanical, Term work – 25)

Subject: **Finite Element Analysis and Simulation Techniques**

Sr. No.	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct	Quantity		Whether experiment can be conducted
			Required	Available	
1	Analysis of Trusses.	Software			Yes
2	Modal Analysis of Spring-Mass System.	Software			Yes
3	Modal Analysis of continuous System.	Software			Yes
4	Thermal analysis of any component.	Software			Yes
5	Stress strain analysis of any component.	Software			Yes

Class: - B.E (Mechanical, Term work – 25)

Subject: **Power Plant Engineering**

Sr. No.	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct	Quantity		Whether experiment can be conducted
			Required	Available	

1	Study of Fluidized Bed Combustor.		1	1	Yes
2	Study of Environmental Impact of Thermal Power Plant.		1	1	Yes
3	Study of Demand supply scenario of Electricity.		1	1	Yes
4	Study or visit of Co-generation Plant.				
5	Study or visit of Non conventional power plant.				
6	Efficiency measurement of Standalone Solar PV System.		1	1	Yes
7	Measurement of current-voltage characteristics of two solar cells connected a) in series and b) in parallel.				

Class: - B.E (Mechanical, Term work – 25)

Subject**: Industrial Lecture**

Class: - B.E (Mechanical, Term work – 75)

Subject: **Project-II**

Item No.26

A) Facilities for conducting Practicals in the Laboratories

Name of Course : **Mechanical** Class: - **S.E. Subject: - Workshop Practice -III**

Name of the Department / Section:- **Workshop**

Subject wise & laboratory wise Lists of material, machinery, equipment & Instrument required performing prescribed Practicals

Sr.No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt. can be conducted
			Required	Available	

1	Machine Shop I (Turning Shop) - One Job (by each student) consisting of turning, thread cutting (Internal, External), Facing, Plain Turning, Taper turning , Step turning, Chamfering, Grooving, Drilling, Boring, Reaming, Knurling etc. Operations.	1) Lathe Machine 2) Vernier caliper 3) H.S.S. cutting tool 4) Screw pitch gauge 5) Knurling tool 6) Drill (20 m.m.) 7) boring tool 8) V threading tool 9) Shaper machine 10) Drilling machine 11) Grinder	16 20 20 05 05 02 10 05 01 01 02	16 30 40 05 05 02 10 05 01 04 02	Yes
2	Carpentry shop: Preparation & Manufacturing of solid wooden pattern for foundry shop involving wood turning lathe machine.	1) Measuring Tape 2) Try Square 3) Marking Gauge 4) Metal Jack plane 5) Tenon saw 6) Mortise chisel 1” 7) Firmer chisel 25 mm 8) Chisel 1" & 2 1/2” 9) Chisel 2” 10) Wooden mallet 11) File 12) Carpentry Bench Vice 13) Screw driver 14) Hand drill M/C 15) Wood Turning Set 16) Wood Turning Lathe M/C. 17) Caliper (inside) 18) Caliper (outside) 19) Contraction slide rule	5 20 20 20 20 20 20 12 12 20 20 20 2 5 8 8 10 10 14	5 20 20 20 20 20 20 12 12 20 20 20 2 5 4 set 4 10 10 4	Yes

3	Foundry shop- Mold making Practice: Preparation of mould of above pattern, casting from this mould. Actual weight calculation, Yield & costing of item should be performed.	1)Moulding Boxes 300x300x100 mm 2) Moulding Boxes 450x450x100 mm 3) Moulding tool set 4) Moulding closing pin Round 5) Moulding Box bush round 6) Blower (Air fan) 01 h.p. 3 ph 2880 rpm & pit furnace	10 10 02 20 40 1	10 10 02 20 40 1	Yes
4.	Welding shop- One job on welding (fabrication) preparing a component comprising welding joints such as shoe rack, book rack, stands for flower pots, house hold applications, stools etc. (Group of 4 to 5 students)	1) Hack saw frame 2) Flat file 3) Hammer 4) Measuring tape 5) Try square 6) Bench vice 7) Welding transformer 8) Hand screen 9) Hand gloves 10) Chipping hammer 11) MIG Welding	20 20 05 03 20 16 03 18 12 06 01	24 20 05 02 20 16 03 16 12 06 01	Yes

Item No.26

A) Facilities for conducting Practicals in the Laboratories

Name of Course : **Mech.** Class: - **S.E.** Subject: - **Workshop Practice -IV**

Name of the Department / Section:- **Workshop**

Subject wise & laboratory wise Lists of material, machinery, equipment & Instrument required performing prescribed Practicals

Sr. No	Experiment Title	Name of Equipment, Machinery Instrument etc. Required to Conduct Experiment	Quantity		Whether expt. can be conducted
			Required	Available	
1	Machine Shop II (Turning Shop) - One composite job by each student involving different machining operations on lathe, Milling, Drilling, Shaper, Grinding machines.	1) All geared lathe M/C 2) Milling M/C 3) Machine Vice 4) Power hack saw M/C 5) Verniner caliper 6) Drilling M/C 7) Dial test indicator 8) Cutters 9) HSS tool 10) Spanner set 11) Shaper machine 12) Grinder	16 02 04 01 20 02 03 02 20 01 01 01	16 02 04 01 30 04 03 16 40 01 01 02	Yes
2	CNC Lab: CNC Lathe: One job for programming and manufacturing on CNC Lathe machine for each student consisting operations like Turning, Thread Cutting (Internal or External), Facing, Plain Turning, Taper Turning, Step Turning, Chamfering, Grooving, Drilling etc. operations.	1) CNC lathe machine 2) Vernier caliper 3) Spanner set	01 05 01	01 10 01	Yes
3	VMC (CNC Milling) One job of programming and manufacturing on VMC ,CNC milling machine for each student performing drilling, tapping, milling etc.	1) CNC milling machine 2) Vernier caliper 3) Spanner set 4) End Mill cutter	01 05 01 01	01 10 01 04	Yes

DEPARTMENT OF BUSINESS ADMINISTRATION

Details of Major Equipments of Laboratory

NAME OF THE DEPARTMENT: - M.B.A.

Sr.No	Name of the laboratory/Workshop Detail	**Major Equipment above 50,000/-**
01	Computer Lab-01	**-NIL-** .

Lab In charge

H.O.D. (MBA)

COLLEGE OF ENGINEERING AND TECHNOLOGY,
BAMBHORI POST BOX NO. 94, JALGAON – 425001. (M.S.)

(With NBA Accredited Programmes)

Website : www.sscoetjalgaon.ac.in Email : sscoetjal@gmail.com

Mandatory Disclosure

Part-II

January 2018

Shrama Sadhana Bombay Trust's
COLLEGE OF ENGINEERING AND TECHNOLOGY
BAMBHORI, POST BOX NO. 94, JALGAON – 425001 (M.S.)
Included under section 2 (f) & 12 (B) of the UGC Act, 1956
Grade B ++ (2.91) NAAC Accredited

ISO 9001:2008

Website- www.sscoetjalgaon.ac.in
Email: sscoetjal@gmail.com
Principal: Dr. K.S.Wani
M. Tech., DBM, Ph.D.

Phone No. (0257) 2258393
Fax No. (0257) 2258392

Ref. No. COET/AICTE/MD/ / 18 **Date:**

C E R T I F I C A T E

Certified that all enclosures contained in PART-I , PART-II & PART-III bearing page no. to page no. are pertaining to our institution which are being submitted in two separate above mentioned bound booklets/box file of Mandatory Disclosure. All xerox copies may be treated as original.

PRINCIPAL

Computing Facilities Existing for the existing Programmes

Sr. No.	Particulars	Availability
01.	No of Computer Terminals	1011
02.	Hardware Specification	Core 2 Duo and Higher Specifications = 1011
03.	No of Terminals on LAN/WAN	1011
04.	Relevant Legal Software	• 54 System software packages • 69 Application software packages
05.	Peripherals / Printers	• Printers= 85 • Scanners = 9
06.	Internet Accessibility (in kbps & hrs)	• Leased Line = 48Mbps

College is having Wireless and OFC Connectivity through out the Campus

Central Computing Facility

1	Number of Systems available	37
2	Configuration of the Systems	HCL EZEEBEE, Intel Core 2 Duo Processor @2.93 GHz, 3GB DDR3 RAM, 320 GB SATA HDD, DVD Writer, 18.5“ TFT Monitor, G-41 Motherboard, Keyboard, Mouse
3	Total Number of Systems Connected in LAN	37
4	Total Number of Systems Connected in LAN	37
5	Internet band width	• Leased Line = 48 Mbps

Sports Facilities Available

a) List of outdoor facilities

Sr. No	Games	Area	Facility
01	Football	102m*68m	Playground (01)
02	Cricket	50 Yards(45m radius)	Playground (01)
03	Volleyball	9m*18m	Playground (02)
04	Basketball	28m*15m	Basketball Court(01)
05	Kho-Kho	29m*16m, 25m*14m	Playground (01)
06	Kabaddi	13m*10m, 12m*10m	Playground (02)
07	Handball	40m*20m	Playground(01)
08	Athletics	300m Track	Playground(01)
09	Archery	50m Range	Playground(01)
10	Hockey	45m*90m	Playground(01)

b) List of indoor facilities

01	Badminton Court	13.40m *6.10m	Separate for Boys & Girls
02	Gymnasium	NA	Common for Boys & Girls
03	Table Tennis	NA	Separate for Boys & Girls
04	Chess	NA	Separate for Boys & Girls
05	Carom	NA	Separate for Boys & Girls
06	Billiards	NA	For staff
07	Fencing	NA	Yoga Hall

c) Total Ground Area

01	Details	Available Area (sq.mtr.)
02	Play Ground	12,204
03	Basket ball Court	1,140
04	Gym and Sports Office	226
05	Bad Minton court	988
06	**Total**	**14,558 sq.mtr**

Students Performance: 2016-17

Achievements at Intercollegiate Level

Year	No of Teams Played	No of Students Played	Events
2011-12	21	178	Football , Badminton, Table Tennis ,Chess, Basket Ball, Volley Ball, Cricket, Kabbadi, Fencing, Hockey, Handball, Boxing, Archery, Swimming, Athletics, Kho –Kho, Lawn-Tennis, Judo, Rifle, Pistol Shooting, Taekwondo.
2012-13	17	195	
2013-14	25	216	
2014-15	29	228	
2015-16	32	240	
2016-17	30	261	

Achievements at Inter Group Level

Year	No. of Students Selected	Participation in Events
2011-12	50	Football , Badminton, Table Tennis ,Chess, Basket Ball, Volley Ball Cricket, Kabbadi, Weight Lifting, Fencing
2012-13	68	Football , Badminton, Table Tennis ,Chess, Basket Ball, Volley Ball Cricket, Kabbadi, Weight Lifting, Fencing
2013-14	67	Football , Badminton, Table Tennis ,Chess, Basket Ball, Volley Ball, Cricket, Kabbadi, Fencing, Hockey, Handball, Boxing, Archery, Swimming, Athletics, Kho –Kho.
2014-15	69	Football , Badminton, Table Tennis ,Chess, Basket Ball, Volley Ball, Cricket, Kabbadi, Fencing, Hockey, Handball, Boxing, Archery, Swimming, Athletics, Kho –Kho.
2015-16	86	Football , Badminton, Table Tennis ,Chess, Basket Ball, Volley Ball, Cricket, Kabbadi, Fencing, Hockey, Handball, Boxing, Archery, Swimming, Athletics, Kho –Kho, Lawn-Tennis, Judo, Rifle, Pistol Shooting, Taekwondo.
2016-17	107	Football , Badminton, Table Tennis ,Chess, Basket Ball, Volley Ball, Cricket, Kabbadi, Fencing, Hockey, Handball, Boxing, Archery, Swimming, Athletics, Kho –Kho, Lawn-Tennis, Judo, Rifle, Pistol Shooting, Taekwondo.

Achievements at Inter University Level

Year	No. of students played at zonal level	No of Students Selected in university	Event
2011-12	50	12	Basket Ball, kho-kho, Fencing, Table Tennis, Badminton, Hockey,
2012-13	68	12	Chess, Basket Ball, Archery, Kho Kho, Fencing, Rifle Shooting
2013-14	67	21	Football , Table Tennis , Basket Ball, Volley Ball, Cricket, Fencing, Archery, Swimming, Kho-Kho.
2014-15	69	21+ 07 (Ashwamedh)	Football , Table Tennis , Basket Ball, Volley Ball, Fencing, Archery, Swimming, Kho-Kho, Chess
2015-16	85	15+02 (Ashwamedh)	Chess, Table Tennis, Football , Swimming, Lawn-Tennis, Kabbadi, Badminton, Handball, Basket Ball, Archery, Volley Ball, Boxing, Judo, Athletics, Kho –Kho, Cricket, Fencing, Rifle, Pistol Shooting, Taekwondo, Hockey.
2016-17	107	16+04 (Ashwamedh)	Chess, Table Tennis, Football , Swimming, Lawn-Tennis, Kabbadi, Badminton, Handball, Basket Ball, Archery, Volley Ball, Boxing, Judo, Athletics, Kho –Kho, Cricket, Fencing, Rifle, Pistol Shooting, Taekwondo, Hockey.

Host for Intercollegiate Tournament

Year	Event	Number of Teams Participated	
		Boys	Girls
2011-12	Table tennis	04	02
	Hockey	05	--
2012 -13	Foot Ball	07	--
	Basket Ball	07	03
2013-14	Table Tennis	05	03
	Hockey	03	-
2014-15	Hockey	03	-
	Football	04	-
2015-16	Hockey	03	-
2016-17	Hockey	04	-

Annual Sports Inter Branch

Year	No. of Students participated	Participation in Events
2011-12	**Boys – 486** **Girls - 198**	Football , Badminton, Table Tennis ,Chess, Basket Ball, Volley Ball Cricket, Kabaddi, Weight Lifting, Fencing' cross country
2012-13	**Boys – 608** **Girls - 226**	Football , Badminton, Table Tennis ,Chess, Basket Ball, Volley Ball Cricket, Kabaddi, Weight Lifting, Fencing , cross country
2013-14	**Boys - 618** **Girls - 230**	Football , Badminton, Table Tennis ,Chess, Basket Ball, Volley Ball Cricket, Kabaddi, Weight Lifting, Fencing , cross country
2014-15	**Boys - 621** **Girls - 228**	Football , Badminton, Table Tennis ,Chess, Basket Ball, Volley Ball Cricket, Kabaddi, Weight Lifting, Fencing , cross country
2015-16	**Boys - 569** **Girls - 221**	Badminton, Table Tennis, Chess, Basket Ball, Volley Ball Cricket, Kabaddi, Hand Ball, Archery, Snooker, 100mtr. Running.
2016-17	**Boys - 576** **Girls - 234**	Badminton, Table Tennis, Chess, Basket Ball, Volley Ball Cricket, Kabaddi, Hand Ball, Archery, Snooker, 100mtr. Running.

Soft Skill Development Facilities

The soft skill development facilities are provided at the Department Level by each Department and at College level through Training and Placement cell which is headed by Training and Placement Officer.

The College signed MOU with Treezec E Solutions, Mumbai for personality development and aptitude test for success in professional & personal life.

The Training and Placement Cell caters to soft skill development in the following areas:

a) Work ethic

b) Courtesy

c) Teamwork

d) Self-discipline and self confidence

e) Conformity to prevailing norms pertaining to dress, body language, tone of voice and vocabulary according to the particular culture of the given work place

f) Language Proficiency and environmental awareness

APPENDIX - 1

LAND

Enclose with appendix 01, 7/12 extracts or other documents showing ownership of land on which the buildings are constructed.

Particulars of ownership of land of Engineering college only do not club with polytechnic or otherst

Sr.No	Date of Purchase or Acquisition	Gut No.or Survey No	Area in Hacters	Present ownership title
01	**The Collector, Jalgaon vide letter No.3-RR4431, dated 17/10/1984**	**280**	**9.56**	**Shram Sadhana Sadhana Bombay Trust**
02	**The Collector, Jalgaon vide letter No.3-RR4431, dated 17/10/1984**	**290**	**0.44**	**Shram Sadhana Sadhana Bombay Trust**
	Total Area		**10.00**	

SSBT'S COLLEGE OF ENGINEERING & TECH. BAMBHORI,JALGAON.

Department: - 11) **Applied Science**

Building wise/Department wise space allocation

Sr. No.	Particulars/Details	Room No.	Size Maximum m x m	Carpet Area in Sq m.	Remarks
1	HOD Cabin	G41	3 x 6	18	Administrative
	Dept office	G40A,B	3x9	27	
2	Staff Cabin	B14(A)	3 x 6	18	Administrative
		B15	3x3	9	210
		G 34A,B	3x7.5	22	
		G35 A,B	3x7.5	22	
		G37A,B	3x9	27	
		G38	3 x6	18	
		G39A,B	3x9	27	
		320A	3x7.5	22 – 165	
3	Class Room	130	9 x 9	81	Instructional
		131	9 x 9	81	999
		132	9 x 9	81	
		133	9 x 9	81	CR 8
		229	9 x 9	81	648
		230	9 x 9	81	
		232	9 x 9	81	
		233	9 x 9	81	
		114	12 x 9	108	Tran. to Civil

		321	12 x 9	108	Tran. to Civil
4	Drawing Hall/ class Room	G37	15x9	135	
5	Laboratories				Instructional
	1) Physics Lab	B14	15 x 9+3 x 3	144	522
	2) Chemistry Lab	G 40	15 x 9	135	
	3) Environment lab	G 34	12 x 9	108	NR
	4) Language & audio visual lab	G 39	15 x 9	135	NR Furniture
6	Toilet	228 306	2x3 x 3 2x3x6	18 18	Amenities
	Passage Stair		54x3 3x4.5	162 13.5	Circulation & other 175
	Total				

Total Instructional area =1816

Total Administrative area = 210

Total Amenities area= 36

DEPARTMENT OF BIOTECHNOLOGY

Department wise area statement details of Biotechnology Department

Sr.No	Particulars	Room No.	Size (M X M)	Carpet area Sq.M	Remarks
1	Departmental office	236(A)	6 x 3	18	**Administrative**
2	HOD Cabin	234	6 x 3+6x2	30	
3	Staff Cabin	238A	3x4	12	
		239A	3 x 4	12	
4	Class Room	223	6x9	54	**Instructional**
		224	6x9	54	
		225	6x7.5	45	
5	Faculty Room	226	4x9	36	
6	Tutorial Room	111A	5.5x6	33	
7	Seminar Hall with Chemical Engg.	308	18x9	162	
8	**Laboratories**				**Instructional**
9	1. Microbiology	238	9 x 9- 3x 4	69	Developed
	2. Biochemistry	239	9 x 9- 3x 4	69	Developed
	3. Fermentation Biotechnology	242	4.8 x 9 +3 x 7.5	66	Developed
	4. Bioprocess Engineering	241	9 x 7.3	66	Developed
	5. Bioprocess Modeling & Simulation/ Computer Lab	243	4.8 x 9 + 3 x 7.5	66	Developed
	6. Immunology Lab/ Molecular Biology and Genetic Engineering	235	9 x 7.3	66	Developed
	7. Project Lab	234	3 x 7.5 _ 5 x 9	68	Developed
	8. Plant Tissue Culture Lab	245	7.5x9	68	Developed
	9. Bioinformatics	111	12x9	108	Developed
	10. Down Stream Processing Lab	M001A	8.8 x 7.5	66	Developed
	11. Research Lab	227	9 x 7.3	66	Developed
10	Toilet	240	3x3	9	Amenities
11	Passage	GF, FF, SF	66 x 3 1x3x4.5	198 13.5	Circulation and others 212 Sq.M
				Total	**1442 Sq.M**

H.O.D. (MBA)

Sr.No	Particulars	Room No.	Size (M X M)	Carpet area Sq.M	Remarks
1	Departmental office	236(A)	6 x 3	18	**Administrative**
2	HOD Cabin	234	6 x 3+6x2	30	
3	Staff Cabin	237A 238A 239 227[a]	3x4 3 x 4	12 12	
4	Class Room	224	6x9	54	

	Tutorial Room	225	6x9	54	**Instructional**
		B12	6x7.5	45	
	Tutorial Room	226			
		11A			
5	Seminar Hall with Chemical Engg.	308	18x9	162	
6	**Laboratories**				**Instructional**
9	12. Microbiology	238	9 x 9- 3x 4	69	Developed
	13. Biochemistry	239	9 x 9- 3x 4	69	Developed
	14. Bioprocess Engineering	242	4.8 x 9 +3 x 7.5	66	Developed
	15. Fermentation Technology	241	9 x 7.3	66	Developed
	16. Bioinformatics Lab	244	4.8 x 9 + 3 x 7.5	66	Developed
	17. Plant Tissue Culture Lab	245	9 x 7.3	66	Developed
	18. Project Lab	235	3 x 7.5 _ 5 x 9	68	Developed
	19. Immunology MBGE	236	7.5x9	68	Developed
	20. Bioinformatics	111	12x9	108	Developed
	21. Down Stream Processing Lab	M001A	8.8 x 7.5	66	Developed
	22. Research Lab	227	9 x 7.3	66	Developed
10	Toilet	240	3x3	9	Amenities
11	Passage	GF, FF, SF	66 x 3 1x3x4.5	198 13.5	Circulation and others 212 Sq.M
				Total	**1442 Sq.M**

Details of Laboratories and Workshop

NAME OF THE DEPARTMENT: - CHEMICAL ENGINEERING

S.No.	Name of the Laboratory /Workshop Details	Total area of lab./w.s. in m^2	Major equipment* Above 50000/-
01	LAB-1: Mass Transfer- I	68	Absorption in Packed Column, Cooling Tower
02	LAB-2: Mass Transfer- II	68	Bubble Cap Distillation, Ion Exchange, Single Effect Evaporator, Vapor liquid Equilibrium Set Up Apparatus
03	LAB-3: Fluid Flow Operation	66	-
04	LAB-4: Mechanical Operation	66	Rotary Vaccum Filter, Vertical Pressure Leaf Filter
05	LAB-5: Instrumentation	66	-
06	LAB-6: Process Control	66	Dynamic Response of Control Valve Rotameter, Flow Control Trainer, Pressure Control Trainer
07	LAB-7: Project	81	Evaporator Set up , Film Wise Drop Wise Condensation
08	LAB-8: Computer	81	Software Packages: ASPEN HYSIS, U.P.S. With Batteries
09	LAB-9: Chemical Reaction Engineering	90	Rotating Basket Reactor, Continuous Stirred Tank Reactor, Plug Flow Reactor (Coil Type), Cascaded Continuous Stirred Tank Reactor
10	LAB-10: Chemical Technology	90	Viscometric Bath
11	LAB-11: Research	72	FTIR Spectrophotometer, Liquid Ultrasonic Processor Reflectance Meter Digital Electronic Balance

*(Costing ≥ Rs. 50,000/-)

SSBT'S COLLEGE OF ENGINEERING & TECH. BAMBHORI, JALGAON.

Department: - 1) **Civil Engineering**

Building wise/Department wise space allocation

Sr. No.	Particulars/Details	Room No.	Size Maximum m x m	Carpet Area in Sq m.	Remarks
1	Departmental Office	102	4.5 x 6	27	Administrative
2	HOD Cabin	102A	4.5 x 6	27	Administrative
3	Staff Cabin	G16A,13B 104A, 108B 105(A) 105(B) G20 (B) 102 A 314	2x3x4 2x3x4 4.5 x 4.5 6 x 3 3 x 3 7.5x3 6x3	24 24 20 18 09 22 18	Administrative 180
4	Class Room Class Room Class Room Class Room Class Room Class Room Tutorial UG Tutorial P G Tutorial UG	203 205 212 305 114 321 G13A 104B G10A	12 x 9 15 x9 12x9 12x9 12x9 12x9 4.5 x 7.5 6 x 5.5 6x5.65	108 135 108 108 108 108 34 33 PG 34	Instructional 473
5					Instructional
	Seminar Hall	G14	18x9	162	
6	Laboratories				**UG 388**
	1) Engg. Geology Lab	108	10.5 x 9	95	Instructional
	2) TOM I Lab Concrete	G9 + G10	12 x 9- 6x5.5	74	UG
	3) TOM II lab	G10	9X9	81	
	4) Engineering Mechanic I	109	9 x 9	81	PG
	5) Engg. Mechanics II	110	9 x 9	81	12 labs 1101
	6) Geotechnical Lab	G13	18 x 9+9 x 3-3x3- 4.5x7.5	147	
	7) Survey Lab	108 (A)	7.5x9	68	
	8) Fluid Mechanics I	G19	12 x 9-3x4	96	
	9) Fluid Mechanics II	G20	9x9+3x3	90	
	10) Comp lab UG & PG	101	12 x 9	108	
	11) Environmental Lab/ Research Lab	103+104	12 x 9-3x3	99	PG Shared UG
	12) Transportation Lab	105	9 x9	81	
	13) Dept. Library	102C	3x7.5	23	UG
7	Store	G 20 (A)	3 x 3	09	Administrative
8	Toilet	G11+G12 106+107 206+207	3 x 6 3 x 6 3 x 6	18 18 18	Amenities 54
9	Passage, Passage GF, FF, SF Stair	G8 205 212	1.5 x 5.5 6 x 1.5 6 x 1.5 3x51x3 3x 3x4.5	8.25 09 09 459 40.5	Circulation & Other 525
	Total			2803	

Total Instructional area =2029

Total Administrative area = 180

Total Amenities area= 54

Details of Laboratories

Name of the Department:-**COMPUTER ENGINEERING**

Sr. No.	Name of the Laboratory	Total Area of Lab in m^2	Major Equipment above 50,000/-
1	Lab 1 /Data Structure Lab	90	-
2	Lab 2/Embedded System Lab	68	-
3	Lab 3 / ME (CSE) Computer Lab	66	-
4	Lab 4/Digital & Microprocessor Lab	81	-
5	Lab 5/Software Engineering Lab	68	-
6	Lab 6/Programming Lab-I	67	-
7	Lab 7/Database Lab	67	-
8	Lab 8/System Programming Lab	67	-
9	Lab 9/Project Lab	81	-
10	Lab-10/Linux Lab	144	Interactive White Board Veronmake Model No. IB 78 (4*6 feet)
11	Lab-11/Programming Lab-II	71	-
12	Lab-12/ME (CSE) Research Lab	71	-
13	Server Room	56	IBM Server@ 1.26GHz UPS Online 5KVA with Batteries
14	HOD Cabin (Computer)	40	UPS 1 battery 12V-65H-12Nos battery with Maintainance free battery IBM System X3100 M4 Server Desktop, 8 GB RAM, Hard disk 1 TB, Lenovo 18.5 W LED Monitor Lenovo Monitor

SSBT'S COLLEGE OF ENGINEERING & TECH. BAMBHORI, JALGAON.

Department: - 7) **Electronics & Telecommunication Engineering**

Building wise/Department wise space allocation 31.07.13 SAR

Sr. No.	Particulars/Details	Room No.	Size Max. m x m	Carpet Area in Sq m.	Remarks
1	Departmental Office	202A	4.5x6	27	Administrative
2	HOD Cabin	202	4.5 x 6	27	Administrative
3	Staff Cabin	119A 121B 202B,C 209A B 210 211 213ABC 214 215A 216 A 217A1 217B1 201B 311	3.2x3.2 2.4x2.4 2x3 x 7.5 2x3.2x3.2 3 x 3 3 x 3 3 x 2.5x2.5 6 x 3 3.2 x 3.2 3.2x3.2 2.8x2.8 3.2x3.2 3.2x3.2 6.0x3.0	10 6 45 20 9 9 18 18 10 10 8 10 10 18 – 211	Administrative Civil
4	Class Room Tutorial Room **P G** Tutorial Room **U G** Tutorial Room **P G**	301 302 312 313 322 325 119B 220A 221 A	12 x 9 12 x 9 12 x 9 12 x 9 12X9 12x9 6 x5.8 9 x 3.8 9X 3.8	108 108 108 108 108 108 35 PG 34 UG 34 PG	Instructional UD*
5	Seminar Hall	208	18x9	162	Instructional
6	Laboratories 1) Computer lab	119	9 x 9	81	Instructional
	2) EDC Lab	121	12x9- 2.4x2.4	102	**UG**
	3) EM / EI Lab	201	9 x 9-3.2x3.2	71	**PG**
	4) NAS / FOC Lab	213	12x9-3x9	81	
	5) Communication Lab	215	9 x 9-3.2x3.2	71	
	6) RMT Lab	216	9 x 9-3.2x3.2	71	
	7)TV & CE Lab	217(B)	9 x 9-3.2x3.2	71	
	8) E D / TM Lab	217(A)	9.3 x8-2.8x2.8	67	
	9)Basic electronics &project Lab	220	9 x 7.5	68	12 lab 896
	10) EE E/P E Lab	221	12 x 9 -9X3.8	75	*
	11) Comp lab **PG**	209 A	9x9-3.2x3.2	67	PG
	12) Research lab **PG**	209 B	9 x 7.5	71	PG
	13) Library	201(A)	3 x 7.5	22	
7	Toilet	117+118 218+219	3 x 6 3 x 6	18 18	Amenities 36
	Passage Passage GF, FF, SF Passage FF, SF Passage SF Stair Stair	201	3 x 1.5 3x12x3 2x27x3 18x3 3x4.5x4.5 3x3x4.5	4.5 108 162 54 60.75 40.5	Circulation 430
	Total			**2416**	

Total Instructional area = **1830**

Total Administrative area =275

Total Amenities area=**36**

S.S.B.T.'s College of Engineering and Technology, Bambhori, Jalgaon
Electrical Engineering Department

Investment in Laboratories

Sr. No.	Name of the Laboratory	Area (Sq. m.)	Cost in Rs.
1	Measurement/Network Analysis Lab	68	688780
2	Industrial Drives & Control Lab	82	698493
3	Electrical Machine Lab I	75	388187
4	Electrical Machine Lab II	81	584428
5	Power System Lab	67	615821
6	Switch Gear& Protection Lab	68	292670
7	High Voltage Engineering Lab	67	364829
8	Electronic Lab	68	510959
9	Control system Lab	68	119800
10	Computer Lab	83	968218
11	PG Lab	68	505984
12	PG Research Lab	68	1187288
	TOTAL	**863**	**6925457**

SSBT'S COLLEGE OF ENGINEERING & TECH. BAMBHORI, JALGAON.

Information Technology

Building wise/Department wise space allocation

Sr. No.	Particulars/Details	Room No.	Size Maximum m x m	Carpet Area in Sq m.	Remarks
1	HOD Cabin	E210	3.65x5 3.80x1.80	25	Administrative
2	Departmental Office	E209	3.5x7.3	26	Administrative
3	Staff Cabins Staff Cabins **Proposed cabins**	E211-213 E 203 A E 204 A E 205 A E 303A*	3x3x3.65 4x3 7.6 x 3.8 9.1 x 3.5 3.5x3.8	33 12 20 32 **13**	Administrative 206 UD
4	Class Rooms Tutorial Room	E 305 E 311 E 312 E308A	10.80x7.60 11.40x7.60 11.40x7.60 7.8x5.2	82 87 87 40	Instructional 256
5	Seminar Hall	310	18.30x7.60	139	139
6	Laboratories				Instructional
	1)Programming lab / lab3	E201	9.50 x 7.60	72	723
	2) Digital & micro processor / lab 1	E202	9.50 x 7.60	72	
	3) Computer Network /lab 6	E203	11.4 x 7.60	86	
	4) Data base & management / lab 7*	E204	7.60 x 9	68	
	5) Lab 8	E205	9.10 x 9.30	84	
	6) Operating System / lab 5	E206	7.30 x9.50	69	
	7) Data Structure / lab2	E207	7.30 x 9.20	67	
	8) Multimedia / lab 4	E208	7.30 x 9.20	67	
	9)Lab 9 undeveloped	E303	7.60 x 10.80 – 3.5x3.8	69	
	10)Lab 10 undeveloped	E304	7.60 x 8.80	67	
	11) Dept. Library	E205B	9.1x3.5	32	
7	Toilet		2x7.65x3.8	58	Amenities 58
8	Passage SF	SF SF SF TF	11.5x1.80 30.5x1.8 46x2 7.5x2 2x7.5x3.75 41x1.8 3.65x9 2x9.5x3.8 2x6.2x1.9	21 55 92 15 56 74 33 +11 72 24	Circulation 453

Total Instructional area = 1118

Total Administrative area = 206

Total Amenities area= 58

Total Amenities area= 09

SSBT'S COLLEGE OF ENGINEERING & TECH. BAMBHORI, JALGAON.

Department: -4) **Mechanical Engineering**

(7)

Building wise/Department wise space allocation

Sr. No.	Particulars/Details	Room No.	Size Maximum m x m	Carpet Area in Sq m.	Remarks
1	**Departmental Office**	M108	7.5 x 7.6	57	Administrative
2	HOD Cabin	M107	7.5 x 3.6	27	Administrative
3	Staff Cabin	M 2,3,6,7 M109 M110,111 M201 M202 M207 M208 M209 M214	4x3.7x3.7 3.4x3.7 2x3x3.7 3.75x3.5 3X3.5 4.5x3.75 5.75x3.5 3.5x1 4.5x3.75 2.5x3.75	56 13 22 13 10.5 17 20 3.5 17 9	Administrative 295
4	MESA Office	M310	7.5x4	30	Administrative
5	Class Room **SE (B)** **TE (A)** **TE (B)** **BE (A)** **BE (B)** **SE (A)** Tutorial Room **P G*** ~~Tutorial Room **P G***~~	M301 M302 M303 M304 M306 M309 M102 A ~~M 103 A~~	7.5x11 7.5x11.3 7.5x11.3 7.5x11.3 9.5x11.3 9.5 x 11.3 7.5 x4.5 ~~7.5 x 4.5~~	82 85 85 85 107 107 34 P G 34 P G	Instructional 619 Cr 551 PG PG
6	Drawing Hall	M305	9.7x7.5	73	Instructional
7	Seminar Hall	M104	7.5x18.75	141	214
8	Laboratories				Instructional
	1)Heat Transfer Lab	M001	7.5x10.00	75	UG PG 1298
	2) Heat Power Lab	M004	7.5 x18.75	141	UG
	3) RAC lab	M007	**7.5x11.30**	85	PG
	4) Lab	M007A	**7.5x7.45 +2.25x7.5**	**73**	
	5) Computer Lab	M102	7.5x14.5	109	
	6) ~~CAD CAM Lab/~~ Research Lab	M103	~~7.5x14.25~~ 7.5x18.75	~~107~~ 141	Research Institute lab
	7) Tribology Lab	M204	9.5x11.3	107	PG
	8) Materials Science Lab	M203	9.5x11.2+ 7.5x1	114	
	9) Mechanical Measurement & Metrology Lab	M205	9.5x11.3	107	
	10) Mechatronics Lab	M213	9.5x11.3	107	
	11) Theory of Machine	M210	9.5xx11.3	107	
	12) Model & project Lab	M206	9.5x11.3+ 7.5x1	114	
	13) Automobile lab	M005	10.5x18.75	196	
	14) Dept library	M101	7.5x7.25	54	
9	Toilet	M105,106, 211,212 307,308	6x3.8x3.8	87	Amenities 87
10	Passage, Passage FF,SF& TF Passage FF & TF Passage SF	GF	2.75x20 3x12.75 x3.75 3x42x2.75 3x4x10.5	55 143 346 126	Circulation & Other 670

DEPARTMENT OF BUSINESS ADMINISTRATION

Department wise area statement details of MBA Dept

Sr. No.	ParticularsDetails	Room No.	Size Maximum mxm	Area Sqm.	Remarks
1	HOD Cabin	A209	3.00 x 6.65	20	Administrative
	Department Office/ Lib.	A208	6.00 x 6.65	20+20=40	Administrative
2	Staff Cabin	A203	3.0 x 4.00	12	Administrative
		A204A	3 x 3.0 x 3.0	27	91
		A212	3 x 4	12	
3	Class Room	A202	9.1 x 7.4	67	Instructional
	Class Room	A213	9.1 x 7.4	67	456
4	Seminar Hall"	A211	7.9 x 17.0	134	Instructional
5	Computer Lab	204	7.3x14.0	102	Instructional
	Tutorial room I	A206	4.5 x 7.4	33	
	Tutorial room II	A207	4.5 x 7.4	33	
6	Girl's Common Room	A306	7.4 x 9.1	67	Amenities
	Boy's Common / GD	A309	7.4 x 9.1	67	Amenities
	Toilets	A203,12A	2 x 1.2 x 1.8	4	157
		A205,10	2 x 2.9 x 3.3	19	
7	Passage	FF	19.5 x 2.4	47	Circulation
		SF	19.5 x 2.4	47	158
	Stair		3 x 3.2 x 6.7	64	
	Total			862	

Total Instructional Are: **456**
Tontal Administrative Area: **91**
Total Amenities Area: **157**

H.O.D. (MBA)

Teaching Learning Process

Methodology

For effective teaching learning process good and adequate infrastructure facilities are available. The class rooms and labs / workshop are well lighted with natural light during day time with circulation of fresh air. Conventional methods is adopted where in black board, chalk and faculty are involved in teaching the students in conjunction with modern methods like charts, cut models, OHPS, LCD's , electronics media like e-books , educational CD's, VCD. TV's are adopted by the faculty . Course files for all the subject are available in each department. Each department is having a departmental library and computer lab connected with internet. The central library is computerized with Del Net facilities and has AC reference room in addition to a reading room and staff rooms.

A computer center having 40 terminals is independently available for the use of faculty and students. The computer center is provided with internet facility and is available both during working hours and in additional time also.

Effectiveness

To asses the effectiveness of learning process by the students, two class tests at each month end and an assignment week is conducted where in the students are given an assignment sheets in a period sometime during 5^{th} and 6^{th} week of the term as per notified schedule and the students who gets the maximum marks is given a book on subject as reward with intention of motivating him for better performance in forthcoming university examination. The answer papers are checked in time and are shown to students and are collected back for record duly singed by student concerned.

Internal continuous evaluation system is followed for evaluation of term work as per guidelines issued by the University.

Motivations and rewards

Gold medals are awarded by the Management who are University first position rank holder in branch of Chemical Engg., Production Engg., Computer Engg. and Electronics Engg. in the University convocation. The University toppers are also felicitated at the college level in the afternoon of University convocation day.

ShramaSadhana Bombay Trust's

COLLEGE OF ENGINEERING & TECHNOLOGY, BAMBHORI, JALGAON

TENTATIVE ACADEMIC CALENDAR (TERM-I) 2017-18

Sr.No.	Activity	Day	Date / From -To
1.	Opening of College for Students & their registration (S.E. to B.E.& ME - II)	Monday	03 July 2017
2.	Commencement of Classes (S.E. to B.E.)	Tuesday	04 July 2017
3.	Meeting of IQAC	Saturday	22 July 2017
4.	Opening of College &Commencement of Classes for F.E. Students	Monday	01 Aug. 2017
5.	Commencement of Classes (DSE and M.E.-I year)	Monday	01 Aug. 2017
6.	Induction Programme for F.E. Students	Sunday	06 Aug. 2017
7.	S.E., T.E. & B.E. : ISE-I	Friday Saturday Monday	11 Aug. 2017 12 Aug. 2017 14 Aug. 2017
8.	Independence Day Celebration	Tuesday	15 Aug. 2017
9.	Add-on Course	Wednesday to Saturday	16 to 19 Aug. 2017
10.	Display of ISE – I (S.E. to B.E.) Results	Saturday	19 Aug. 2017
11.	Feedback from Students	Tuesday to Thursday	22 to 24 Aug. 2017
12.	Seminar Presentation (B.E.) (Till Date)	Saturday	26 Aug. 2017
13.	Alumni Meet	Sunday	10 Sept. 2017
14.	Engineer's Day	Friday	15 Sept. 2017
15.	F.E. : ISE-I	Saturday Monday Tuesday	16 Sept. 2017 18 Sept. 2017 19 Sept. 2017
16.	S.E., T.E. & B.E. : ISE-II	Friday Saturday Monday	22 Sept. 2017 23 Sept. 2017 25 Sept. 2017
17.	Display of ISE – I (F.E.) Results	Tuesday	26 Sept. 2017
18.	Display of ISE – II (S.E. to B.E.) Results	Friday	29 Sept. 2017
19.	Project Presentation (B.E.) (Till Date)	Friday	29 Sept. 2017
20.	Makeup Week (S.E. to B.E.)	Tuesday to Saturday	3 to 7 Oct 2017
21.	S.E. To B.E. : ICA	Monday to Wednesday	09 to 11 Oct. 2017
22.	F.E. & DSE: ISE-II	Tuesday Wednesday Thursday	24 Oct. 2017 25 Oct. 2017 26 Oct. 2017
23.	Makeup Week (F.E. and DSE)	Friday to Wednesday	27 Oct. to 1 Nov. 2017
24.	Display of ISE – II (F.E and DSE) Results	Monday	30 Oct. 2017
25.	F.E. and M.E. - I: ICA	Thursday to Friday	2 to 3 Nov. 2017
26.	PR/OR Exam. (T.E & B.E.) (Tentatively)	Tuesday to Sunday	7 Nov. to 12 Nov. 2017
27.	University Theory Examination (Tentatively)	Tuesday to Wednesday	14 Nov. to 13 Dec. 2017
28.	PR/OR Exam. (F.E. , S.E. & M.E.) (Tentatively)	Friday to Thursday	15 Dec. to 21 Dec. 2017
29.	International Conference on Global Trends in Engg., Tech., & Management	Friday to Sunday	22 Dec. to 24 Dec. 2017

Ref. No. COET/Aca.Cal./24/01/18

03 JAN 2018

Shrama Sadhana Bombay Trust's
COLLEGE OF ENGINEERING & TECHNOLOGY, BAMBHORI, JALGAON.
TENTATIVE ACADEMIC CALENDAR (TERM-II) 2017-18

Sr. No.	Activity	Day	Date / From -To
1.	Start of II Term: Registration of students (F.E. to B.E. and M.E. – I)	Tuesday	02 Jan. 2018
2.	Commencement of Classes (F.E. to B.E. and M.E. – I)	Wednesday	03 Jan. 2018
3.	FEAST (Festival of Engineers, Administrators, Scientists, and Technocrats)	Thursday to Saturday	11, 12, 13 Jan. 2018
4.	Republic Day Celebration	Friday	26 Jan.2018
5.	F.E. to B.E. : ISE-I	Monday, Wednesday, Thursday	12, 14, 15 Feb. 2018
6.	Student Level Technical Paper Presentation (Milestone 2K18)	Saturday	17 Feb. 2018
7.	Entrepreneurship Awareness Camp. for T.E. & B.E. Students	Friday to Saturday	16 to 17 Feb. 2018
8.	Sports & Annual Gathering (Vasant Utsav)	Sunday to Saturday	18 Feb. to 24 Feb. 2018
9.	Display of ISE – I (F.E. to B.E.) Results	Tuesday	20 Feb. 2018
10.	Parents Meet	Sunday	25 Feb. 2018
11.	Science Exhibition for FE (By Applied Science Dept.)	Wednesday	28 Feb.2018
12.	Add-on Course	Wednesday to Friday	28 Feb. to 2 Mar. 2018
13.	Feedback from Students	Wednesday to Saturday	07 Mar. to 10 Mar.2018
14.	Seminar Presentation (T.E.) (Till Date)	Saturday	10 Mar. 2018
15.	Project Demo (T.E.) (Till Date)	Friday	23 Mar. 2018
16.	Shod Prakalpa Pratiyogita 2018 (Project Demo - B.E.)	Saturday	24 Mar. 2018
17.	F.E. to B.E.: ISE-II	Wednesday, Saturday, Monday	28, 31 Mar. and 2 April, 2018
18.	Display of ISE – II (F.E. to B.E.) Results	Friday	6 Apr. 2018
19.	Makeup Week (F.E. to B.E.)	Tuesday to Friday	3 Apr. to 6 Apr. 2018
20.	F.E. to B.E. and M.E. – I: ICA	Tuesday to Thursday	3, 4, 5 Apr.2018
21.	End of Term	Saturday	7 Apr. 2018
22.	PR/Oral Exam., SE to BE (Tentatively)	Tuesday to Friday	10 Apr. to 20 Apr. 2018
23.	Theory Exam., FE to BE & ME (Tentatively)	Tuesday to Thursday	24 Apr. to 24 May 2018
24.	Project Oral (BE) & F.E. (PR/Oral), M.E. (OR) (Tentatively)	Saturday to Thursday	26 May to 31 May 2018
25.	Commencement of Next Academic Year	Monday	02 July. 2018

3.1.18

(Dr. K.S.Wani)
Principal

PRINCIPAL
SSBT's College of Engg.& Technology
Bambhori,Jalgaon-425001(M.S.)

Copy to:
1) Chairman, G.B. & C.D.C.
2) All H.O.Ds, 3) DOAD, 4) DOA, 5) Director, R&D, 6) Director, Technical Development, 7) TPO, 8) D.R. 9) A.R. 10) O.S., 11) Exam. Office, 12) Chairman, Alumni Meet, 13) Store, 14) Library, 15) Chairman, Cultural Activities 16) Physical Director 17) Admission Office, 18) PRO & Coordinator- Parents Meet, 19) Student Welfare Officer, 20) Rector (Boys Hostel), 21) Rector (Girls Hostel), 22) Coordinator, ISTE & IE (I), 23) Vehicle Incharge, 24) Principal office

NORTH MAHARASHTRA UNIVERSITY,

JALGAON (M.S.)

First Year Engineering
(Common to all Branches)

Faculty of Science and Technology

'A' Grade
NAAC Re-Accredited
(3rd Cycle)

Course Outline

Semester – I & II

w.e.f. 2017 – 18

Subject Group Code and Subject Groups

A – Core Engineering Course/ Program specific course

B – Basic Sciences/ Humanities / Social Sciences course

C – Discipline Specific Course / Elective Course

D – Ability Enhancement Course/ Skill development course

E – Interdisciplinary/ Generic Elective course

Syllabus Structure for First Year Engineering (Semester – I)

Course Code	Name of the course	Group	Teaching Scheme				Theory (Marks)		Practical (Marks)		Total (Marks)	Credits
			Teaching Hrs./week	Tut. Hrs./week	PR Hrs./week	Total Hrs./week	ISE	ESE	ICA	ESE		
FEN 101	**Applied Physics -I**	B	03	--	--	03	40	60	--	--	100	03
FEN 102	**Applied Chemistry -I**	B	03	--	--	03	40	60	--	--	100	03
FEN 103	**Applied Mathematics -I**	B	03	01	--	04	40	60	--	--	100	04
FEN 104	**Communicative English**	D	03	--	--	03	40	60	--	--	100	03
FEN 105	**Introduction to Civil Engineering & Engineering Mechanics**	A	03	--	--	03	40	60	--	--	100	03
FEN 106	**Introduction to Electrical Engineering**	A	03	--	--	03	40	60	--	--	100	03
FEN 107	**Workshop Practice –I**	A	-	--	02	02	--	--	25	--	25	01
FEN 108	**Applied Sciences Lab -I**	B	--	--	*02	02	--	--	25	--	25	01
FEN 109	**Introduction to Civil Engineering & Engineering Mechanics Lab**	A	--	--	02	02	--	--	25	25 (OR)	50	01
FEN 110	**Introduction to Electrical Engineering Lab**	A	--	--	02	02	--	--	25	25(OR)	50	01
FEN 111	**Communicative English Lab**	D	--	--	02	02	--	--	25	25(OR)	50	01
Total			**18**	**01**	**10**	**29**	**240**	**360**	**125**	**75**	**800**	**24**

ISE: Internal Sessional Examination, **ESE:** End Semester Examination, **ICA:** Internal Continuous Assessment, *Alternate week.

Syllabus Structure for First Year Engineering (Semester – II)

Course Code	Name of the course	Group	Teaching Scheme				Theory (Marks)		Practical (Marks)		Total (Marks)	Credits
			Teaching Hrs./week	Tut. Hrs./week	PR Hrs./week	Total Hrs./week	ISE	ESE	ICA	ESE		
FEN 112	**Applied Physics -II**	B	03	--	--	03	40	60	--	--	100	03
FEN 113	**Applied Chemistry -II**	B	03	--	--	03	40	60	--	--	100	03
FEN 114	**Applied Mathematics -II**	B	03	01	--	04	40	60	--	--	100	04
FEN 115	**Introduction to "C" Programming**	A	03	--	--	03	40	60	--	--	100	03
FEN 116	**Introduction to Mechanical Engineering & Engineering Drawing**	A	03	--	--	03	40	60	--	--	100	03
FEN 117	**Introduction to Electronics Engineering**	A	03	--	--	03	40	60	--	--	100	03
FEN 118	**Workshop Practice –II**	A	-	--	02	02	--	--	25	--	25	01
FEN 119	**Applied Sciences Lab -II**	B	--	--	*02	02	--	--	25	--	25	01
FEN 120	**Introduction to Mechanical Engineering & Engineering Drawing Lab**	A	--	--	02	02	--	--	25	25 (OR)	50	01
FEN 121	**Introduction to "C" Programming Lab**	A	--	--	02	02	--	--	25	25(OR)	50	01
FEN 122	**Introduction to Electronics Engineering Lab**	A			02	02	--	--	25	25(OR)	50	01
Total			**18**	**01**	**10**	**29**	**240**	**360**	**125**	**75**	**800**	**24**

ISE: Internal Sessional Examination, **ESE:** End Semester Examination, **ICA:** Internal Continuous Assessment, *Alternate week

Applied Physics - I

COURSE OUTLINE

Applied Physics - I	AP-I	FEN101
Course Title	**Short Title**	**Course Code**

Course description:

This course is aimed at introducing the fundamentals of basic sciences (Applied Physics-I) to undergraduate students. The background expected includes a prior knowledge of physics from HSC (science) and familiarity with various laws, principles and theories. The goals of the course are to understand the basic principles of science (Applied Physics -I) and their applications in different areas

Lecture	Hours/week	No. of weeks	Total hours	Semester credits
	03	**14**	**42**	**03**

Prerequisite course (s): 11^{th}& 12^{th} Physics

Course Objectives

1. To impart knowledge of basic concepts in applied physics and implementation to various engineering fields.
2. To provide the knowledge and methodology necessary for solving problems in the field of engineering.

Course outcomes:

Learner will be able to…

1. Apply the concepts of use of non-conventional energy for betterment of society.
2. Apply the concepts of Laser and Fiber Optic communication and Illustrate the principle, construction and working of various LASERs and its applications.
3. Apply the concepts of crystallography and to use XRD techniques for analysis of crystal structure.
4. Basic understanding of Semiconductor theory with use of Hall effect in science and technology as a Hall probe sensor
5. Comprehend principles of interference and diffraction.

COURSE CONTENT

Applied Physics - I | **Semester I**

Teaching Scheme | **Examination scheme**

Lectures: 3 hours/week | **End semester exam (ESE): 60 marks**

Duration of ESE: 03 hours

Internal Sessional Exams (ISE): 40 marks

Unit-I: Environmental Science — No. of Lectures: 08 Hours, Marks: 12

a) Energy Sources (Non-conventional): Introduction to non-conventional energy sources, Solar cell (Principle, Construction, Working and Characteristics), Wind energy - Wind Mill, Biogas and Biomass (Brief explanation about way of harnessing or utilization, advantages), Advantages of non-conventional energy.

b) Energy Sources (Conventional): Introduction to Nuclear Fission, Fusion, Chain reaction, Multiplication factor, Nuclear Reactor (with diagram and working), Numericals.

Unit-II: Laser and Fiber Optics — No. of Lectures: 08 Hours, Marks: 12

a) Laser: Introduction, Laser beam characteristics – Coherence, Directionality, Intensity, Monochromaticity, Mechanism of laser–Stimulated absorption, Spontaneous emission, Stimulated emission, Laser terminology – Active medium, Population, Population inversion, Pumping and Metastable state. Types of laser – Gas laser (He-Ne laser), Nd-yag laser, Applications of laser, Holography – Introduction, Principle of holography, recording of 3D images using hologram, Reconstruction of 3D images, Comparison with ordinary photography.

b) Fiber Optics: Structure of optical fibre. Principle of optical fibre. Propagation mechanism in optical fibre – Angle of acceptance, Numerical aperture, Critical angle, Optical fibre communication system (only diagram), Advantages of optical fibre, Applications of optical fibre.

Unit-III: Crystallography and X-rays — No. of Lectures: 08 Hours, Marks: 12

a) Crystallography: Introduction, Space lattice – Translation vectors, the basis and crystal structure, Unit cell and Lattice parameters, Bravais lattices, the cubic crystal – The Simple Cube (SC), Body Centered Cube (BCC), Important parameters of cubic lattice – Number of atoms per unit cell, Co-ordination number, Atomic radius, packing density or Packing factor, Calculation of lattice constant. Miller indices – Rules for finding miller indices, Important features of miller indices, Miller indices for cubic crystal, Numericals.

b) X-rays: Production of X-rays (Coolidge tube), Continuous and characteristic X-rays. Bragg's law, Properties and Applications of X-rays, Numericals.

Unit-IV: Physics of Semiconductor **No. of Lectures: 08 Hours, Marks: 12**

Classification of solids on the basis of band theory, Fermi level and position of Fermi level in intrinsic [With derivation i.e. Ef = (Ec + Ev)/2] and extrinsic semiconductors, Conductivity in semiconductors, Formation of P-N junction, Diode under forward and reverse bias, Hall effect, Determination of Hall coefficient.

Unit-V: Optics **No. of Lectures: 08 Hours, Marks: 12**

a) Interference: Interference, Michelson's Interferometer, Applications of Michelson's interferometer – Wavelength determination, Refractive index of thin film, Thickness of transparent material.

b) Diffraction: Diffraction, Theory of plane transmission diffraction grating, Determination of wavelength by grating, Rayleigh's criteria of resolution, Resolving power of grating.

c) Polarization: Polarization, Polarization by reflection, Brewster's law, law of Malus, Dichroism, Polaroids. Engineering applications of polarization.

Text Books:

1. R K Gaur, S L Gupta, "Engineering Physics", Dhanpat Rai Publications.
2. M N Avadhanulu, P G Kshirsagar, "Text book of Engineering Physics", S. Chand.

Reference Books:

1. P S Aithal, H J Ravindra, Engineering Physics", Acme Learning.
2. G Vijayakumari, "Engineering Physics", Vikas Publications.
3. M R Srinivasan, "Physics for Engineers", New Age International Publishers.
4. C S Solanki, "Solar Photovoltaic", PHI Learning Private Limited.
5. S O Pillai, "Solid state Physics", New Age International Publishers.
6. Ajay Ghatak, "Optics", TMH.
7. Hugh D Young, Roger A Freedman, "University Physics (With Modern Physics)", Pearson.
8. Hintendra K Malik, A K Singh, "Engineering Physics", Mc Graw Hill.
9. K Rajgopal, "Engineering Physics", PHI Learning Private Limited.
10. Uma Mukharji, "Engineering Physics", Narosa Publishing House
11. S Deswal, A Deswal, "Basic Course of Environmental Pollution", Dhanpath RaiPublications.
12. N Subrahmanyam, Brijal, M N Avadhanulu, "Optics", S. Chand.

13. Sanjay Jain, “Engineering Physics”, Universities Press (India) Pvt Ltd.

Applied Chemistry - I

COURSE OUTLINE

Applied Chemistry - I	AC-I	FEN102
Course Title	**Short Title**	**Course Code**

Course description:

This course is aimed at introducing the fundamentals of basic sciences (Applied Chemistry –I) to undergraduate students. The background expected includes a prior knowledge of chemistry from HSC (science) and familiarity with basic fundamental theories. The goals of the course are to understand the basic principles of Applied Chemistry –I and their applications in different branches of engineering.

Lecture	Hours/week	No. of weeks	Total hours	Semester credits
	03	**14**	**42**	**03**

Prerequisite course (s): 11^{th} & 12^{th} Chemistry

Course objectives:

To apply the knowledge of science in engineering and technology and also understand the basic concepts of chemistry and to analyze it from experiments.

Course outcomes:

After successful completion of this course the student will be able to:

a) Design and conduct experiments, analyze and interpret data.

b) Design a component, system or process to meet desired needs within realistic constraints.

c) An ability to function on multidisciplinary terms.

d) Identify, formulate and solve problems.

e) Understand the impact of engineering solutions in global, economic, environmental and societal context.

f) Ability to appreciate contemporary issues and engages in life-long learning.

g) Use the latest techniques, skills and modern tools necessary for engineering practices.

h) Understanding of the necessity to quantitatively balance the built environment with the natural world.

i) Understanding the basic parameters of water, different water softening processes and effect of hard water in industries.

j) Understanding the preparation, basic properties and applications of various polymers as an engineering material.

k) Understand the preparation, basic properties and applications of Portland cement.

l) Understand the classification, preparation, properties and applications of different alloys.

m) Understand the Water, Air Noise and Radioactive Pollution along with its control measures.

COURSE CONTENT

Applied Chemistry - I	**Semester I**
Teaching Scheme	**Examination scheme**
Lectures: 3 hours/week	**End semester exam (ESE): 60 marks**
	Duration of ESE: 03 hours
	Internal Sessional Exams (ISE): 40 marks

Unit–I: Water **No. of Lectures: 08 Hours, Marks: 12**

a) Introduction: Definition of water, impurities of water

b) Types of hardness – Units of hardness, causes of hardness of water

c) Analysis of water - Chloride contents by Mohr's method, Alkalinity along with numerical.

d) Water Softening Process:(i) Lime soda process by Hot continuous process (Numerical based on it) (ii) Zeolite process, (iii) Ion exchange method, (iv) Reverse Osmosis method

Unit–II: Polymer **No. of Lectures: 08 Hours, Marks: 12**

a) Introduction, Definition

b) Classification: on the basis of chemical composition, synthesis, intramolecular forces.

c) Types of polymerization – addition &condensation polymerization with examples.

d) Plastic – Types of plastic – Thermoplastic & thermosetting plastic.

e) Explanation & different types with their properties & applications(i) PVC (ii) Teflon (iii) Polycarbonate (iv) Polystyrene

f) Rubber - Types of rubber- natural & synthetic

g) Vulcanization of rubber: drawbacks of natural rubber

i) Synthetic Rubber - Synthesis, structure, properties & applications of-(i) Styrene butadiene rubber (SBR) (ii) Neoprene rubber (iii) Nitrile rubber

Unit–III: Cement **No. of Lectures: 08 Hours, Marks: 12**

a) Definition, Classification and properties - Natural, Pozzolana & Port land

b) Chemical constituent of Portland cement.

c) Manufacture of Portland cement by wet process.

d) Manufacture of Portland cement by dry process (using flow sheet diagram)

e) Setting & Hardening of Portland cement with chemical reaction.

f) Heat of hydration of cement.

Unit – IV Alloys **No. of Lectures: 08 Hours, Marks: 12**

a) Introduction,

b) Necessity (Purpose) of making alloys

c) Classification of alloys

d) Preparation of alloys – Fusion method, Electro deposition method

e) Composition, Properties & Application of following -(i) Brass (ii) Bronze (iii)Duralumin (iv) Nichrome (v) Steel – Mild, Medium & High.

Unit–V: Environmental Pollution & its control. No. of Lectures: 08 Hours, Marks: 12

a) Introduction

b) Water Pollution: Causes, Effects and Control measures of water pollution,

c) Air Pollution: Acid Rain, Green house effects, Depletion of Ozone

d) Causes, Effect and Control measures of air pollution.

e) Noise Pollution: Causes, effects & Control of noise pollution

f) Radioactive pollution: Causes, effects & Control of Radioactive pollution.

g) Green Chemistry -Definition & its application.

Text Books:

1. Jain & Jain, "Engineering Chemistry", Dhanpat Rai Publishing Co.

2. S. S. Dara, "A Text Book of Engineering Chemistry", S Chand & Co. Ltd.

Reference Books:

1. B K Sharma, Krishna, "Engineering Chemistry", Prakashan Media (P) Ltd.

2. Suba Ramesh, "Engineering Chemistry", Wiley India Pvt. Ltd.

3. R Gopalan, "A Text book of Engineering Chemistry", Vikas Publishing House Pvt. Ltd. Third Edition

4. B S Chauhan, "Engineering Chemistry", University Science Press, Third Edition.

5. Shashi Chawla, "A Text book of Engineering Chemistry", Dhanpat Rai Publishing Co.

6. V R Gowariker, "Polymer Science". New Age International.

7. Abhijit Mallick, "Engineering Chemistry", Viva books.

8. Sunita Ratan, “Engineering Chemistry”, S K Kataria & Sons.
9. Das R K, “Industrial Chemistry”, Asia Pub. House, New York, 1966

Applied Mathematics - I

COURSE OUTLINE

Applied Mathematics - I	AM-I	FEN - 103
Course Title	**Short Title**	**Course Code**

Course description:

This course is aimed at introducing the fundamentals of basic Mathematics to undergraduate students. The background expected includes a prior knowledge of Mathematics from 12th science and familiarity with various laws, principles and theories. The goals of the course are to understand the basic principle of Mathematics and its application in different area.

Lecture	Hours/week	No. of weeks	Total hours	Semester credits
	03	**14**	**42**	**04**

Prerequisite course (s): 11^{th}& 12^{th} mathematics

Course objectives:

The basic necessity for the foundation of Engineering and Technology Being Mathematics, the main aim is to teach mathematical methodologies and models, develop mathematical skill and enhance thinking and decision making power of student.

Course outcomes:

After completion of this course learner will be able to:

1. Apply knowledge of mathematics in engineering and technology.
2. Identify, formulate and solve engineering problems.
3. Design Mathematical models for engineering problems and solve them.

COURSE CONTENT

Applied Mathematics - I	**Semester I**
Teaching Scheme	**Examination scheme**
Lectures: 3 hours/week	**End semester exam (ESE): 60 marks**
Tutorial:1 hour	**Duration of ESE: 03 hours**
	Internal Sessional Exams (ISE): 40 marks

UNIT 1: Matrices and its Applications **No. of Lectures: 08, Marks 12**

(Introduction to Definition of Elementary Transformations, Canonical Form & Rank of Matrix.)

1. System of Linear Equations. (By using rank of matrix) for both Homogeneous & non-Homogeneous systems.
2. Eigen values & Eigen vectors, Cayley Hamilton Theorem (only statement).
3. Orthogonal Transformation and Matrix.
4. Application of Matrices to the Engineering Field.

UNIT 2: Differential Calculus and its Applications **No. of Lectures: 08, Marks 12**

(Introduction to Successive Differentiation with standard formulae)

1. Leibnitz's theorem (without proof).
2. Taylor's & Maclaurin's theorems (without proof).
3. Expansion of Functions using Taylor's theorem, Maclaurin's theorem & Leibnitz's theorem.
4. Applications of Taylor's theorem.

UNIT 3: Complex Number and Its Applications **No. of Lectures: 08, Marks 12**

(Introduction of Complex Number- Definition and Properties, De-Moivre's Theorem and Argand diagrams. Roots of Complex Number)

1. Hyperbolic and Inverse Hyperbolic functions
2. Logarithm of Complex numbers,
3. Separation into Real and Imaginary parts.
4. Application to Engineering Field.

UNIT 4: Partial Differentiation **No. of Lectures: 08, Marks 12**

(Introduction to Partial Derivatives of First and Higher Order)

1. Euler's theorem on Homogeneous functions
2. Change of independent variable/ Composite Function
3. Total derivatives and Total Differential Theorem
4. Differentiation of Implicit functions.

UNIT 5: Integral Calculus **No. of Lectures: 08, Marks 12**

1. Gamma Function.

2. Beta Function.

3. Differentiation under Integral Sign. (No Verification of Rule).

4. Error Function

Text Books:

1. B S Grewal, “Higher Engineering Mathematics”, Khanna Publication.

Reference Books:

1. Erwin Kreyszig, “Advanced Engineering Mathematics”, Wiley Eastern Ltd, 7th Edition.

2. H K Das, “Advanced Engineering Mathematics”, S. Chand & Company.

3. B V Ramana, “Engineering Mathematics”, TMH, 2nd Edition.

4. N P Bali, “A Text Book of Engineering Mathematics”, Laxmi Publication, New Delhi.

5. Kandasamy, “Numerical Methods”, S. Chand & Company.

Communicative English

COURSE OUTLINE

Communicative English	CE	FEN104
Course Title	**Short Title**	**Course Code**

Course description:

This course has been designed paying special attention to the contemporary industrial needs and current society demands for Communicative Language skills.

Lecture	Hours/week	No. of weeks	Total hours	Semester credits
	03	14	42	03

Prerequisite course (s): 11^{th} & 12^{th} English

Course objectives:

1. To help students become more fluent in the use of English and thus develop the ability to communicate easily and naturally.
2. To introduce different social situations to learners for developing their conversational skills.
3. To enhance learners English language proficiency in social and work situations, particularly in spoken interaction.
4. To develop communication skills in a professional context which will enable students to compete for an engineering or technical career and also perform effectively in their chosen profession.
5. To help students correct their pronunciation, word stress and intonation.
6. To develop the skills of technical writing and enable them to carry out their official and professional duties efficiently.
7. To help students use grammar for communication and relate grammatical structures to meaning, use and situation.
8. To inculcate student's competence in academic, commercial, and professional writing.

Course outcomes:

Upon Successful Completion of this course the students will be able to:

1. Students will be “accomplished technical communicators”;
2. Enhance learners’ English language proficiency in spoken interaction
3. They will be more fluent in the use of English and communicate naturally.
4. Augment the ability of the students to create, compose& render presentation with or without the help of media
5. Develop a logical framework for the critical analysis of spoken, written, visual and mediated messages in a diverse marketplace.
6. Become adept in their use of the spoken words in interpersonal communication, small group interactions and public speaking.
7. Students will be experts in professional writing.
8. Students will demonstrate proficiency in the use of written English, including proper spelling, grammar, and punctuation

COURSE CONTENT

Communicative English

Teaching Scheme

Lectures: 3 hours/week

Semester I

Examination scheme

End semester exam (ESE): 60 marks

Duration of ESE: 03 hours

Internal Sessional Exams (ISE): 40 marks

UNIT 1: Spoken English — No. of Lectures: 08, Marks 12

a) Pronunciation & Spelling

b) Organs of Speech-(diagram)

c) Vowels

d) Consonants

e) Diphthongs

f) Phoneme & phonemic Transcription

g) Intonation

h) Word & Sentence Stress

UNIT 2: Oral Communication (Functions) **No. of Lectures: 08, Marks 12**

Drills, Dialogues & Dialogue Comprehension, Role plays

a) Introducing oneself

b) Asking questions and giving polite replies

c) Complaining and apologizing

d) Persuading people to do something

e) Taking the initiative

f) Seeking permission

g) Inviting friends and colleagues

h) Praising and complimenting people

i) Expressing sympathy

j) Using the telephone

UNIT 3: Professional Communication **No. of Lectures: 08, Marks 12**

a) Interview Skills (campus recruitment): Why an Interview? Interview Questions, Types of Interview, how to Answer the Questions, Reasons for selecting & rejecting a candidate, how to present well in the Interview?

b) Group Discussion: Why Group discussion? Skills required in Group discussion, Areas to be concentrated while preparing for Group discussion, Techniques to initiate a Group discussion

c) Difference between Group Discussion & Debate

d) Successful Leadership Qualities

e) Effective Presentation strategies: Preparation, structuring the Presentation, Visual Aids, Positive & Negative traits

f) Public speaking

g) Effective Listening Strategies: Difference between hearing & Listening

UNIT 4: Commercial and professional writing **No. of Lectures: 08, Marks 12**

a) Job Application

b) Preparing CV/Résumé

c) Difference among Bio-data, CV & Résumé

d) Business correspondence: Layout of Business letter, (complaint & adjustment, Invitation, order, inquiry, reply letters)

e) Meeting, Notice, Agenda and minutes of a meeting, Memo, Fax, E-mail

f) Paragraph writing

e) Précis writing

f) Academic writing: Research article

g) Report writing

UNIT 5: Grammar Usage & Vocabulary Enhancement No. of Lectures: 08, Marks 12

a) Agreement of Subject and Verb

b) Static and Dynamic Verbs

c) The auxiliary system: finite and non-finite verbs

d) Modal Verbs

e) Parts of Speech

f) Sequence of Tenses

g) Interrogation

h) Reported Speech

i) Conditionals

j) Comprehension of Unseen Passages

k) Punctuation and Capitalization

Text Books:

Effective Technical Communication by M Ashraf Rizvi, The McGraw-Hill companies.

Reference Books:

1. A Text Book of English Phonetics for Indian Students by T. Balasubramaniam. (Macmillan India Limited)
2. A Course in Phonetics and Spoken English by J. Sethi and P.V. Dhamija (PrenticeHall of India.)
3. Spoken English by R.K. Bansal and J.B. Harrison (Orient Longman)
4. Cambridge English Pronouncing Dictionary, Cambridge University Press, India, 2012
5. Better English Pronunciation by J.D.O'Connor.
6. The Functional Aspects of Communication Skills- Prasad, P., Delhi.
7. Communicative Grammar of English by Geoffrey Leech and Ian Svartik.

8. English Vocabulary in Use- McCarthy, Michael., Cambridge University Press.
9. English Grammar and Composition- Rajinder Pal and Prem Lata., Sultan Chand Publication.
10. Business Correspondence and Report Writing- R C Sharma Krishna Mohan - 2002
11. An introduction to Professional English and Soft Skills by B. K. Das et al., Cambridge University Press (Facilitated by BPUT)
12. Entrepreneurial Development by C. B. Gupta& Srinivasan. (S. Chand & Sons)

Introduction to Civil Engineering and Engineering Mechanics

COURSE OUTLINE

Introduction to Civil Engineering and Engineering Mechanics	ICEEM	FEN-105
Course Title	**Short Title**	**Course Code**

Course description:

This course provides the elementary level knowledge of civil Engineering and Engineering mechanics which includes-

a) Study of Forces and force systems.

b) Resultant and equilibrium of coplanar force systems.

c) Kinematics and kinetics of bodies which are in motion.

d) Scope of civil engineering and basic areas of civil engineering.

e) Types of civil engineering structures and important parts of buildings.

f) Principles of Planning

Lecture	Hours/week	No. of weeks	Total hours	Semester credits
	03	**14**	**42**	**03**

Prerequisite course (s): 11^{th} & 12^{th} Mathematics &Physics

Course objectives:

The general objective of course is to know the concepts of statics and dynamics. This includes application of math and physics principles to identify formulate and solve engineering problems. Also, it aims to introduce the students the scope and basic areas of civil engineering.

Course outcomes:

Upon successful completion of this course the student will be able to:

1. Know basic areas of civil engineering
2. Know principle of planning and building byelaws.
3. Understand use of the compass for angular measurement and calculation of included angles in a traverse
4. Compute the rectangular components of a force.
5. Identify and/or list the different types of force systems.
6. Define and calculate the resultant of coplanar force systems.

7. Define and calculate the moment of forces about any given point.

8. Draw free body diagrams of coplanar force systems.

9. Understand condition of equilibrium for coplanar forces

10. Solve for the forces and reactions in statically determinate coplanar force systems

11. Calculate the centroid of composite plane and curved figures.

12. Compute the tensile and compressive values of forces in truss members.

13. Define friction, friction force, static friction, kinetic friction, normal force, coefficient of static friction, angle of friction, and angle of repose.

14. Find position, displacement, speed, velocity, acceleration, distance, and time of moving particle along the straight line and curved path.

15. Solve particle motion involving equation in 2D using rectangular and tangential/normal Coordinate systems.

16. Understand Newton's second law and D Alembert's principle, understand principle of linear impulse and momentum, Understand the principle of work and energy for particles.

COURSE CONTENT

Introduction to Civil Engineering & Engineering Mechanics **Semester I**

Teaching Scheme **Examination scheme**

Lectures: 3 hours/week **End semester exam (ESE): 60 marks**

Duration of ESE: 03 hours

Internal Sessional Exams (ISE): 40 Marks

UNIT 1: Introduction to Civil Engineering No. of Lectures: 08, Marks 12

a) Basic Civil engineering: Introduction to various branches of civil engineering

b) Building Construction: Introduction to principles of planning, introduction to various parts of buildings. Load bearing & frames structure

c) Surveying: Principles of surveying, introduction to compass, bearing, Whole Circle Bearing & reduced Bearing System and measurement of included angles.

UNIT 2: Statics - I **No. of Lectures: 08, Marks 12**

a) Resultant of coplanar forces: Introduction, basic concepts, principals of mechanics, force systems, composition and resolution of forces, resultant of concurrent force system in plane, moment of forces, couples, Varignon's theorem, equivalent force couple systems, resultant of non-concurrent force system in plane.

b) Equilibrium of coplanar force system: Introduction, body constraints, types of supports and loads, free body diagrams, conditions of equilibriums, equilibriums of forces in a plane, Lami's theorem, reactions of determinate beams

UNIT 3: Statics – II **No. of Lectures: 08, Marks 12**

a) Centre of Gravity, Centre of mass and Centroid: Introduction, centre of gravity, centre of mass, centroid of composite plane figures, Derivation for centroid of rectangle, triangle and semicircle. Numerical on centroid of composite plane figures.

b) Plane Truss: Types of Plane trusses (perfect and imperfect), Analysis of plane truss by method of joints and method of sections.

c) Friction: - Introduction, laws of friction, simple contact friction, ladder friction, application of friction on horizontal and inclined planes.

UNIT 4: Dynamics - Kinematics **No. of Lectures: 08, Marks 12**

a) Kinematics of rectilinear motion of particle: Introduction, basic concepts, types of rectilinear motions, motion under gravity.

b) Kinematics of curvilinear motion of particle: Introduction, basic concepts, motion along curved path, normal and tangential components of motion, rectangular and path coordinate systems, projectile motion.

UNIT 5: Dynamics - Kinetics **No. of Lectures: 08, Marks 12**

Kinetics of rectilinear motion of particle:

a) D Alembert's Principle, Newton's second law of motion,

b) Conservation of energy and work energy principle for motion of particles.

c) Impulse, momentum, direct central impact and coefficient of restitution. Conservation of momentum & impulse momentum principle of particle.

Text Books:

1. Sanju Unadkat, Engineering Mechanics, Techmax Prakashan

2. S C Gupta, Engineering Mechanics, Nirali Prakashan

Reference Books:

1. Bhavikatti S. S. & K. G. Rajashekarappa, "Engineering Mechanics", New Age International (P) Ltd., Publishers.

2. Kanitkar T. P. and Kulkarni, "Surveying and Levelling, Part I", Pune Vidyarthi Gruha Prakashan, 24th Edition

3. Bindra and Arora, "Building Construction", Dhanpat rai and Sons, Delhi.

4. N Kumara Swamy and A Ksmeswara Rao, "Building Planning and Drawing", Charotar Publishing House Pvt. Ltd.

5. Satish Gopi, "Basic Civil Engineering", Pearson Education, Delhi, 2008.

6. F P Beer and E R Johnson, "Mechanics for Engineers – Statics", McGraw-Hill Publication, 5th Edition

7. F P Beer and E R Johnson, "Mechanics for Engineers – Dynamics", McGraw-Hill Publication, 8th Edition.

8. S P Timoshenko and D H Young, "Engineering Mechanics", McGraw- Hill Publications, 4th Edition

9. R C Hibbeler, "Engineering Mechanics statics and dynamics", Pearson Education,11th Edition.

11. S R Bendale, "Engineering Mechanics", John Wiley & Sons, Delhi, 1st Edition

12. Jaget Babu, "Engineering Mechanics", Pearson Education, Delhi, 1st Edition.

13. Sushilkumar, "Building Construction", Standard Publishers, New Delhi, 2010.

Introduction to Electrical Engineering

COURSE OUTLINE

Introduction to Electrical Engineering	IEE	FEN-106
Course Title	**Short Title**	**Course Code**

Course description:

This course provides an introduction to electrical engineering which includes over view of electric power generation, single and three phase AC circuit, magnetic circuit and fundamentals of electrical installation

Lecture	Hours/week	No. of weeks	Total hours	Semester credits
	03	**14**	**42**	**03**

Prerequisite course (s): 11^{th} & 12^{th} Physics

Course objectives:

1. To explain basic laws and theorems of electrical networks
2. To explain fundamentals of magnetic circuits and alternating current circuits
3. To study and significance of magnetic circuits
4. To illustrate electrical wiring fundamentals and safety measures

Course outcomes:

1. Students will be able to demonstrate knowledge of circuit analysis using various basic laws and theorems of electrical circuits
2. Students will be able to demonstrate knowledge of magnetic circuits
3. Students will be able to demonstrate and understand definition and relationship of various AC circuits
4. Students will be able to demonstrate and understand the operation of transformer
5. Students will be able to demonstrate and understand the electrical wiring installations

COURSE CONTENT

Introduction to Electrical Engineering | **Semester I**

Teaching Scheme | **Examination scheme**

Lectures: 3 hours/week | **End semester exam (ESE): 60 marks**

Duration of ESE: 03 hours

Internal Sessional Exams (ISE): 40 marks

UNIT 1: DC Circuit **No. of Lectures: 09, Marks 12**

DC Circuit: Kirchhoff's laws, Source conversion, series and parallel circuit, current and voltage division rule, Delta-star and star-delta conversion, Node voltage and Mesh current methods, Superposition theorem, Thevenin's theorem, Maximum power transfer theorem, Charging and discharging of capacitor, Time constant for RC circuit

UNIT 2: Single Phase AC Circuit **No. of Lectures: 08, Marks 12**

Single phase AC Circuits: Concept of single phase supply, Terms related with A.C. quantities, pure resistive, inductive and capacitive circuits, complex and phasor representation of AC quantities, series and parallel circuits. Resonance in series and parallel circuits, Q-factor of coil.

UNIT 3: Three Phase AC Circuit **No. of Lectures: 08, Marks 12**

Three phase AC Circuits: Concept of Three phase supply, star and delta connections, line and phase values, solution of balanced three phase circuits, phasor diagram. Measurement of power in three phase circuit.

UNIT 4: Magnetic Circuit **No. of Lectures: 09, Marks 12**

Electromagnetic Induction: Faraday's laws, statically and dynamically induced emf, self and mutual inductance, coefficients of coupling, Terms related with magnetic circuits, Magnetization curve, Magnetic leakage and fringing, Leakage coefficient, Calculation of mmf, reluctance and flux Series and parallel magnetic circuits, Magnetic hysteresis, Hysteresis and eddy current loss.

UNIT 5: Electrical Installation **No. of Lectures: 08, Marks 12**

Electric Wiring installations: Types of insulated wires & wiring systems, concept of fuses, MCBs, RCCB, ELCBs, etc. in wiring installations, concept of earthling, energy bill calculations, study of different lamps.

Principle of operation, constructional details, types and applications of single phase Transformer.

Text Books:

1. B. L. Theraja and A. K. Theraja, "A Text book of Electrical Technology - Vol-I and Vol-II", S. Chand, 1st Edition, 2001.
2. J. B. Gupta, "A Course in electrical Power", S. K. Kataria and Sons, 12th Edition, 2002.

Reference Books:

1. V. N. Mittal, Arvind Mittal, "Basic Electrical Engineering", Tata McGraw Hill publishing co. ltd, New Delhi
2. D. P. Kothari, I.J Nagrath , "Basic Electrical Engineering", Tata McGraw Hill
3. M. S. Naidu, S. Kamakshaiah , "Introduction to Electrical Engineering", Tata McGraw Hill.
4. P. Tiwari, "Basic Electrical Engineering", New Age Publication.
5. Josep Administer, "Schaum's outline of Electric circuits", Tata McGraw Hill
6. Leonard Bobrow "Fundamentals of Electrical Engineering", Oxford University press.
7. Vincent Del Toro, "Electrical Engineering Fundamentals", Pearson.

Workshop Practice - I

LAB COURSE OUTLINE

Workshop Practice - I	WP-I	FEN 107
Course Title	**Short Title**	**Course Code**

Course Description:

Workshop Practice - I cover the basic knowledge and practices on measuring instrument, fitting shop, welding shop, Tin smithy, Black smithy and foundry shop in order to improve the practical skill of students in different workshops.

Laboratory	Hours/Week	No. of weeks	Total Hour	Semester Credits
	02	14	28	01

ESE Pattern: ICA

Prerequisite Course(s): 11th Physics, 12th Physics

Course Objective:

In workshop practice, students will get familiar with use of different workshop practices like fitting, welding, tin smithy, black smithy, foundry and computer hardware workshop. Students will also get familiar with different tools, machines, equipment's, job holding devices, job drawing, job material, job manufacturing operations and processes in different workshops.

Course Outcomes:

Upon successful completion of these practical's the student will be able to hand

1. Measuring Instruments and fitting shop
2. Welding Shop
3. Tin smithy shop
4. Black smithy shop
5. Foundry shop

LAB COURSE CONTENT

Workshop Practice - I	**Semester I**
Teaching Scheme	**Examination scheme**
Practical: 2 hours/week	**End Semester Exams (ESE): ---**
	Internal Continuous Assessment (ICA): 25

1. Measuring Instruments:

a. Demonstration of handling measuring instruments like steel rule, measuring tape, try- square, Vernier calliper, micrometre, Vernier height gauges, bevel protector etc.

b. Fitting shop:

One job on finishing two sides and make right angles of square job by filling operation, one drilling and taping operations.

2. Welding Shop:

a. Demonstration or One Job on T-joint: one side of T-joint welded by Gas welding and another by Electrical Arc Welding

b. Demonstration of Brazing.

3. Tin Smithy Shop:

One job including soldering, Riveting etc. For example- letter box, Waste paper basket, tray, Funnel etc.

4.Black Smithy Shop:

One job on black smithy including Bending and Flattening etc. For example: S-shape, hook shape, U shape job.

5. Foundry Shop:

Demonstration of preparation of moulding, casting of any simple pattern.

Reference Books:

1. Hajara Chaudhary and Bose S K, "Element of Workshop Technology Volume I andII", Asia Publishing House.
2. P N Rao, "Production Technology Volume I and II", Tata McGraw Hill Publication.
3. R K Jain, "Production Technology", Khanna Publications.
4. P C Sharma, "Production Technology", Khanna Publication.
5. Chapman W A J, "Workshop Technology", ELBS Publication.

6. HMT, "Production Technology", Tata McGraw Hill Publication.
7. Kannaiah K L, Narayana, "Workshop Manual", Scitech Publications, Chennai, 2nd Edition.

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Applied Science - I Lab

LAB COURSE OUTLINE

Applied Science -I Lab	AS-II LAB	FEN 108
Course Title	**Short Title**	**Course Code**

Course Description:

In this laboratory, course emphasis is on the understanding of basic principles, working of pH-meter, Bomb calorimeter, Ostwald's Viscometer, various properties of lubricating oils, proximate analysis of fuels etc. The learner can use this knowledge and apply in various branches of engineering as required.

Laboratory	Hours/Week	No. of weeks	Total Hour	Semester Credits
	02	14	28	01

Prerequisite Course(s): 12^{th} Chemistry, Different laws, basic principles and theories.

Course Objective:

This course is intended to provide engineering students with a background in important concepts and principles of chemistry and emphasis on those areas considered most relevant in an engineering context, and practical applications in engineering and technology.

1. To impart knowledge of basic concepts in applied physics and implementation to various engineering fields.

2. To provide the knowledge and methodology necessary for solving problems in the field of engineering.

Course Outcomes:

Upon successful completion of lab Course, student will be able to:

a) Analyse the partition Coefficient of Iodine between water & CCl4.

b) Analyse the saponification value of given oil sample.

c) Analyse the viscosity of given liquid by Ostwald's Viscometer.

d) Analyse the Calorific value of fuel sample by using Bomb calorimeter.

e) Identify the Moisture content, Volatile matter, Ash content and Fixedcarbon in coal sample by proximate analysis.

f) Identify the acidic and basic solution by using pH-meter.

g) Analyse the acid value of Vegetable Oil sample.

h) Analyse the strength of NaHCO3 and NA2CO3 in alkali mixture.

i) Analyse the Aniline point of lubricating oil.

j) Analyse the Iodine value of an Oil sample by Wij's method.

Learner will be able to:

1. Apply the concepts of use of non-conventional energy for betterment of society.

2. Apply the concepts of Laser and Fiber Optic communication and Illustrate the principle, construction and working of various LASERs and its applications.

3. Apply the concepts of crystallography and to use XRD techniques for analysis of crystal structure.

4. Basic understanding of Semiconductor theory with use of Hall effect in science and technology as a Hall probe sensor

5. Comprehend principles of interference and diffraction.

LAB COURSE CONTENT

Applied Science - I Lab	**Semester I**
Teaching Scheme	**Examination scheme**
Practical: 2 hours/week	**End Semester Exams (ESE): ---**
(Alternate)	**Internal Continuous Assessment (ICA): 25**

Applied Chemistry – I Lab

Practical -2 Hrs/Alternate weeks (Alternate with Applied Physics- I)

(Note: Minimum FIVE Experiments out of the following)

1. Estimation of total hardness of given sample of water by EDTA Method.

a. Standardization of EDTA by using standard hard water.

b. To find the exact normality of EDTA solution.

c. Estimation of total hardness of given water sample.

2. Determination of Dissolved oxygen present in given water sample (Winkler's Method).

a. Standardization of Sodium Thiosulphate solution against std. K2Cr2O7 solution using starch indicator.

b. Calculate exact normality of Sodium Thiosulphate solution.

c. Estimation of dissolved oxygen from given water sample.

d. Calculate the strength of dissolved oxygen from given water sample.

3. Determination of alkalinity of water sample.

a. To find the presence of OH –, CO32- and HCO3 - ions in given sample of water by titrating against N/10 HCL using phenolphthalein indicator.

b. Using Methyl orange indicator in the same solution, to find out the methyl orange end point.

c. Calculate the amount of OH –, CO3- and HCO3- ions in given sample by end point results.

4. Estimation of Chloride content in a given water sample by Mohr's Method.

a. Standardization of AgNO3 solution by using Standard NaCl solution.

b. To find the exact normality of AgNO3 solution.

c. Estimation of Chloride ions in given sample of water.

d. Calculate the strength of Chloride ions in sample water.

5. Estimation of phenol by Iodometrically.

a. Dilution of Phenol solution.

b. Back titration of the above solution against standard 0.1 N Sodium Thiosulphate solutions.

c. Blank titration from brominating stock solution against 0.1 N Sodium Thiosulphate solutions.

d. Calculate the percentage of phenol.

6. Preparation of Polystyrene by bulk polymerization.

a. Add nitrogen to styrene in oil bath.

b. Cool the mixture and break it to give Polystyrene.

c. Dissolve the polystyrene in benzene, filter the precipitate and dry it.

d. Calculate the yield percentage.

7. Preparation of Phenol Formaldehyde Resin (Bakelite).

a. Dissolution of Glacial acetic acid, formaldehyde and phenol.

b. Acidifying the above solution.

c. Washing the residue obtained with distilled water and dry it.

d. Calculate of the yield of Phenol formaldehyde resin.

8. Estimation Copper in Brass Iodometrically.

a. Prepare given brass sample by acidifying, neutralizing and dilution in volumetric flask.

b. Determine the amount of Copper in diluted brass sample solution by volumetric titration.

c. Calculate the percentage of copper in given Brass Sample.

9. Estimation of Zinc from Brass Volumetrically.

a. Standardization of K_4[Fe (CN) 6] by using Uranyl nitrate indicator.

b. Dilution of the brass sample.

c. By removing Sn, Pb, Cu, Fe from the solution.

d. Titrating the remaining solution against K_4 [Fe (CN) 6] and calculate the percentage of Zinc in Brass sample.

10. Determination of % of Ca in Cement.

a. Dilution of the cement sample in NH_4Cl Solution.

b. Distilled off and filter the solution with Whatmann paper No. 1.

c. To the above filtrate add NH_4NO_3 solution, keep the filtrate and washing for the estimation of Lime.

d. Estimation of Lime- Rectify the solution then add methyl red indicator along with ammonium oxalate solution.

e. Calculate the amount of Calcium using oven and estimate the percentage of lime from the sample.

f. Also find the percentage of calcium by volumetric analysis using $KMNO_4$ solution.

Text Books:

1. Jain & Jain, "Engineering Chemistry", Dhanpat Rai Publishing Co.

2. S. S. Dara, "A Text Book of Engineering Chemistry", S Chand & Co. Ltd.

Reference Books:

1. B K Sharma, Krishna, "Engineering Chemistry", Prakashan Media (P) Ltd.

2. Suba Ramesh, "Engineering Chemistry", Wiley India Pvt.Ltd.

3. R Gopalan, "A Text book of Engineering Chemistry", Vikas Publishing House Pvt. Ltd. Third Edition

4. B S Chauhan, "Engineering Chemistry", University Science Press, Third Edition.

5. Shashi Chawla, "A Text book of Engineering Chemistry", Dhanpat Rai Publishing Co.

Applied Physics – I

Practical -2 Hrs/Alternate weeks (Alternate with Applied Chemistry- I)

(Note: Minimum FIVE Experiments from the following)

1. Semiconductor diode characteristics.
2. Band gap in semiconductor material.
3. To determine the resistivity of the given semiconductor by using four probe method.
4. To determine the wavelength of laser source.
5. Fiber Optics Communications.

6. Hall Effect & determination of Hall coefficient.
7. Solar cell Characteristics
8. Spectrometer Grating
9. Michelson's Interferometer
10. Determination of polarizing angle for glass and to determine refractive index of glass using Brewster's law.
11. Experimental verification of law of Malus
12. Crystal structure

Text Books:

1. R K Gaur, S L Gupta, "Engineering Physics", Dhanpat Rai Publications.
2. M N Avadhanulu, P G Kshirsagar, "Text book of Engineering Physics", S. Chand.

Reference Books:

1. P S Aithal, H J Ravindra, Engineering Physics", Acme Learning.
2. G Vijayakumari, "Engineering Physics", Vikas Publications.
3. M R Srinivasan, "Physics for Engineers", New Age International Publishers.
4. C S Solanki, "Solar Photovoltaic", PHI Learning Private Limited.

Introduction to Civil Engineering &Engineering Mechanics Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Introduction to Civil Engineering & Engineering Mechanics Lab	ICEEM LAB	FEN109

Course Description:

These laboratories cover experiments related to basic principles of Statics, Dynamics, Topographic Surveying, building planning.

Laboratory	Hours/Week	No. of weeks	Total Hour	Semester Credits
	02	13	26	01

ESE Pattern: Oral (OR)

Prerequisite Course(s): 12^{th} Physics.

Course Objective:

In these laboratories students will be introduced to the applications of different theorems of mechanics to solve problems in statics and dynamics. Also students will get familiar with surveying with Compass. These include:

a) Concept of vectors

b) Triangle law of forces.

c) Lami's theorem.

d) Conditions of equilibrium.

e) Laws of friction.

f) Laws of simple machines.

g) Angular Measurements with Compass.

Course Outcomes:

Upon successful completion of these practical the student will be able to

a) To understand basic laws of engineering mechanics & apply the same to solve problems.

b) To learn the use of prismatic compass for angular measurements.

c) Understand & apply triangle laws of forces for solving problems.

d) Understand the conditions of equilibrium of forces.

e) Describe efficiency, load, efforts, velocity ratio, frictional effort verify law of machines.

f) Describe frictional forces, limiting friction, coefficient of friction and verify law of friction.

g) Apply graphical methods to solve problems.

h) Measure bearings of lines with prismatic compass and calculate included angles.

LAB COURSECONTENT

Introduction to Civil Engineering		
& Engineering Mechanics Lab	**Semester I**	
Teaching Scheme	**Examination scheme**	
Practical: 2 hours/week	**End Semester Exams (ESE):**	**25 marks**
	Internal Continuous Assessment (ICA):	**25 marks**

Group A

1. Study of vectors

a) To calculate the resultant of coplanar and non-coplanar (space) forces.

b) To calculate unknown forces (reaction).

2. Verification of law of polygon of forces.

a) To verify the law of polygon of forces.

b) To calculate analytically and experimentally resultant of concurrent force system.

c) To compare analytical values with measured ones.

3. Verification of Lami's theorem.

a) To verify Lami's theorem.

b) To observe the ratio of P/sinα, Q/sinβ, R/sinγ and compare the same.

4. Forces in jib crane.

a) To study law of triangle of forces analytically and graphically.

b) To apply conditions of equilibrium.

c) To calculate forces in members of jib crane.

d) To compare the theoretical results with experimental values.

5. Reaction of beam.

a) To verify conditions of equilibrium of a system of coplanar parallel forces using reaction of beam apparatus.

b) To understand active and reactive forces.

6. Simple frictions on horizontal and inclined planes.

a) To describe frictional force, limiting friction, coefficient of friction, angle of repose.

b) To know the concept that the force ∝ reaction.

7. Study the simple machines and verification of law of machines.

a) To describe efficiency, load, effort, velocity ratio, frictional effort and verify law of machines.

b) To establish the law of machines from graph.

8. Graphical work (Statics)- (minimum three problems on graphical solutions of Static's problems).

a) To solve the problem on coplanar concurrent forces, parallel forces and reactions of beam by graphical method.

b) To describe Bow's notation, space diagram, vector diagram, polar diagram, funicular diagram and to draw the same.

9. Graphical work (Dynamics)- (minimum three problems on graphical solutions of Dynamic's problems).

a) To draw the motion curve and understand the significance of same.

b) To calculate the displacement and distance travelled from V-T diagram.

Note: The lab journal should consist of six experiments/assignments from group A. Assignment no. 8 & 9 are compulsory. Any four out of remaining seven experiments/assignments are to be conducted.

Group B

1. Observations of bearings by using Compass and calculations of included angles.

a) Describe whole circle and quadrantal bearing system.

b) Calculate included angles from observed bearings in a closed traverse.

2. Assignment based of first unit. Any one of the following.

a) Write notes on following: Various branches of civil engineering such as Structural Engineering, Water Resource Engineering, Geotechnical engineering, Transportation engineering, Environmental Engineering, Building science and Construction Management.

b) i) Explain principles of planning.

ii) Differentiate between load bearing and framed structures with neat sketches.

Note: The lab journal should consist of above two experiments/assignments from group B.

Text Books:

1. Sanju Unadkat, Engineering Mechanics, Techmax Prakashan
2. S C Gupta, Engineering Mechanics, Nirali Prakashan

Reference Books:

1. Bhavikatti S. S. & K. G. Rajashekarappa, "Engineering Mechanics", New Age International (P) Ltd., Publishers.
2. Kanitkar T. P. and Kulkarni, "Surveying and Levelling, Part I", Pune Vidyarthi Gruha Prakashan, 24th Edition
3. Bindra and Arora, "Building Construction", Dhanpat rai and Sons, Delhi.
4. N Kumara Swamy and A Kameswara Rao, "Building Planning and Drawing", Charotar Publishing House Pvt. Ltd.
5. Satish Gopi, "Basic Civil Engineering", Pearson Education, Delhi, 2008.
6. F P Beer and E R Johnson, "Mechanics for Engineers – Statics", McGraw-Hill Publication, 5th Edition
7. F P Beer and E R Johnson, "Mechanics for Engineers – Dynamics", McGraw-Hill Publication, 8th Edition.
8. S P Timoshenko and D H Young, "Engineering Mechanics", McGraw- Hill Publications, 4th Edition
9. R C Hibbeler, "Engineering Mechanics statics and dynamics", Pearson Education,11th Edition.
11. S R Bendale, "Engineering Mechanics", John Wiley & Sons, Delhi, 1st Edition
12. Jaget Babu, "Engineering Mechanics", Pearson Education, Delhi, 1st Edition.
13. Sushilkumar, "Building Construction", Standard Publishers, New Delhi, 2010.

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guidelines for ESE:

ESE will be based on journal submitted by the students.

Introduction to Electrical Engineering Lab.

LAB COURSE OUTLINE

Introduction to Electrical Engineering Lab	IEE LAB	FEN110
Course Title	**Short Title**	**Course Code**

Course Description:

In this laboratory course emphasis is on the understanding of the characteristics of basic circuits that use resistors, inductors and capacitors; magnetic circuits, AC/DC circuits and electrical installation. The students can use this knowledge to analyze more complex circuits such as electrical networks, single and three phase circuits, magnetic circuits etc.

Laboratory	Hours/week	No. of weeks	Total Hour	Semester Credits
	02	**14**	**28**	**01**

ESE Pattern: Oral [OR]

Prerequisite Course(s): Course on Physics at HSC level.

Course Objectives:

The objective of this lab is to impart the fundamental knowledge of electrical engineering to the students and to develop the students' ability to apply the specific procedures to analyze the electrical engineering Systems.

In this lab, students will be familiar with use of different theorems to analyze electrical networks. Students will also become familiar with R, L and C circuit, transformation ratio of transformer, power measurement, energy bill calculations etc.

Course Outcomes:

Upon successful completion of the lab student will be able to

a. Identify electrical components / equipment's.
b. Simplify D.C. network using Superposition Theorem.
c. Simplify D.C. network using Thevenin's Theorem.
d. Analyze RL and RLC series circuit.

e. Perform measurement of power in a single phase circuit.
f. Determine transformation ratio of a single phase transformer.
g. Analyze the measurement of power consumption of lamp.
h. Analyze light output in lumens of different lamps.
i. Analyze energy bill calculation of different lamps.
j. Describe operating principle of MCB, RCCB and ELCB.

LAB COURSE CONTENT

Introduction to Electrical Engineering	**Semester I**
Teaching Scheme	**Examination scheme**
Practical: 2 hours/week	**End Semester Exams (ESE): 25 marks**
	Internal Continuous Assessment (ICA): 25 marks

(Minimum FOUR practical's in each group)

Group A

1. Study and representation of electrical components / equipment's
2. Verification of Thevenin's theorems.
3. Verification of Superposition theorems.
4. Verification of Maximum power transfer theorems.
5. Measurement of current, voltage and power in R-L series exited by single phase AC supply.
6. Measurement of current, voltage and power in R-L-C series exited by single phase AC supply.

Group B

7. Measurement of power in single-phase circuit.
8. Measurement of power in three-phase circuit.
9. Determination of transformation ratio of a single-phase transformer.
10. Measurements of light output in lumens and energy bill calculation for different lamps.
11. Study of MCB, RCCB and ELCB.
12. Study of different earthing systems

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and

practical assignment submitted by the student in the form of journal.

Guidelines for ESE:

ESE will be based on journal submitted by the students.

Text Books:

1. B. L. Theraja and A. K. Theraja, "A Text book of Electrical Technology - Vol-I and Vol-II", S. Chand, 1st Edition, 2001.

2. J. B. Gupta, "A Course in electrical Power", S. K. Kataria and Sons, 12th Edition, 2002.

Reference Books:

1. V. N. Mittal, Arvind Mittal, "Basic Electrical Engineering", Tata McGraw Hill publishing co. ltd, New Delhi.

2. D. P. Kothari, I.J Nagrath, "Basic Electrical Engineering", Tata McGraw Hill

3. M. S. Naidu, S. Kamakshaiah, "Introduction to Electrical Engineering", Tata McGraw Hill.

4. P. Tiwari, "Basic Electrical Engineering", New Age Publication.

5. Josep Administer, "Schaum's outline of Electric circuits", Tata McGraw Hill

6. Leonard Bobrow "Fundamentals of Electrical Engineering", Oxford University press.

7. Vincent Del Toro, "Electrical Engineering Fundamentals", Pearson.

Communicative English Lab

COURSE OUTLINE

Communication English Lab	CE-I	FEN111
Course Title	**Short Title**	**Course Code**

Course description:

The Communicative English Lab focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations and contexts.

Lecture	Hours/week	No. of weeks	Total hours	Semester credits
	02	14	28	01

Prerequisite course (s): 11^{th} & 12^{th} English

Course objectives:

1. To make students recognize the accents of English through Audio-Visual aids.
2. To help students build their confidence and help overcome their inhibitions and self-consciousness while speaking in English. The focus will be on fluency.
3. To familiarize the students with communicative English.

Course outcomes:

Upon Successful Completion of this course the students will be able to:

1. Students will be sensitized towards recognition of English sound pattern.
2. The fluency in speech will be enhanced.

LAB COURSE CONTENT

Communicative English Lab	**Semester I**
Teaching Scheme	**Examination scheme**
Practical: 2 hours/week	**End Semester Exams (ESE): 25 marks**
	Internal Continuous Assessment (ICA): 25 marks

Laboratory Work:

Note: - The students will be required to submit practical assignments before Examination.

- Sounds of English

- Pronunciation & Spelling
- Stress and Intonation
- Errors in Spoken English
- Business Letter (Layout)
- Job application with Resume preparation
- Newspaper Reading

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guidelines for ESE:

ESE will be based on journal submitted by the students.

Reference Books:

1. English Pronouncing Dictionary, Cambridge University Press, India, 2012.
2. A Textbook of English Phonetics for Indian Students by T. Balasubramanian, Macmillan Publisher, 1981

Applied Physics - II

COURSE OUTLINE

Applied Physics - II	AP-II	FEN112
Course Title	**Short Title**	**Course Code**

Course description:

This course is aimed at introducing the fundamentals of basic sciences (Applied Physics-II) to undergraduate students. The background expected includes a prior knowledge of physics from HSC (science) and familiarity with various laws, principles and theories. The goals of the course are to understand the basic principles of science (Applied Physics -II) and their applications in different areas

Lecture	Hours/week	No. of weeks	Total hours	Semester credits
	03	14	42	03

Prerequisite course (s): 11^{th} & 12^{th} Physics

Course Objectives

1. To impart knowledge of basic concepts in applied physics and implementation to various engineering fields.
2. To provide the knowledge and methodology necessary for solving problems in the field of engineering.

Course outcomes:

Learner will be able to…

1. Apply the concepts of use of non-conventional energy for betterment of society.
2. Apply the concepts of Laser and Fiber Optic communication and Illustrate the principle, construction and working of various LASERs and its applications.
3. Apply the concepts of crystallography and to use XRD techniques for analysis of crystal structure.
4. Basic understanding of Semiconductor theory with use of Hall effect in science and technology as a Hall probe sensor.
5. Comprehend principles of interference and diffraction.

COURSE CONTENT

Applied Physics - II | **Semester II**

Teaching Scheme | **Examination scheme**

Lectures: 3 hours/week | **End semester exam (ESE): 60 marks**

Duration of ESE: 03 hours

Internal Sessional Exams (ISE): 40 marks

Unit-I: Acoustics and Ultrasonic — No. of Lectures: 08 Hours, Marks: 12

a) Acoustics: Elementary acoustics, Echo, Reverberation, Reverberation time, Sabine's formula (without derivation). Coefficient of absorption, Intensity level, Loudness, decibel, Acoustic intensity, Limits of audibility, Acoustical planning of building, Factors affecting the architectural acoustics of building, Limits of audibility, Numericals.

b) Ultrasonic: Ultrasonic waves, Production of ultrasonic waves by – (1) Piezoelectric generators-its merits and demerits, (2) Magnetostriction oscillator - its merits and demerits. properties of ultrasonic. Engineering applications of ultrasonic. Numericals.

Unit-II: Magnetic Materials & Superconductivity — No. of Lectures: 08 Hours, Marks: 12

a) Magnetic Materials: Origin of magnetism, Classification of magnetic materials into paramagnetism, Diamagnetism and Ferromagnetism. Hysteresis loop, Hard and Soft magnetic materials. Ferrites – Production, Properties and Applications. Numerical.

b) Superconductivity: Superconductors, Type-I and Type-II superconductors, Properties of superconductors, Effect of Impurity, Magnetic field, Pressure, Stress etc. on superconductors, Meissner's effect, Applications of superconductor. Numericals.

Unit-III: Modern Physics and Spectroscopy — No. of Lectures: 08 Hours, Marks: 12

a) Modern Physics: Motion of a charged particle in electric field, Magnetic field and Combined field. Electron microscope (SEM), Positive rays. Block diagram, Principle and Working of cathode ray oscilloscope, Bainbridge Mass Spectrograph (Principle, Construction and Working). Numericals.

b) Spectroscopy: Zeeman effect (Normal and Anomalous), Experimental arrangement for Normal Zeeman effect, Nuclear magnetic resonance, Magnetic resonance imaging. Numericals.

Unit-IV: Quantum Physics **No. of Lectures: 08 Hours, Marks: 12**

Wave nature of matter, Wave-particle duality, De-Broglie's wave, Wavelength of matter wave, Concept of group velocity, Phase velocity and Wave packet. Heisenberg's uncertainty principle with illustrations, Physical significance of wave function, Schrodinger's time independent and time dependent wave equation, Application of Schrodinger's time independent wave equation to the problem of particle in rigid box.

Unit-V: Nanoscience and Nanotechnology **No. of Lectures: 08 Hours, Marks: 12**

Introduction to Nano particles, Properties of Nano particles (Optical, Electrical, Magnetic, Structural, Mechanical), Brief description of different methods of synthesis (Physical, Chemical, Biological, Mechanical), Classification of Nano materials, Fabrication process – Top-down approach, Bottom-up approach. Applications of nanotechnology. Advantages and Limitations of Nano-materials.

Text Books:

1. R K Gaur, S L Gupta, "Engineering Physics", Dhanpat Rai Publications.

2. M N Avadhanulu, P G Kshirsagar, "Text book of Engineering Physics", S. Chand.

Reference Books:

1. P S Aithal, H J Ravindra, Engineering Physics", Acme Learning.
2. G Vijayakumari, "Engineering Physics", Vikas Publications.
3. M R Srinivasan, "Physics for Engineers", New Age International Publishers.
4. C S Solanki, "Solar Photovoltaic", PHI Learning Private Limited.
5. S O Pillai, "Solid state Physics", New Age International Publishers.
6. Ajay Ghatak, "Optics", TMH.
7. Hugh D Young, Roger A Freedman, "University Physics (With Modern Physics)", Pearson.
8. Hintendra K Malik, A K Singh, "Engineering Physics", Mc Graw Hill.
9. K Rajgopal, "Engineering Physics", PHI Learning Private Limited.
10. Uma Mukharji, "Engineering Physics", Narosa Publishing House
11. S Deswal, A Deswal, "Basic Course of Environmental Pollution", Dhanpath Rai Publications.
12. N Subrahmanyam, Brijal, M N Avadhanulu, "Optics", S. Chand.
13. Sanjay Jain, "Engineering Physics", Universities Press (India) Pvt Ltd.

Applied Chemistry - II

COURSE OUTLINE

Applied Chemistry - II	AC-II	FEN113
Course Title	**Short Title**	**Course Code**

Course description:

This course is aimed at introducing the fundamentals of basic sciences (Applied Chemistry –I) to undergraduate students. The background expected includes a prior knowledge of chemistry from HSC (science) and familiarity with basic fundamental theories. The goals of the course are to understand the basic principles of Applied Chemistry –I and their applications in different branches of engineering.

Lecture	Hours/week	No. of weeks	Total hours	Semester credits
	03	**14**	**42**	**03**

Prerequisite course (s): 11^{th} & 12^{th} Chemistry

Course objectives:

1. To apply the knowledge of science in engineering and technology.
2. To understand the basic concepts of chemistry and to analyse it from experiments.

Course outcomes:

After successful completion of this course the student will be able to:

a) Design and conduct experiments, analyse and interpret data.

b) Design a component, system or process to meet desired needs within realistic constraints.

c) An ability to function on multidisciplinary terms.

d) Identify, formulate and solve problems.

e) Understand the impact of engineering solutions in global, economic, environmental and societal context.

f) Ability to appreciate contemporary issues and engages in life-long learning.

g) Use the latest techniques, skills and modern tools necessary for engineering practices.

h) Understanding of the necessity to quantitatively balance the built environment with the natural world.

i) Understanding the basic parameters of water, different water softening processes and effect of hard water in industries.

j) Understanding the preparation, basic properties and applications of various polymers as an engineering material.

k) Understand the preparation, basic properties and applications of Portland cement.

l) Understand the classification, preparation, properties and applications of different alloys.

m) Understand the Water, Air Noise and Radioactive Pollution along with its control measures.

COURSE CONTENT

Applied Chemistry - II	**Semester II**
Teaching Scheme	**Examination scheme**
Lectures: 3 hours/week	**End semester exam (ESE): 60 marks**
	Duration of ESE: 03 hours
	Internal Sessional Exams (ISE): 40 marks

Unit–I: Chemical bonding — No. of Lectures: 08 Hours, Marks: 12

Introduction, Definition, Ionic bond, Covalent bond, coordinate or Dative bond, & Metallic bond

Metallic bond &Explanation of metallic Properties -

i) Electrical conductivity ii) Thermal conductivity iii) Metallic cluster iv) Malleability & Ductility v) Melting point

Hybridization: Types of Hybridization SP, SP^2, SP^3

Unit–II: Fuels — No. of Lectures: 08 Hours, Marks: 12

a) Introduction – Definition, classification of Fuel, Calorific value & its units,

b) Characteristics of good fuel

c) Solid Fuel: Analysis of Coal-(i) Proximate analysis – Determination & its significance (ii) Ultimate analysis – Determination & its Significance

d) Determination of Calorific Value by Bomb calorimeter (Numerical based on it).

Liquid Fuel: Refining & fractional distillation of LPG, petroleum, gasoline, diesel,

Kerosene. Biodiesel –preparation, properties & uses.

Gaseous Fuel: Preparation, properties & uses of (i) Water gas, (ii) Natural gas.

e) Determination of Calorific Value of gaseous Fuel/Volatile liquid by Boy's Gas Calorimeter (Numerical based on it).

Unit–III: Lubricant **No. of Lectures: 08 Hours, Marks: 12**

a) Introduction: Classification, characteristics.

b) Mechanism of lubrication – Fluid Film, boundary & extreme-pressure lubrication

c) Properties of lubricant –

A. Physical properties with Experimental determination

i. Viscosity & Viscosity Index by Red wood viscometer.

ii. Flash & fire point by Pensky - Marten's apparatus

iii. Cloud & pour points

B. Chemical properties with determination

i. Saponification value

ii. Acid value

d) General Criteria for selection of lubricants for delicate machine, IC engine, gears, cutting tools, transformer & refrigeration system.

Unit–IV: Refractories **No. of Lectures: 08 Hours, Marks: 12**

a) Introduction,

b) Types of Refractories, Characteristics of Refractories

c) Preparation, Properties & application of acidic, basic & neutral Refractories

(i) Acidic - Alumina, Silica, Fireclay.

(ii) Basic - Magnesite, Dolomite.

(iii) Neutral - Carbon, graphite.

Unit–V: Corrosion and its control **No. of Lectures: 08 Hours, Marks: 12**

a) Introduction – definition, causes, consequences of corrosion

b) Dry & Wet Corrosion - explanation with mechanism.

c) Types of corrosion – Pitting, waterline, soil.

d) Corrosion Control - Design & material selection, anodic & cathodic protection, hot dipping, galvanizing, tinning, electroplating.

Text Books:

1. Jain & Jain, "Engineering Chemistry", Dhanpat Rai Publishing Co.

2. S. S. Dara, "A Text Book of Engineering Chemistry", S Chand & Co. Ltd.

Reference Books:

1. B K Sharma, Krishna, "Engineering Chemistry", Prakashan Media (P) Ltd.

2. Suba Ramesh, “Engineering Chemistry”, Wiley India Pvt. Ltd.

3. R Gopalan, “A Text book of Engineering Chemistry”, Vikas Publishing House Pvt. Ltd. Third Edition

4. B S Chauhan, “Engineering Chemistry”, University Science Press, Third Edition.

5. Shashi Chawla, “A Text book of Engineering Chemistry”, Dhanpat Rai Publishing Co.

6. V R Gowariker, “Polymer Science”. New Age International.

7. Abhijit Mallick, “Engineering chemistry”, Viva books.

8. Sunita Ratan, “Engineering chemistry”, S K Kataria & Sons.

9. Das R K, “Industrial Chemistry”, Asia Pub. House, New York, 1966

Applied Mathematics - II

COURSE OUTLINE

Applied Mathematics - II	AM-II	FEN114
Course Title	**Short Title**	**Course Code**

Course description:

This course is aimed at introducing the fundamentals of basic Mathematics to undergraduate students. The background expected includes a prior knowledge of Mathematics from 12^{th}science and familiarity with various laws, principles and theories. The goals of the course are to understand the basic principle of Mathematics and its application in different area.

Lecture	Hours/week	No. of weeks	Total hours	Semester credits
	03	14	42	04

Prerequisite course (s):11^{th}& 12^{th} mathematics

Course objectives:

The basic necessity for the foundation of Engineering and Technology being Mathematics the main aim is to teach mathematical methodologies and models, develop mathematical skill and enhance thinking and decision-making power of student.

Course outcomes:

After completion of this course learner will be able to:

1. Apply knowledge of mathematics in engineering and technology.
2. Identify, formulate and solve engineering problems.
3. Design Mathematical models for engineering problems and solve them.
4. Use partial derivative to find total derivative of implicit functions.
5. Use partial derivative to find Jacobians
6. Find error and approximate values of problems related to engineering field.
7. Draw the rough sketch of Cartesian and polar curves.
8. Evaluate multiple integrals using spherical polar and cylindrical polar coordinates.
9. Solve ordinary differential equations using numerical methods.

COURSE CONTENT

Applied Mathematics - II	**Semester II**
Teaching Scheme	**Examination scheme**
Lectures: 3 hours/week	**End semester exam (ESE): 60 marks**
Tutorial: 1hr.	**Duration of ESE: 03 hours**
	Internal Sessional Exams (ISE): 40 marks

Unit-I: Application to Partial differentiation (No. of Lect. 08, Marks-12)

1. Jacobian and its applications. (Definition of Jacobian, chain Rule of Jacobian,
2. Jacobian of implicit function,
3. Functional dependence & independence
4. Errors & approximations. (Problems related to engineering field)
5. Lagrange's method of undetermined multipliers for single constraint.

Unit-II: Differential Equation & its Applications (First order & First degree) (**No. of Lect. - 08, Marks-12)**

1. Exact differential equation.
2. Reducible to exact differential equation.
3. Linear differential equation.
4. Reducible to linear differential equation.
5. Applications of differential equation to simple Electrical circuits & Conduction of heat

Unit-III: Curve Tracing and Fourier series (No. of Lect. - 08, Marks-12)

1. Curve Tracing: Cartesian & polar curves.
2. Fourier series: a) Full range Fourier series on $c \leq x \leq c + 2L$
   b) Half range Fourier series on $0 \leq x \leq L$
   c) Applications to Harmonic analysis

Unit-IV: Multiple Integrals and its Applications (No. of Lect.-08, Marks- 12)

1. Introduction to three co-ordinate systems.
2. Double integration. (Cartesian form, polar form & change of order of integration).
3. Triple integration.
4. Application of multiple integrals to area & volume.

Unit-V: Numerical Solution of Ordinary Differential Equation (First order and First degree) (No. of Lect. - 08, Marks-12)

1. Numerical solution by Taylor's series method.
2. Runge -Kutta method (fourth order).
3. Picard's method.
4. Modified Euler's method.

5. Milne's method

Reference Books:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley Eastern Ltd, 7th Edition.
2. B S Grewal, "Higher Engineering Mathematics", Khanna Publication.
3. H K Das, "Advanced Engineering Mathematics", S. Chand & Company.
4. B V Ramana , "Engineering Mathematics", TMH, 2nd Edition.
5. N P Bali, "A Text Book of Engineering Mathematics", Laxmi Publication, New Delhi.
6. Kandasamy , "Numerical Methods", S. Chand & Company.

Introduction to "C" Programming

COURSE OUTLINE

Introduction to "C" Programming	ICP	FEN115
Course Title	**Short Title**	**Course Code**

Course description:

This course provides students with a comprehensive study of the C /C++ programming language. Introduction to program design and problem solving using the C /C++ programming language. Programming topics include control structures, functions, arrays, pointers, and file I/O.

Lecture	Hours/week	No. of weeks	Total hours	Semester credits
	03	**14**	**42**	**03**

Prerequisite course (s): Physics

Course objectives:

To impart knowledge so that the student will:

1. Learn the fundamentals, structure and syntax of C Language.
2. Write simple programs in C Language.

Course outcomes:

Upon completing this course, the student will be able to:

1. Understand the fundamentals of C programming.
2. Choose the loops and decision making statements to solve the problem.
3. Use functions to solve the given problem.
4. Implement different Operations on arrays.
5. Understand strings and structures.
6. Understand the usage of pointers

COURSE CONTENT

Introduction to "C" Programming	**Semester II**	
Teaching Scheme	**Examination scheme**	
Lectures: 3 hours/week	**End semester exam (ESE):**	**60 marks**
	Duration of ESE:	**03 hours**
	Internal Sessional Exams (ISE):	**40 marks**

UNIT 1: Introduction **No. of Lectures: 08, Marks 12**

What is C, The C Character set, Constant, Variables & Keywords, Types of C Constants, Rules for constructing Integer Constants, Rules for constructing Real Constants, Rules for constructing Character Constants, Types of C Variables, Rules for constructing Variable Names, Comments in a C Program

Type Declaration Instruction, Type Conversion in Assignments

Data Types Revisited: Integers, long & short, signed & unsigned, Chars, signed & unsigned, Float & Doubles

Console Input/Output: Types of I/O, Console I/O Function, Formatted Console I/O Functions, Unformatted Console I/O Functions

Decision Control Instruction: The if statement, Multiple Statements within if, The if-else statement, Nested if-else, Forms of if

Use of Logical Operators, The else if Clause, The | Operator, The Conditional Operators

UNIT 2: Loop **No. of Lectures: 08, Marks 12**

Loop Control Instruction: Loops, the while Loop, Tips & Traps, More Operators, for Loop, Nesting of Loops, Multiple Initializations in the for Loop, the break Statement, the continue Statement, The do-while Loop, The Odd Loop

Case Control Instruction: Decisions using switch, The Tips & Traps, switch versus if-else Ladder, The goto Keyword

UNIT 3: Function & Pointers **No. of Lectures: 08, Marks 12**

Function: What is a Function? Why use Functions? Passing Values between Functions, Scope Rule of Functions, Order of Passing Arguments, Using Library Functions

Pointers: Call by Value and Call by Reference, An Introduction to Pointers, Pointer Notation, Back to Function Calls

UNIT 4: Arrays **No. of Lectures: 08, Marks 12**

Arrays: What are Arrays? A Simple Program using Array, more on Arrays, Array Initialization, Array Elements in Memory, Bounds Checking, Passing Array Elements to a Function, Pointers and Arrays, Passing an Entire Array to a Function, The Real Thing

Multidimensional Array: Two Dimensional Arrays, initializing a Two-Dimensional Array, Memory Map of a Two-Dimensional Array, Pointers and Two Dimensional Arrays, Pointer to an Array, Passing 2 D Array to a Function, Array of Pointers, Three-Dimensional Array

UNIT 5: Strings **No. of Lectures: 08, Marks 12**

Strings: What are Strings? More about Strings, Pointers and Strings, Standard Library String Functions: strlen(), strcpy(), strcat(), strcmp()

Handling Multiple Strings: Two-Dimensional Array of Characters, Array of Pointers to strings, Limitations of Array of Pointers to Strings

Structures: Why use Structures? Declaring a Structure, Accessing Structure Elements, How Structure Elements are Stored? Array of Structure

Text Books:

1. Let Us C by Yashavant Kanetkar, 14th Edition, BPB Publication

Reference Books:

1. Programming in ANSIC C by E Balagurusamy, Tata McGraw Hill, 4/E, 2007

2. Mastering C by K. R. Venugopal and S. R. Prasad, Tata McGraw Hill, 2011

3. The C Programming Language by Brian W. Kernighan and Dennis M. Ritchie, PHI

4. C How to Program by Paul Deitel and Harvey Deitel, 8th Edition, Pearson

Introduction to Mechanical Engineering and Engineering Drawing

COURSE OUTLINE

Introduction to Mechanical Engineering and Engineering Drawing	IMEED	FEN116
Course Title	**Short Title**	**Course Code**

Course description:

This course provides the elementary level knowledge of Introduction to Mechanical Engineering and Engineering Drawing. Course includes introduction to Engineering Drawing, Orthographic Projection, Isometric view and Isometric Projection. The course also introduces students to concept of Energy and energy conservation, Energy management & Audit, Conventional Energy Sources and various mechanical devices.

Lecture	Hours/week	No. of weeks	Total hours	Semester credits
	03	14	42	03

Prerequisite course (s): Elementary Physics

Course objectives:

1. To describe some of the subfields of mechanical engineering
2. To develop imagination of physical objects to be represented on paper for engineering communication
3. To develop the manual drawing skill.
4. To develop drawing interpretation skill.
5. To develop the physical realization of the dimension of the objects.

Course outcomes:

1. Students will be able to understand the theory of projection.
2. Students will be able to know and understand the conventions and the methods of engineering drawing.
3. Students will be able to improve their visualization skills so that they can apply these skills in developing new products.
4. Students will be able to define mechanical engineering
5. Students will be able to distinguish mechanical engineering from other types of engineering
6. Students will be able to describe important components of engineering design

COURSE CONTENT

Introduction to Mechanical Engineering & Engineering Drawing

Semester II

Teaching Scheme

Lectures: 3 hours/week

Examination scheme

End semester exam (ESE): 60 marks

Duration of ESE: 04 hours

Internal Sessional Exams (ISE): 40 marks

UNIT 1: Introduction to Mechanical Engineering No. of Lectures: 08, Marks 12

a) Introduction to Manufacturing: Definition and working of Turning, facing, knurling, Thread cutting, Drilling, Boring, Counter Sinking, Counter Boring, Plane milling, End milling, Slot milling. (No sketches of Machine tools and no analytical portion, sketches to be used only for explaining operations.).

b) Introduction to Machine Design: Basic procedure of machine design, requisite of design engineer, Introduction to steel and cast iron and its mechanical properties.

Mechanical elements: Basic functions and applications od shafts, keys, couplings, bearings.

c) Introduction to Thermal Engineering: Energy, different forms of energy, heat, work and its forms, sources of energy.

Difference between 2 stroke & 4 stroke engine, diesel & petrol engine, introduction to steam power plant layout.

d) Introduction to Industrial Engineering: Basic concepts of method study, time study, site selection, productivity. Definition, concepts, aims, objectives and scope of industrial psychology.

UNIT 2: Projections of Lines No. of Lectures: 08, Marks 12

a) Line parallel to both the plane, Line parallel to one plane and perpendicular to the other. Line inclined to one plane and parallel to the other.

b) Line inclined to both the reference planes. (First Angle & Third angle method of projection),

c) Traces of lines.

UNIT 3: Projections of Planes **No. of Lectures: 08, Marks 12**

a) Plane with surface parallel to one plane and perpendicular to other, Plane inclined to one plane and perpendicular to other (First Angle & Third Angle method of projection)

b) Projections of planes inclined to both the plane (problems on AIP & AVP). (First Angle & Third Angle method of projection)

UNIT 4: Orthographic Projections **No. of Lectures: 08, Marks 12**

a) Types of lines, methods of dimensioning and types of dimensioning,

b) Orthographic projections (First angle orthographic projection methods) of different machine parts problem,

c) Types of sections & Sectional Orthographic projections (First angle & Third angle orthographic projection methods)

UNIT 5: Isometric Projections **No. of Lectures: 08, Marks 12**

a) Introduction, Isometric axes, lines and planes; true scale and isometric scale. Isometric projection and Isometric view

b) Conversion of given orthographic view into isometric projection.

Text Books:

1. Arunoday Kumar, Engineering Drawing, Techmax

2. Venugopal, Engineering Drawing

Reference Books:

1. Bhatt N D, Panchal V M, "Engineering Drawing – Plane and Solid Geometry", Charotar Publishing House.

2. T Jeyapoovan, "Engineering Drawing and Graphics Using Autocad", Vikas Publication Noida, New Delhi.

3. H G Phakatkar, "Engineering Graphics", Nirali Publication, Pune.

4. Kannaiah K L, Narayana, "Engineering Graphics", Scitech Pub, Chennai

6. Khurmi, Machine Design, Dhanpat Rai Publication

7. P K Nag, Engineering Thermodynamics, Tata McGraw Hill

Introduction to Electronics Engineering

COURSE OUTLINE

Introduction to Electronics Engineering	IEXE	FEN117
Course Title	**Short Title**	**Course Code**

Course description:

This course provides an introduction to electronics engineering covering: semiconductor devices such as diodes, transistors FETs and Optoelectronic and Power Electronic devices, operational amplifiers and their application; logic gates and their applications

Lecture	Hours/week	No. of weeks	Total hours	Semester credits
	03	**14**	**42**	**03**

Prerequisite course (s): Physics

Course objectives:

1. To provide students with a firm grasp of the essential principles of basic electronics.
2. To understand the concepts and terminology that is used in electronics engineering.
3. It is not an in-depth Electronic course but, rather a course aimed at acquiring an understanding of basic principles that are used in electronic engineering.

Course outcomes:

1. Understand working principle of PN junction diode, Zener diode and their applications.
2. Describe different configuration of Bipolar Junction Transistor.
3. Understand CE amplifier and working of transistor as a switch.
4. Describe different configurations of FET
5. Understand operating principle of various Optoelectronics and Power Electronics Devices
6. Understand operational amplifier and its applications.
7. Describe use of the Basic gate and Universal gate

COURSE CONTENT

Introduction to Electronics Engineering | **Semester II**

Teaching Scheme | **Examination scheme**

Lectures: 3 hours/week | **End semester exam (ESE): 60 marks**

Duration of ESE: 03 hours

Internal Sessional Exams (ISE): 40 marks

UNIT 1: Diodes **No. of Lectures: 08, Marks 12**

PN Junction Diode, V-I Characteristics, Junction break down, Diode current equation, Diode resistances, Temperature Dependence, Zener Diode and its V-I Characteristics,

Applications: Rectifiers, basic clipping and clamping circuits, Voltage Multipliers

UNIT 2: Bipolar Junction Transistors **No. of Lectures: 08, Marks 12**

Introduction to npn and pnp transistors, Alpha, Beta, Gamma and their relations, different regions of operations, CE & CB input output characteristics, BJT as a switch, BJT as an amplifier, DC load line and Q point. Applications of BJT as switch and amplifier.

Unit 3: Field Effect Transistors **No. of Lectures: 8, Marks 12**

Classification, working and V-I Characteristics of JFET and MOSFET, Parameters of FET, Difference between FET and BJT, MOSFET resistors, MOSFET Capacitor, CMOS (NMOS & PMOS), Applications of FET as Switch.

Unit 4: Optoelectronics and Power Devices **No. of Lectures:8, Marks 12**

Luminance, Photoconductivity, Photodiode, LED, LCD, Laser Diode, Optocoupler, Power Diode, SCR, SCR as a switch, V-I Characteristics, DIAC and TRIAC, UJT and relaxation oscillator.

Unit 5: OPAMP, Number System and Logic Gates **No. of Lectures- 8, Marks- 12**

OPAMP: IC 741 Pin diagram, Virtual ground concept, Inverting and Noninverting Amplifier, Adder, Subtractor, Integrator, Differentiator and Voltage follower.

Logic Gates: Number Systems, Basic and Universal Logic gates, truth table verification, Simplification and implementation of logic equations, De-Morgan's theorem, Half adder and Half Subtractor, Concept of Combinational & Sequential logic circuits

Text Books:

1. Applied Electronics: S. Chand Publication, R. S. Sedha

2. Principles of Electronics: S. Chand Publications, V.K. Mehta

Reference Books:

1. Modern Digital Electronics: TMH Publications, R. P. Jain

2. Applied Electronics: S. Chand Publication, B. L. Theraja

3. Electronics Principles: TMH Publications, A.P. Malvino

4. Linear Integrated Circuits: PHI Publications Ramakant Gaykwad

Workshop Practice- II

LAB COURSE OUTLINE

Workshop Practice II	WP-II	FEN 118
Course Title	**Short Title**	**Course Code**

Course Description:

Workshop Practice II covers the basic knowledge and practices on Carpentry shop, plumbing shop, Machine shop, and Electronics and Electrical workshop in order to improve the practical skill of students in different workshops.

Laboratory	Hours/Week	No. of weeks	Total Hour	Semester Credits
	02	14	28	01

Prerequisite Course(s): 11^{th}, 12^{th} Physics, Mathematics,

Course Objectives:

In workshop practice, students will get familiar with use of different workshop practices like carpentry shop, plumbing shop, machine shop, electronics and electrical workshop. Students will also get familiar with different tools, machines, equipment's, job holding devices, job drawing, job material, job manufacturing operations and processes in different workshops.

Objective to develop following Intellectual skills: -

a) Identification and selection of manufacturing processes/operations according to job requirement in different workshops.
b) Identification, selection and understanding of tools, equipment's, machines and job material according to job drawing for different workshops.
c) Understanding working principle and construction of process planning sheet.
d) Identification, repairing, maintenance and understanding of the working principle of electronic and electrical components/devices.

Objective to develop following Motor skills:

a. Ability to handle measuring instruments.
b. Ability to read the job drawing.
c. Ability to understand the basic working principle of carpentry operations, tools and equipment's in carpentry shop. Ability to understand the basic working principle of Plumbing operations, tools and equipment's in Plumbing shop.

d. Ability to understand the basic working principle of lathe machine operations, tools and equipment's in Machine shop.
e. Ability to understand the basic working principle of Electronics components used in electronics workshop.
f. Ability to understand the repair and maintenance of domestic appliances in electrical workshop.

Course Outcomes:

Upon successful completion of these practical's the student will be able to work in -

a) Carpentry shop

b) Plumbing shop

c) Machine shop

LAB COURSE CONTENT

Workshop Practice- II	**Semester II**
Teaching Scheme	**Examination scheme**
Practical: 2 hours/week	**End Semester Exams (ESE): --**
	Internal Continuous Assessment (ICA): 25 marks

A. Carpentry shop

1. Introduction to carpentry operations, equipment and tools.

2. One job involves lap joint, bridle joint.

B. Plumbing shop

1. Introduction to the tools and equipment's like pipe vice, pipe bending machine, pipe dies, cutting dies, pipe wrench etc. used for plumbing operations on G.I. pipe.

2. One Job having both side threading and like bending operations.

C. Machine shop

1. One job on lathe machine involving operations like Facing, plain turning, step turning, taper turning, chamfering and drilling.

Reference Books:

1. Hajra Chaudhary and Bose S K, "Element of Workshop Technology Volume I and II", Asia Publishing House.

2. P N Rao, "Production Technology Volume I and II", Tata McGraw Hill Publication.

3. R K Jain, “Production Technology”, Khanna Publications.
4. P C Sharma, “Production Technology”, Khanna Publication.
5. Chapman W A J., “Workshop Technology”, ELBS Publication.
6. HMT, “Production Technology”, Tata McGraw Hill Publication.
7. Kannaiah K L, Narayana, “Workshop Manual”, Scitech Publications, Chennai, 2nd Edition

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Applied Science-II Lab

LAB COURSE OUTLINE

Applied Science-II Lab	AS-II LAB	FEN 119
Course Title	**Short Title**	**Course Code**

Course Description:

In this laboratory, course emphasis is on the understanding of basic principles, working of pH-meter, Bomb calorimeter, Ostwald's Viscometer, various properties of lubricating oils, proximate analysis of fuels etc. The learner here can use this knowledge and apply in various branches of engineering as required.

Laboratory	Hours/Week	No. of weeks	Total Hour	Semester Credits
	02	14	28	01

Prerequisite Course(s): 12^{th} Chemistry, Different laws, basic principles and theories.

Course Objectives:

1. To impart knowledge of basic concepts in applied physics and implementation to various engineering fields.

2. To provide the knowledge and methodology necessary for solving problems in the field of engineering.

Course Outcomes:

Upon successful completion of lab Course, student will be able to:

a) Analyse the partition Coefficient of Iodine between water & CCl4.

b) Analyse the saponification value of given oil sample.

c) Analyse the viscosity of given liquid by Ostwald's Viscometer.

d) Analyse the Calorific value of fuel sample by using Bomb calorimeter.

e) Identify the Moisture content, Volatile matter, Ash content and Fixed carbon in coal sample by proximate analysis.

f) Identify the acidic and basic solution by using pH-meter.

g) Analyse the acid value of Vegetable Oil sample.

h) Analyse the strength of $NaHCO_3$ and Na_2CO_3 in alkali mixture.

i) Analyse the Aniline point of lubricating oil.

j) Analyse the Iodine value of an Oil sample by Wij's method.

LAB COURSE CONTENT

Applied Science - II Lab	**Semester II**
Teaching Scheme	**Examination scheme**
Practical: 2 hours/week	**End Semester Exams (ESE): --**
	Internal Continuous Assessment (ICA): 25 marks

Applied Physics-II Lab

Practical: 2 hours/ week (Alternate with Applied Chemistry-II)

(Note: Minimum FIVE Experiments from the following)

1. Sound Level Meter
2. Ultrasonic Interferometer.
3. Ultrasonic Detectors
4. EMF by Thomson's method.
5. To Study B-H curve
6. Determination of Magnetic Susceptibility.
7. Uses of CRO
8. Synthesis and Characterization of Nano Composites

Applied Chemistry-II Lab

Practical: 2 hours/ week (Alternate with Engineering Physics-II)

(Note: Minimum FIVE Experiments from the following)

1. Determination of partition Coefficient of Iodine between water & CCl4.

a). Preparation of different composition of saturated Iodine solution in CCl_4.

b). Separation of Aqueous and CCl_4 layer from each bottle.

c). Titration of Aqueous layer against N/100 Sodium Thiosulphate solution.

d). Titration of CCl_4 layer against N/20 Sodium Thiosulphate solution.

e). Calculation of Iodine in both the layers.

2. Determination of saponification value of oil.

a). Preparation of std. KOH solution.

b). Standardization of Std. KOH solution against 0.5N HCL solution using Phenolphthalein indicator.

c). Add KOH solution in 2 gm of Oil sample and reflux for 2 hours.

d). Titrate the above solution against 0.5N HCL solution using Phenolphthalein indicator.

e). Using two titrate values calculate the saponification number.

3. Determination of Viscosity by Ostwald's Viscometer.

a). Find out the density of given liquid by using specific gravity bottle.

b). Measure the flow time required for liquid and water by using Ostwald's Viscometer.

c). Calculate the relative viscosity from the above observed values.

4. Determination of Calorific value of fuel sample by using Bomb calorimeter.

a). Burn the known mass of solid fuel in Bomb pot.

b). Observe the temperature difference of water in bomb pot.

c). Calculate the actual and corrected calorific value of solid fuel sample from above observations.

5). Determination of Moisture, Volatile matter & Ash in a given sample of Coal (Proximate analysis).

a). Determine and calculate the moisture content from the given coal sample.

b). Determine and calculate the Volatile matter from the given coal sample.

c). Determine and calculate the Ash content from the given coal sample.

d). Determine and calculate the Fixed Carbon from the given coal sample.

6. Use of pH meter.

a). Calibrate the pH-meter using buffer solution at room temperature.

b). Measure the pH-values of given solutions.

c). From the measured pH-values of solution, conclude which are acidic or basic solutions.

7. Acid Value of vegetable Oil sample.

a). Add neutral alcoholic solution in given Oil sample and heat in water bath for 30minutes.

b). Titrate above solution against 0.1N KOH solution using phenolphthalein indicator.

c). Calculate the acid value of given Vegetable Oil sample from above observations.

8. Determination of NaHCO3 & Na2CO3 in given alkali mixture.

a). Titration of alkali mixture solution against 0.1N HCl using methyl orange indicator.

b). Titration of alkali mixture solution against 0.1N HCl using phenolphthalein indicator.

c). Calculate the strength of NaHCO3 and NA2CO3 from the above observed titrate values.

9. Determination of Aniline point of lubricating oil.

a). Mixed Aniline and lubricating oil sample in Aniline point apparatus.

b). Maintain the apparatus at constant temperature using water bath.

c). Observe the temperature at which cloudiness and hazy appearance in the solution.

d). Report the observed values as Aniline point.

10. Determination of Iodine value of an Oil sample (Wij's method).

a). Back Titration: Dissolve the given oil sample in CCl4 solution then add Wij'ssolution.

b). Titrate the above solution against std. 0.1N Sodium Thiosulphate solution.

c). Blank Titration: In Wij's solution add KI solution and titrate it against 0.1Nsodium Thiosulphate solution.

d) Calculate the Iodine value of an oil sample from above observed titrate values.

Reference Books:

1. B K Sharma, "Engineering Chemistry", Krishna Prakashan Media (P) Ltd.
2. Subaramesh, "Engineering Chemistry, Wiley India Pvt. Ltd.
3. Jain & Jain, "Engineering Chemistry ", Dhanpat Rai Publishing Co.
4. S S Dara, "A Text Book of Engineering Chemistry", S. Chand & Co. Ltd.
5. R. Gopalan, "A Text book of Engineering Chemistry (Third Edition)", Vikas Publishing House Pvt. Ltd.
6. B S Chauhan, "Engineering Chemistry", University Science Press. Third Edition.
7. Shashi Chawla, "A Text book of Engineering Chemistry", Dhanpat Rai Publishing Co.
8. Abhijit Mallick, "Engineering chemistry", Viva books.
9. Sunita Ratan, "Engineering chemistry", S K Kataria & Sons.
10. R K Das, "Industrial Chemistry", Asia Publishing House.
11. S. Deswal, A. Deswal, "Basic Course in Environmental Pollution", Dhanpat Rai Publishing Co.

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Introduction to Mechanical Engineering & Engineering Drawing Lab

LAB COURSE OUTLINE

Introduction to Mechanical Engineering & Engineering Drawing Lab	IMEED LAB	FEN 120
Course Title	**Short Title**	**Course Code**

Course Description:

This lab includes drawing sheets related to Engineering Drawing and labs related to elementary level knowledge of Elements of Mechanical Engineering.

Laboratory	Hours/Week	No. of weeks	Total Hour	Semester Credits
	02	14	28	01

ESE Pattern: Oral (OR)

Prerequisite Course(s): 11th Physics, 12th Physics

Course Objective:

In this lab, students will imbibe essentials of Engineering Drawing through progressive practice of Orthographic Projection, Isometric view and Isometric Projection. Students will also get familiar with mechanical devices used to transmit power.

Objective to develop following Intellectual skills:

a) Identify elements of given Engineering Drawing.

b) Interpretation of given engineering drawing.

c) Understand Orthographic projection.

d) Understand Isometric projection and Isometric view.

e) Understand principle and working of Boiler, its mountings & accessories.

f) Understand principle and working of power transmission devices.

g) Understand principles of energy audit of domestic devices.

Objective to develop following Motor skills:

a) Ability to layout a drawing sheet and apply basic drawing concepts to it.

b) Ability to draw Orthographic projection of given object.

c) Ability to draw Orthographic projection with section view.

d) Ability to draw Isometric projection and Isometric view of given object.

e) Ability to perform energy audit of domestic devices.

Course Outcomes:

Upon successful completion of these practical the student will be able to

a) Read the given engineering drawing sheet.

b) Interpret different views of given engineering object.

c) Construct an orthographic projection i.e. front view, top view, side views of an object.

d) Prepare an orthographic projection with section of an object.

e) Construct an isometric projection of an object.

f) Prepare an isometric view of an object.

g) Convert orthographic projections of given object into isometric drawing.

h) Illustrate principle and working of fire tube and water tube boiler.

i) Illustrate principle and working of boiler mountings and accessories.

j) Explain principle and working of power transmission devices.

k) Illustrate energy audit of simple domestic appliances.

LAB COURSE CONTENT

Introduction to Mechanical Engineering	
& Engineering Drawing Lab	**Semester II**
Teaching Scheme	**Examination scheme**
Practical: 2 hours/week	**End Semester Exams (ESE): 25 marks**
	Internal Continuous Assessment (ICA): 25 marks

1. Sheet No. 01 – Freehand sketches of Machine elements.

Free hand sketches of machine elements including screw threads, screwed fasteners, nuts, bolts, riveted and welded joints, Keys, shaft, couplings. (With constructional details.)

2. Sheet No. 02 – Projection of lines.

a) Illustration of projection of straight line inclined to two planes. (Minimum 02 solved examples)

b) Illustration of projection of straight line inclined to two planes (Traces of lines). (Minimum 02 solved examples)

3. Sheet No. 03 – Projection of Planes.

Illustration of projection of plane inclined to both planes. (Minimum 04 solved examples)

4. Sheet No. 04– Orthographic Projection.

a) Illustration of simple orthographic projection using both 1stangle and 3rdangle method. (Minimum 02 solved examples)

b) Illustration of sectional orthographic projection using both 1st angle and 3rd angle method. (Minimum 02 solved examples)

5. Sheet No. 05 – Isometric Projection

a. Illustration of Isometric projection with natural scale. (Minimum 02 solved examples)

b. Illustration of Isometric projection with isometric scale. (Minimum 02 solved examples)

Note: FIVE drawing sheets from ED Lab shall be conducted during 14 weeks available during semester.

Reference Books:

1. Bhatt N D, Panchal V M, "Engineering Drawing – Plane and Solid Geometry", Charotar Publishing House.

2. Rajan T S, "Basic Mechanical Engineering", New Age International Pvt. Ltd, New Delhi.

3. T Jeyapoovan, "Engineering Drawing and Graphics Using Autocad", Vikas Publication Noida, New Delhi.

4. Kannaiah K L, Narayana, "Engineering Graphics", Scitech Publications, Chennai, 2nd Edition

5. H G Phakatkar, "Engineering Graphics", Nirali Publication, Pune.

6. R K Dhawan, "Machine Drawing", S Chand& Co., New Delhi

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guidelines for ESE:

ESE will be based on journal submitted by the students.

Introduction to "C" Programming Lab

LAB COURSE OUTLINE

Introduction to "C" Programming Lab	ICP LAB	FEN121
Course Title	**Short Title**	**Course Code**

Course Description:

This course provides students with a comprehensive study of the C / C++ programming language. Introduction to program design and problem solving using the C / C++ programming language. Programming topics include control structures, functions, arrays, pointers, and file I/O.

Laboratory	**Hours/Week**	**No. of weeks**	**Total Hour**	**Semester Credits**
	02	**14**	**28**	**01**

ESE Pattern: Oral (OR)

Prerequisite Course(s): 11th Physics, 12th Physics

Course Objectives:

To impart knowledge so that the student will:

1. Learn the fundamentals, structure and syntax of C Language.
2. Write simple programs in C Language.

Course Outcomes:

Upon completing this course, the student will be able to:

1. Understand the fundamentals of C programming.
2. Choose the loops and decision making statements to solve the problem.
3. Use functions to solve the given problem.
4. Implement different Operations on arrays.
5. Understand strings and structures.
6. Understand the usage of pointers.

LAB COURSE CONTENT

Introduction to "C" programming Lab	**Semester II**
Teaching Scheme	**Examination scheme**
Practical: 2 hours/week	**End Semester Exams (ESE): 25 marks**
	Internal Continuous Assessment (ICA): 25 marks

GROUP - A

Concerned faculty member will suitably frame FIVE assignments, ONE from each UNIT of the concerned theory subject, each assignment of 20 questions from unsolved exercises of Text Books as given below. The questions should be in the nature of multiple choices, TRUE / FALSE, output of a program, identify errors in a program etc. These assignments should be performed in the lab and for hands on experience.

GROUP – B

Minimum FIVE laboratory assignments from Group - B shall be performed using open source software. The suggested List is given below.

1. Write a C program to find area of circle, triangle, rectangle, square using switch statement.
2. Write a C program to find the sum of a series (looping).
3. Write a C program to accept a string and reverse it without using library functions. Display the original and reversed string. (String handling).
4. Write a C program that uses functions to perform the following string operations using function and pointers:
    i) To insert a sub-string in to given main string from a given position.
    ii) To delete n Characters from a given position in a given string.
5. Write a C program to read 'N' elements into an array and compute the sum of all the elements stored in an array using pointer. (Arrays and pointers).
6. Write a C program to read a matrix of order (M *N) and (P * Q) and compute the addition and multiplication of two matrices. (Passing matrix to functions).
7. Write a C program to read 'N' students information and display the information with appropriate headings, where each student information consists of roll number, Name, total marks scored etc. (Structure handling).

Note: Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

Guidelines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guidelines for ESE:

ESE will be based on journal submitted by the students.

Text Books:

1. Test Your C Skills by Yashavant Kanetkar, 5th Edition, BPB Publication
2. Let Us C by Yashavant Kanetkar, 14th Edition, BPB Publication

Reference Books:

1. Programming in ANSIC C by E Balagurusamy, Tata McGraw Hill, 4/E, 2007
2. Mastering C by K. R. Venugopal and S. R. Prasad, Tata McGraw Hill, 2011
3. The C Programming Language by Brian W. Kernighan and Dennis M. Ritchie, PHI
4. C How to Program by Paul Deitel and Harvey Deitel, 8th Edition, Pearson

Introduction to Electronics Engineering Lab

LAB COURSE OUTLINE

Introduction to Electronics Engineering Lab	IEXE LAB	FEN 122
Course Title	**Short Title**	**Course Code**

Course Description:

In this laboratory course emphasis is on the understanding of the characteristics of basic circuits that use resistors, capacitors, diodes, bipolar junction transistors, Op-Amp, logic gates, transducers etc. The students can use this knowledge to analyse more complex circuits such as complex electrical networks, rectifiers, amplifiers, digital circuits, circuits using transducer etc.

Laboratory	**Hours/Week**	**No. of weeks**	**Total Hour**	**Semester Credits**
	02	**14**	**28**	**01**

ESE Pattern: Oral (OR)

Prerequisite Course(s): Course on physics at HSC level

Course Objectives:

The objective of this lab is to impart the fundamental knowledge of electronics engineering to the students and to develop the students' ability to apply the specific procedures to analyse the electronics engineering Systems.

In this lab, students will become familiar with various basic analogue and digital electronic circuits.

Course Outcomes:

Upon successful completion of these practical the student will be able to

a) Identify Electronic components

b) Learn diode V-I Characteristic

c) Understand BJJ as a switch

d) Understand LED, JFET, SCR V-I characteristics

e) Analyse and implementation of Op-amp and Digital circuits.

f) To understand PCB and Various soldering techniques.

LAB COURSE CONTENT

Introduction to Electronics Engineering Lab	**Semester II**	
Teaching Scheme	**Examination scheme**	
Practical: 2 hours/week	**End Semester Exams (ESE):**	**25 marks**
	Internal Continuous Assessment (ICA):	**25 marks**

Group A

1. To Plot the V-I Characteristics of P-N Junction diode.

a) To plot forward characteristic of P-N Junction diode.

b) To plot reverse characteristic of P-N Junction diode.

c) To determine static resistances of diode.

2. Study of BJT as a Switch

a) Determination of parameters in cut off region.

b) Determination of parameters in saturation region.

c) Understanding of Q-point.

3. To Plot the V-I Characteristics of JFET.

a) To plot drain characteristic of JFET.

b) To plot transfer characteristic of JFET.

c) To determine JFET parameters.

4. A study of characteristics of Light Emitting Diode (LED)

a) To plot forward characteristic of Light Emitting Diode (LED).

b) To study difference of this characteristics with P-N junction diode characteristics.

5. To plot V-I characteristics of SCR

a) To plot forward characteristic of SCR.

b) To determine $V_{BO,}$ I_L& I_H of SCR

Group B

6. Implementation of inverting and non-inverting amplifier using OPAMP

a) To determine theoretical gain in both applications

b) To compare these with practical values

7. Implementation of any Boolean expression using LOGIC GATES.

a) Simplification of Boolean expression

b) Implementation using Basic gates

c) Implementation using Universal gates

8. Introduction to Printed Circuit Board (PCB) & Soldering Techniques.

a) Study of types of PCB's.

b) Study of Layout and artwork

c) Study of different soldering techniques.

Note: Perform any Three (03) experiments from each group.

Reference Books:

1. S Salivahanan, N Sureshkumar and A Vallavaraj, "Electronics Devices and Circuits", TMH, 2 nd Edition, 2009

2. R S Sedha, "Applied Electronics", S Chand, 1 st Edition, 2005

3. R A Gaikwad, "Op-Amps and Linear Integrated Circuits", PHI, 4 th edition,2001

4. R P Jain, "Modern Digital Electronics", TMH, 4th Edition, 2010

5. Printed Circuit Board Design and technology: Walter C. Bosshar

Guide lines for ESE:

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guide lines for ESE:

ESE will be based on practical assignments submitted by the student in the form of journal. Evaluation will be based on paper work.

New Proposed Syllabus

(With effect from 2013-14)

S.E. Biotechnology

Second Year Biotechnology

Faculty of Engineering and Technology

North Maharashtra University, Jalgaon

NORTH MAHARASHTRA UNIVERSITY, JALGAON
STRUCTURE OF TEACHING & EVALUATION
S.E. (BIOTECHNOLOOGY) W.E.F.2013-2014

Semester III

Course Code	Name Of The Course	Group	Teaching Scheme				Evaluation Scheme					Credits
							Theory		Practical		Total	
			Theory Hrs/Week	Tutorial Hrs/Week	Practical Hrs/Week	Total	ISE	ESE	ICA	ESE		
	Engineering Mathematics –III	A	3	1	--	4	20	80	--	--	100	4
BTL-301	Concepts in Biotechnology	B	3	--	--	3	20	80	--	--	100	3
BTL-302	Bioprocess Calculations	D	3	1	--	4	20	80	--	--	100	4
BTL-303	Unit Operations-I	D	3	--	--	3	20	80	--	--	100	3
BTL-304	Microbiology	D	3	--	--	3	20	80	--	--	100	3
	Soft Skills –III	C	1	--	2	3	--	--	50	--	50	2
BTP-305	LAB Microbiology	D	--	--	4	4	--	--	50	50	100	2
BTP-306	LAB Concepts In Biotechnology	B	--	--	2	2	--	--	50	--	50	1
BTP-307	LAB Unit Operations-I	D	--	--	2	2	--	--	25	25	50	1
TOTAL			**16**	**2**	**10**	**28**	**100**	**400**	**175**	**75**	**750**	**23**

Semester IV

Course Code	Name Of The Course	Group	Teaching Scheme				Evaluation Scheme					Credits
							Theory		Practical		Total	
			Theory Hrs/Week	Tutorial Hrs/Week	Practical Hrs/Week	Total	ISE	ESE	ICA	ESE		
BTL-401	Biochemistry	D	3	--	--	3	20	80	--	--	100	3
BTL-402	Immunology	D	3	1	--	4	20	80	--	--	100	4
BTL-403	Biostatistics	D	3	1	--	4	20	80	--	--	100	4
BTL-404	Unit Operations –II	D	3	--	--	3	20	80	--	--	100	3
BTL-405	Process Heat Transfer	D	3	--	--	3	20	80	--	--	100	3
BTP-406	LAB Computer Applications	B	1	--	2	3	--	--	50	--	50	2
BTP-407	LAB Biochemistry	D	--	--	2	2	--	--	25	25	50	1
BTP-408	LAB Immunology	D	--	--	2	2	--	--	25	25	50	1
BTP-409	LAB Unit Operations –II	D	--	--	2	2	--	--	50	--	50	1
BTP-410	LAB Process Heat Transfer	D	--	--	2	2	--	--	25	25	50	1
TOTAL			**16**	**2**	**10**	**28**	**100**	**400**	**175**	**75**	**750**	**23**

NOTE: As Microbiology practical requires 4 hrs workload for performance of practical hence two laboratory hours are merged to form four hours slot.

*Computer based numerical methods in Bioprocess Engineering.

S.E. Biotechnology

Semester-III

Second Year Biotechnology

Faculty of Engineering and Technology

North Maharashtra University, Jalgaon

Engineering Mathematics -III

Course Outline

Engineering Mathematics -III	**EM-III**	
Course Title	Short Title	Course Code

Course Description:

This course is aimed at introducing the fundamentals of basic Mathematics to undergraduate students. The background expected includes a prior knowledge of Mathematics from first year engineering or diploma and familiarity with various laws, principles and theories. The goals of the course are to understand the basic principle of Mathematics and its application in different area.

	Hours per Week	**No. of Weeks**	**Total Hours**	**Semester Credits**
Lecture	**03**	**15**	**40**	**03**
Tutorial	**01**	**15**	**12**	**01**

Prerequisite Course(s): EM-I, EM-II/ Diploma Mathematics.

General Objective:

The basic necessity for the foundation of Engineering and Technology being Mathematics, the main aim is to teach mathematical methodologies and models, develop mathematical skill and enhance thinking and decision making power of student.

Learning Outcomes:

After completion of this course learner will be able to:

1. Apply knowledge of mathematics in engineering and technology.

2. Identify, formulate and solve engineering problems.

3. Design Mathematical models for engineering problems and solve them.

Course Content

SE Biotechnology Engineering Mathematics-III Semester – III

Teaching Scheme
Theory : 3 hours/ week
Tutorial : 1 hour/ week

Examination Scheme
End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Examination (ISE) : 20 Marks

UNIT – I **No of Lecture: 8 Hours, Marks: 16.**

Linear Differential Equations:

- Solution of LDE of order n with constant coefficients.
- Method of variation of parameters (Only second order).
- Cauchy's linear equation.
- Legendre's linear equation.

UNIT – II **No of Lecture: 8 Hours, Marks: 16.**
Applications of Linear Differential Equations and Partial Differential equations

- Applications of linear differential equations to Chemical Engineering.
- Applications of Partial Differential equations to

  i) One dimensional heat flow equation $\frac{\partial u}{\partial t} = C^2 \frac{\partial^2 u}{\partial x^2}$

  ii) Two dimensional heat flow equation $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial y^2} = 0$

UNIT – III **No of Lecture: 8 Hours, Marks: 16.**
Laplace Transform

- Definition and Existence of Laplace transforms.
- Laplace Transform of elementary/standard functions.
- Theorems & Properties of Laplace Transform (without proof).
- Inverse Laplace Transform.

- Laplace Transform of Unit step function.
- Solution of differential equations using LT.

UNIT – IV **No of Lecture: 8 Hours, Marks: 16.**
Statistics and Probability distributions

- Introduction to Mean, Mode, Median standard deviation, Variance, Coefficient of variation.
- Moments, Skewness and kurtosis.
- Correlation and Regression.
- Binominal Distribution.
- Poisson distribution.
- Normal distribution.

UNIT – V **No of Lecture: 8 Hours, Marks: 16.**
Vector Calculus

- Introduction to Gradient, Divergence, Curl, Solenoidal and Irrotational vector fields.
- Vector integration: Line Integral, Surface and Volume integrals.
- Gauss's, Stoke's and Green's Theorems (without proof).

Reference Books:

1. H.K. Dass - Advanced Engineering Mathematics (S. Chand Publication) New Delhi.
2. Erwin Kreyszig - Advanced Engineering Mathematics (Wiley Eastern Ltd.)
3. B.S. Grewal - Higher Engineering Mathematics, Khanna Publication, Delhi
4. Wylie C.R. & Barrett - Advanced Engineering Mathematics - McGraw Hill
5. B.V. Raman - Engineering Mathematics - Tata Mc- Graw – Hill.
6. A Text Book of Engineering Mathematics, By N. P. Bali, Laxmi Publication.

Concepts in Biotechnology

Course Outline

Concepts in Biotechnology	CB	BTL-301
Course Title	Short Title	Course Code

Course Description: This course is introduced for learning the basic fundamentals of Life sciences to undergraduate students. The prospectus includes a prior knowledge of Biotechnology. The goals of the course are to understand the basic principles of Biotechnology and its applications in different areas.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	03	15	40	03

Prerequisite Course(s): 10^{th}&12^{th} STD Zoology, Botany.

Objective of the Subject:

1. Students will understand the structures and purposes of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membranes, and organelles.
2. Students will understand how these cellular components are used to generate and utilize energy in cells.
3. Students will apply their knowledge of cell biology to selected examples of changes or losses in cell function. These can include responses to environmental or Physiological changes, or alterations of cell function brought about by mutation.
4. Students will learn the basic principles of inheritance at the molecular, cellular and Organism levels.
5. Students will understand relationships between molecule/cell level phenomena ("Modern" genetics) and organism-level patterns of heredity ("classical" genetics).
6. Students will test and deepen their mastery of genetics by applying this knowledge in a variety of problem-solving situations.

Learning outcomes:

By completion of this course students will able:

1. To apply all knowledge about basic sciences such as mathematics, physics, chemistry and biology to all problems in molecular biology and genetics.
2. To be able to understand all knowledge about living organisms which is main subject of molecular biology and genetics.
3. To be able to use current techniques and analysis methods in molecular biology and genetics.
4. Understand the current concepts in Cell Biology, Stem Cell Biology and Development.
5. Know the basic cellular processes including heredity, transcription/translation (the central dogma), cellular replication and their role in development, physiology and higher level biological organization.
6. Know the structure/function of the basic components of prokaryotic and eukaryotic cells including macromolecules and organelles.
7. Demonstrate proficiency with at least one instrument commonly used in biological research (microscope, etc).

Course Content

SE Biotechnology Concepts in Biotechnology Semester - III

Teaching Scheme
Theory : 3 hours/ week
Practical: 2 hours/week

Examination Scheme
End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Examination (ISE) : 20 Marks
Internal Continuous Assessment(ICA) :50Marks

UNIT – I **No. of Lecture: 8 Hours, Marks: 16**

Cell Biology and Cell Theory

Structural organization of life, Concepts of modern cell, history of cell, Cell theory, Structure of cell:- Cell shape, size and cell number, Types of cells:- Prokaryotic cells and Eukaryotic cells, Chemistry of cells.

UNIT – II **No. of Lecture: 8 Hours , Marks :16**

Study of Intracellular Components of Cell

Cell organelles:-Structure & Functions of: Mitochondria, Plastids:- Chloroplast, Chromoplast, Nucleus, Ribosomes, Golgi complex, Endoplasmic Reticulum, Endosomes, Lysosomes, Peroxisomes.

UNIT – III **No. of Lecture: 8 Hours , Marks :16**

Cell Division

Cell cycle, mitosis, meiosis, genetic and biochemical approaches for the study of cell division, mitotic cell division, cell cycle check points, meiotic cell division, embryonic cell division, cell death, the cell cycle of cancer, central cell cycle control systems.

UNIT – IV **No. of Lecture: 8 Hours , Marks :16**

Basic Concepts in Genetics

Introduction to gene, Mendels law of segregation, Assumption involved in segregation, physical basis of segregation, Law of Independent Assortment: - Introduction, two characters of independent segregation, test cross of dihybrid & trihybrid, physical basis of independent assortment, Gene vs Allele: A modified concept, fine structure of gene.

UNIT – V **No. of Lecture: 8 Hours , Marks :16**

Elements of Genetics.

Chromosomes:- Introduction, chromosome number, size, morphology, chemical composition of chromosome and function, Structural chromosomal aberrations:- Introduction, origin of structural aberrations, structure of chromosomal aberrations, variation in chromosomal number, Mutation:- Introduction, characteristics of mutations, classification, spontaneous and induced mutations, Population genetics:- Introduction, gene frequency, genotype frequency, gene pool.

References:

1. B.D. Singh " Genetics" Kalyani Publications.
2. P.K.Gupta" Cell&MolegcularBiology"Rastogi Publications.
3. S.C. Rastogi" Cell& Molecular Biology" New Age International Publications.
4. C.B. Pawar" Cell Biology" Himalaya Publications.
5. C.B. Pawar" Cell and Molecular Biology" Himalaya Publications.

Bioprocess Calculations

Course Outline

Bioprocess Calculations	**BPCAL**	**BTL-302**
Course title	Short title	Course code

Course Description:

The goals of the course are to understand the basic principles of Bioprocess Calculations and their applications in different areas. It is highly essential to know the stoichiometry of the processes, conditions to achieve maximum product formation and recycle of the unused materials for better economy. Therefore, knowledge of process calculations is the first and foremost requirement for the success of a Biotechnology Engineering student

Lecture	**Hours per Week**	**No. of Weeks**	**Total Hours**	**Semester Credits**
	03	**15**	**40**	**03**
Tutorial	**01**	**15**	**12**	**01**

Prerequisite Course(s):10th and 12th STD Chemistry, Biology, Mathematics.

Objective of the subject:

1. To make the student familiar with the basic chemical calculations
2. To study the material balance of unit operations used in process industries.
3. To study the material balance of bioreactions.
4. To understand the energy balance of physical operations.
5. To understand energy balance of bioreactions.
6. To make student familiar with psychrometric chart, steam table etc.
7. To make the student familiar with combustion of fuels.

Learning Outcomes:

After successful completion of this course the student will be able to:

1. Differentiate between different units and dimensions and solve relevant problems.
2. To have the ability to identify, formulate and solve engineering problems.

3. Have gained fundamental skills in solving material balance problems with and without bioreactions.
4. Have gained fundamental skills in solving energy balance problems with and without bioreactions.
5. Understand humidity, humid heat, humid volume, dry-bulb temperature, wet-bulb temperature, psychometric chart & steam table.
6. To find out the energy requirements for combustion of fuels.

Course Content

SE Biotechnology **Bioprocess Calculations** **Semester -III**

Teaching Scheme	**Examination Scheme**	
Theory : 3 hours/ week	End Semester Examination (ESE)	: 80 Marks
Tutorial : 1 hour/ week	Paper Duration (ESE)	: 03 Hours
	Internal Sessional Examination (ISE)	: 20 Marks

UNIT-I **No. of Lectures. – 08, Marks: 16.**

Units & Dimensions:

Basic & Derived Units, Dimensional Analysis, Dimensional & Empirical Equations. Different Ways of Expressing Units of Quantities & Physical Constants.

Properties of Gases, Liquids &Solids: Ideal & Real Gas Laws, Critical Properties, Properties of Mixtures & Solutions , Kay's Rule.

UNIT-II **No. of Lectures. – 08, Marks: 16.**

Material Balances without reaction:

Law of conservation of mass, Material balance of unit operations such as Distillation, Mixing, Evaporation, Leaching, Liquid -Liquid Extraction and Solid Liquid Extraction. Numerical based on bioprocesses.

UNIT-III **No. of Lectures – 08, Marks: 16.**

Material Balances with reaction:

Concept of limiting &excess reactants, conversion, yield and Selectivity . Material Balance of biochemical reactions & photochemical reactions. Material balance with recycle, by pass and purge stream of Bioprocesses.

UNIT-IV **No. of Lectures. – 08, Marks: 16.**

Energy balances:

Basic Energy Concept ,Units, Enthalpy, General Energy Balance equation ,Enthalpy Change in Non reactive Processes: sensible heat change, heat capacity, specific heat, sensible heat change with constant Cp, Change of Phase : Enthalpy of Condensations, Heat of solution, study of steam table, energy balance calculations without reaction, enthalpy change due to reaction, heat of combustion, heat of reaction for process with biomass production, heat of reaction with oxygen as electron acceptor, heat of reaction with oxygen not the electron acceptor, energy balance equation for cell culture, fermentation energy balance, Numericals based on above.

UNIT-V **No. of Lectures. – 08, Marks: 16.**

Humidity & Combustion

Humidity & saturation, Define Humid Volume, Humid Heat, Dry bulb temperature, Wet bulb temperature etc. Psychometric chart, solubility diagrams. Combustion: Introduction, fuels, calorific value of fuels, air requirements.

Reference Books:

1. Bhatt & Vora ,Stoichiometry :Tata McGraw Hill.
2. Pauline M. Doran, Bioprocess Engineering Principles, Academic Press an Imprint ofElsevier.
3. Durga Prasad Rao& DVS Murthy ,Process Calculations for Chemical Engineers:McMillanIndia, New Delhi .
4. K A Gavhane , Introduction to Stoichiometry : NiraliPrakashan.
5. Hougen O.A, Watson K.M, &Ragatz R.A. Chemical Process Principles Part-I Asia Publishing House, Mumbai.
6. Himmelblau D.M. Basic principles and calculations in Chemical Engineering, Prentice Hall Publication.
7. Shekhar Pandharipande and Samir Mushrif, Process Calculations. Pune Vidyarthi Griha Prakashan, Pune

Unit Operation –I

Course Outline

Unit Operation –I	**UO-I**	**BTL-303**
Course title	Short title	Course code

Course Description: The goals of the course are to understand the basic principles of fluid mechanics and their applications in different areas. The subject needs to be studied by the biotechnology students to understand the characteristics and properties of fluids as regards to the processing of raw ingredients in the industry.

	Hours per Week	**No. of Weeks**	**Total Hours**	**Semester Credits**
Lecture	03	15	40	03

Prerequisite Course(s): 10^{th} and 12^{th}Std Science, Mathematics.

Objectives of the Course:

1. To study dynamics of fluid flow.
2. To know the fluid properties and applications for energy conservation by studying fluid statics.
3. To make the students analyze the flow measurement principles and equipments.
4. To study and classify different types of pumps, blowers and compressors.
5. Student will be able to select right size pump for given pipeline or a system
6. To make the student familiar with boundary layer phenomenon.
7. To apply scientific method strategies to fluid mechanics, analyze qualitatively and quantitatively the problem situation, propose hypotheses and solutions.

Learning Outcomes:

After successful completion of this course the student will be able to:

1. Understand the following terms in relation to fluid mechanics: viscosity, density, specific gravity, and surface tension. Measure the properties listed above for any given fluids.
2. Apply their knowledge to minimize head losses and evaluate flow through a pipe system by using different types of flow meters.
3. Understand the principles of manometer to calculate pressure of the fluids.
4. Apply knowledge of pumps, blowers and compressors in different areas of engineering and technology for transportation of fluids and gases.
5. Understand the importance of boundary layer flow in engineering applications.

Course Content

SE Biotechnology Unit Operation –I Semester - III

Teaching Scheme
Theory : 3 hours/ week
Practical : 2 hour/ week

Examination Scheme
End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Examination (ISE) : 20 Marks
Internal Continuous Assessment (ICA) :25 Marks
End Semester Examination (ESE) (OR) :25 Marks

UNIT-I **No. of Lectures. – 08, Marks: 16.**

Properties of Fluid

Definition of fluid, mass density, specific weight, specific volume, specific gravity .viscosity concept, viscosity measurement: cone and plate viscometer, use of viscometer with fermentation broths, factor affecting broth viscosity, surface tension, capillarity. Types of fluid: ideal fluid, real fluid, Newtonian and non Newtonian, ideal plastic fluid etc. Numerical based on above.

UNIT-II **No. of Lectures. – 08, Marks: 16.**

Dynamics of Fluid Flow

Continuity equation, Euler's equation of motion, Bernoulli's equations for different conditions. pressure measurements: Hydrostatic law. Pascal law, principle and types of manometer, Numericals based on above.

UNIT-III **No. of Lectures. – 08, Marks: 16.**

Flow through Pipeline System

Major and minor losses, friction factor, friction factor chart, distribution of flowing fluids through branched pipe. Numerical based on above.

Boundary layers flow: Boundary layer flow, laminar boundary layer over a flat plate, turbulent boundary layer, laminar sub layer, boundary layer thickness: displacement thickness, momentum thickness, energy thickness.

UNIT-IV **No. of Lectures. – 08, Marks: 16.**

Flow measurement

Flow through Orifice meter, Nozzle meter, venturi meters, Rotameter and pitot tube. Reynolds experiment. Numerical based on above. Other flow measuring devices such as Ultrasonic flow meters, Anemometers, Electromagnet flow meters.

UNIT-V **No. of Lectures. – 08, Marks: 16.**

Pumping of Fluids

Pumping equipments: working and construction of the Reciprocating pump, Positive Displacement Pump, Centrifugal pumps, Peristaltic pump. NPSH calculations. Blowers & Compressors. Numerical based on above.

Reference Books:

1. Dr. R. K. Bansal, Fluid Mechanics: Laxmi Publications, New Delhi.
2. W.L. McCabe & J.C. Smith, Unit operations in chemical engineering: McGraw Hill/Kogakusha Ltd.
3. I P. Chattopadhaya Unit operations of chemical engineering-volume I: Khanna Publication New Delhi, 2nd edition 1996.
4. V.P. Gupta, Alam Singh and Manish Gupta Fluid Mechanics, Fluid mechanics and hydrostatics: CBS publishers New Delhi.
5. Pauline M. Doran, Bioprocess Engineering Principles, Academic Press an Imprint of Elsevier.

Microbiology

Course outline

Microbiology	**MB**	**BTL-304**
Course Title	Short Title	Course Code

Course Description:

This course is aimed at introducing the fundamentals of basic Microbiology to undergraduate students. The background expected includes a prior knowledge of Biology from HSC (science). The goals of the course are to understand the basic principles of life sciences and their applications in Engineering trade.

	Hours per Week	**No. of Weeks**	**Total Hours**	**Semester Credits**
Lecture	**03**	**15**	**40**	**03**

Prerequisite Course(s):11th, 12th Biology.

General Objective:

To build a necessary platform for analyzing the complex issues in microbiology, including the evolution and diversity of microbes; cell structure and function; metabolism; information flow and the role of microbes in ecosystems.

Learning Outcomes:

1. To apply their knowledge in research related to the use of microbes for human welfare like food production, pigment production, pharmaceutical products etc.
2. To communicate the fundamental concepts of microbiology, both in written and in oral format;
3. Should be able to analyze and simplify the complex issues in microbiology.

Course Content

SE Biotechnology **Microbiology** **Semester-III**

Teaching Scheme	**Examination Scheme**	
Theory : 3 hours/ week	End Semester Examination (ESE)	: 80 Marks
Practical : 4 hour/ week	Paper Duration (ESE)	: 03 Hours
	Internal Sessional Examination (ISE)	:20 Marks
	Internal Continuous Assessment (ICA)	:50 Marks
	End Semester Examination (ESE) (PR)	: 50 Marks

UNIT-I **No. of Lectures. – 08, Marks: 16.**

Introduction of Microbiology

Microbiology and its Scope; History of Microbiology: Contribution of Various Scientists in the Development of Microbiology, Incidences of Microorganisms in Environment, Classification of Microorganisms: Prokaryotes and Eukaryotes (Cell Structure), Morphology and Physiology of Bacteria, Yeast, Molds, Algae and Viruses

UNIT-II **No. of Lectures. – 08, Marks: 16.**

Techniques in Microbiology

Microscopy, nutritional requirements of microorganisms and microbial culture media, isolation, identification and maintenance of cultures (preservation), characteristics of pure culture, enumeration techniques.

UNIT-III **No. of Lectures. – 08, Marks: 16.**

Microbial Control

Basic terms: sterilization, disinfection, antiseptic, sanitizer, germicide, microbiostasis, antimicrobial agents, preservatives, factors influencing antimicrobial activity, mechanisms of cell injury, physical and chemical methods of control of microorganisms with principle, temperature, desiccation, osmotic pressure, surface tension, radiations, filtration, antiseptics and disinfectants, halogens, heavy metals, detergents, dyes.

UNIT-IV **No. of Lectures. – 08, Marks: 16.**

Microbial Growth

Modes of Cell Division, Microbial Growth Kinetics: Growth Rate & Generation, Mathematical expression for Growth, Growth Curve, Diauxic Growth Curve, Continuous Culture: Chemostat

and Turbidostat, Synchronous Culture: Selection by Size and Age, Selection by induction techniques.

UNIT-V **No. of Lectures. – 08, Marks: 16.**

Antibiotics & Other Chemotherapeutic Agents

Characteristics of Chemotherapeutic Agents, Antibiotics and their Mode of Action, Antifungal Antibiotics.

Reference Books:

1. M.J. Pelczar, Jr. E.C.S. Chan and N.R. Krieg, Microbiology 5th Ed. , TMH Book Company.
2. Powar and Daginawala, General Microbiology, Vol I and vol II , Himalaya Publishing House.
3. R.C.Dubey & D.K.Maheshwari, A Textbook of Microbiology, S. Chand Publications.
4. Stainer R.Y., Ingraharn J.L., Whoolis M.L. and Painter P.R. General Microbiology. The McMillan Press Ltd

Soft Skills – III

COURSE OUTLINE

Course Title	Short Title	Course Code
Soft Skills – III	**SK-III**	

Course Description: Through this course we have tried to prepare the students for the industry. Most companies test mathematical and logical ability through an aptitude test. This subject aims at working on these skills of a student through strategies formulae and practice exercises.

Lecture	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
	1	14	14	2

Prerequisite Course(s): Fundamental knowledge of High School Mathematics.

COURSE CONTENT

Soft Skills – III **Semester-III**

Teaching Scheme **Examination Scheme**

Lecture: 1 hour / week **Internal Continuous Assessment (ICA): 50 Marks**

Unit-I: Arithmetic-1 **No. of Lect. – 3, Marks: 10**

a. Basic Formulae

i. Divisibility Rules.
ii. Speed Maths.
iii. Remainder Theorem.
iv. Different Types of Numbers.
v. Applications.

b. HCF, LCM and Linear Equations

i. HCF – Successive Division and Prime Factorization Methods.
ii. LCM – Successive Division and Prime Factorization Methods.
iii. Applications.
iv. Linear Equations – Elimination Method.
v. Substitution Method.
vi. Applications.

c. Averages and Mixtures

i. Concept of Average.
ii. Faster Ways of Finding It.
iii. The Allegation Method.
iv. Applications.

Unit-II: Arithmetic–II **No of Lect. – 3, Marks: 10**

a. Percentages

i. Concept of Percentage.
ii. Working with Percentages.
iii. Applications.

b. Profit and Loss

i. Difference between Cost and Selling Price.
ii. Concept of Profit Percentage and Loss Percentage.
iii. Applications.

c. Time and Work

i. Basic Time and Work Formula.
ii. Relation between Time and Work.
iii. Applications.

Unit-III: Arithmetic–III **No of Lect. –3, Marks: 10**

a. Permutations and Combinations

i. Sum Rule of Disjoint Counting.
ii. Product Rule of Counting.

iii. Concept of Factorial.
iv. Permutations.
v. Linear Permutations.
vi. Combinations.
vii. Circular Permutations.
viii. Applications.

b. Probability

i. Definition and Laws of Probability.
ii. Mutually Exclusive Events.
iii. Independent Events.
iv. Equally Likely Events.
v. Exhaustive Events.
vi. Cards.
vii. Dice.
viii. Applications.

c. Time and Distance

i. Speed.
ii. Conversion Factors for Speed.
iii. Average Speed.
iv. Moving Bodies – Passing, Crossing and Overtaking.
v. Relative Speed.
vi. Boats and Streams.
vii. Applications.

Unit-IV: Non-Verbal Reasoning **No of Lect. 2, Marks: 10**

a. Analogies

i. Examples.
ii. Applications.

b. Classification

i. Examples.
ii. Applications.

c. Sequences

i. Examples.
ii. Applications.

Unit-V: Analytical Reasoning **No of Lect. – 3, Marks: 10**

a. Analytical Puzzles

i. Classification Puzzles.
ii. Ordering Puzzles.
iii. Assignment Puzzles.
iv. Applications.

b. Letter and Number Series

i. Different Types of Letter Series.
ii. Different Types of Number Series.
iii. Mixed Series.

c. Coding and Decoding

i. Letter Coding.
ii. Number Coding.
iii. Mixed Coding.
iv. Odd Man Out.
v. Applications.

Guide lines for ICA:

ICA will be based on credit tests and assignments submitted by the student in the form of journal.

Reference Books:

1. R. S. Aggarwal, "Quantitative Aptitude", S. Chand Publication, New Delhi, 2012.
2. R. S. Aggarwal, "A Modern Approach to Verbal Reasoning", S. Chand Publication, New Delhi, 2012.
3. R. S. Aggarwal, "A Modern Approach to Non-Verbal Reasoning", S. Chand Publication, New Delhi, 2012.

LAB Microbiology

Lab Course Outline

LAB Microbiology	LAB MB	BTP-305
Course Title	Short Title	Course Code

Laboratory	Hours/Week	No. of Weeks	Total Hours	Semester Credits
	4	15	48	2

Course Description:

In this laboratory, course emphasis is on the understanding of basics of identification, isolation, cultivation of microorganisms from the enormous diversity found in environment and its application for the human welfare. The learner here can use this knowledge and apply in allied branches of Biotechnology as required.

Prerequisite Course(s): Course of Chemistry & Biology at HSC level and FE.

General Objective:

The objective of the laboratory is to impart the fundamental knowledge of biology at the microscopic level to the students and develop their ability to apply the specific procedures to analyze the experimental results.

In this lab, students will be familiar with the use of microorganisms as lab tools and various biological equipments which they can apply in research and Development in the field of Biotechnology

Learning Outcomes:

1. After successful completion of this lab student will be able to:
2. Use the microscope effectively and observe and identify the characteristics of microorganisms.
3. Stain the microbes for better visualization and characterization of cells and cell organelles
4. To identify and examine the microorganisms from the food sample and environment.
5. Enumerate the microbes by various methods including viable cell count, haemocytometer and turbidity measurement.
6. To prepare the media and cultivate the microorganisms by different methods.
7. Isolate the microorganisms by streak plate method, pour plate method, serial dilution method etc.
8. Different techniques for the maintenance and preservation of microorganisms.

9. To study the effect of antimicrobial agent , UV radiation & heat on microbial growth.
10. To examine the water samples microbiologically.

Lab Course Content

(Note: Minimum EIGHT Experiments from the following)

1. Study and use of microscope
    a. Examination of prepared slides
2. Preparation of laboratory media:
    a. Autoclaving,
    b. Preparation of agar slants and agar plates.
    c. Preparation of liquid media.
3. Isolation & Cultivation of microorganisms (Bacteria & Fungi) on solid and liquid media and observation of cells
    a. By streak plate method
    b. By pour plate method.
    c. By spreading
    d. Observation of cells:
        i. Cultural characteristics,
        ii. Biochemical characteristics
4. Staining techniques:
    a. Simple staining,
    b. Gram staining,
    c. Lactophenol cotton blue mounting of fungi.
5. Isolation by serial dilution method, maintenance & preservation.
6. Influence of antimicrobial agent, UV radiation & heat on microbial growth.
7. Study of bacterial growth curve. (Turbidity measurement as direct expression of growth)

LAB Concepts in Biotechnology

Lab Course Outline

LAB Concepts in Biotechnology	**LAB CB**	**BTP-306**
Course Title	Short Title	Course Code

Laboratory	Hours/Week	No. of Weeks	Total Hours	Semester Credits
	2	15	20	1

Course Description:

Course emphasis is on the understanding of basic structure & identification and of Cell morphology. The learner here can use this knowledge and apply in allied branches of Biotechnology as required.

Prerequisite Course(s): Botany, Zoology

Course Objectives:

1. To study the cell morphology of animal, plant and bacterial cell.
2. To study mitosis of onion root tips.
3. To isolate different types of cell organelles: nucleus, mitochondria, lysosomes.

Course Outcomes:

By completion of this course students will able to:

1. To stain and distinguish animal, plant and bacterial cells.
2. To explain structure and functions of cell organelles.
3. To explain mitosis & meiosis in plant cell.
4. To isolate cell organelles by designing the specific protocol.
5. To identify different types of chromosomes.
6. To explain Karyotyping of animal, plant & bacterial cell

Lab Course Content

Practical 2 Hrs/ weeks
(Note: Minimum EIGHT Experiments from the following)

Practical Work:

1. Cell staining of Animal cell.
2. Cell staining of Plant cell.
3. Cell staining of Bacteria cell.
4. Mitosis of onion root tips
5. Meiosis of earthworm ovary
6. Microscopic identification of bacterial chromosomes.
7. Microscopic identification of Plant chromosomes.
8. Microscopic identification of Animal chromosomes.
9. Isolation of cell organelles: nucleus, mitochondria, lysosomes.
10. Karyotyping of animal, plant & bacterial cell.

LAB Unit Operation -I

Lab Course Outline

LAB Unit Operation -I	**LAB UO-I**	**BTP-307**
Course Title	Short Title	Course Code

Laboratory	Hours/Week	No. of Weeks	Total Hours	Semester Credits
	2	15	20	1

Course Description: This course is intended to provide engineering students with a background in important concepts and principles of Unit operation –I.

Prerequisite Course(s): 10^{th} and 12^{th}Std Physics, Chemistry, Math's

General Objective: The objective of the laboratory is to impart the fundamental knowledge of Unit operations to the students and develop their ability to apply the specific procedures to analyze the experimental results.

Learning Outcomes:

After successful completion of this lab course the student will be able to:

1. Determine properties of Fluids .
2. Analyzed the characteristics curves of Centrifugal Pump.
3. Determine the coefficient of Venturi meter, Orifice meter, Nozzle meter.
4. Identify the fluids flow laminar , turbulent by Reynolds Experiment.
5. Estimate to minor losses in pipes.
6. Determine the fanning friction factor for given pipe.
7. Study of the different types of Fans, Blowers & Compressors.

Term Work Shall be based on any 08 experiments mentioned below.

List of the Experiments.

1. Determination of Viscosity.
2. Study of Manometers
3. Verification of Bernoulli's theorem.
4. To determine the coefficient of Venturi meter.
5. To determine the coefficient of Orifice meter.
6. To determine the coefficient of Nozzle meter.
7. Reynolds Experiment.
8. Minor losses in pipe.
9. To determine the fanning friction factor for given pipe.
10. Notches & Weirs.
11. To study the characteristics curves of Centrifugal Pump.
12. To study of the different types of Fans, Blowers & Compressors.

S.E. Biotechnology

Semester-IV

Second Year Biotechnology

Faculty of Engineering and Technology

North Maharashtra University, Jalgaon

Biochemistry

Course outline

Biochemistry	**BCH**	**BTL-401**
Course Title	Short Title	Course Code

Course Description:

This course is aimed at introducing the fundamentals of basic Biological chemistry to undergraduate students. The background expected includes a prior knowledge of Biology and chemistry from HSC (science) and first year engineering knowledge. The goals of the course are to understand the basic principles of life sciences and their applications in engineering trade.

	Hours/weeks	No.Weeks	Total Hours.	Semester Credits
Lecture	03	15	40	3

Prerequisite Course(s): 11th, 12th Biology, Chemistry

General Objective:

To build a necessary platform for analyzing the chemical basis of biological phenomenon, including the introduction to biomolecules and their role in biological systems, fundamentals of techniques used in biochemistry.

Learning Outcomes:

At the end of the course, students will be able to;

1. To identify the classes of biomolecules and their role in the biological system.
2. To explain the functions and properties of biomolecules
3. To explain the synthesis of biomolecules in biological system and how it directly relate the energy generation in body.
4. To separate biomolecules from the source by biochemical techniques and its application for human welfare

Course Content

SE Biotechnology **Biochemistry** **Semester-IV**

Teaching Scheme	**Examination Scheme**
Lectures :3 Hrs/week	End Semester Exams (ESE) : 80 Marks.
Practical : 2 Hrs/Week	Duration of Paper (ESE) : 3 Hours.
	Internal Sessional Exam (ISE) : 20 Marks.
	Internal Continuous Assessment (ICA) : 25 Marks
	End Semester Exam (ESE) (PR) : 25 Marks

UNIT –I **No of Lecture: 8 Hours, Marks: 16**

Carbohydrates & their Metabolism

Structure, Classification & Functions of Carbohydrates: Monosaccharides, Oligosaccharides, Polysaccharides. Metabolism: Glycolysis, Gluconeogenesis. TCA cycle, Pentose phosphate pathway , Glyoxylate cycle & Electron Transport Cycle (Brief), Regulation of glycolysis & TCA.

UNIT –II **No of Lecture: 8 Hours, Marks: 16**

Proteins & Amino Acids

Structure, Classification &Functions of Amino acids & Proteins. Metabolism: Amino acid degradation: Summary of amino acid catabolism, amino acid degradation to pyruvate, Acetyl COA, & α- ketoglutarate, Urea cycle. Biosynthesis: Amino acid synthesis overview, six essential amino acid synthesis, synthesis of glutamate, glutamine, proline & arginine.

UNIT –III **No of Lecture: 8 Hours, Marks: 16**

Lipids & their Metabolism

Structure & Functions of lipids: Triacyglycerols, Glycerophospholipids, sphingolipids, Cholesterol, phosphatidylinositols, eicosanoids. Oxidation of fatty acids. Biosynthesis: Fatty acids, Triacylglycerols, & Cholesterol, Glyceroneogenesis

UNIT –IV **No of Lecture: 8 Hours, Marks: 16**

Nucleotides & Vitamins

Vitamins: Introduction, Classification, Biochemical Functions, RDA, Dietary Sources, Deficiency. Structure & Functions of nucleotides. Biosynthesis of nucleotides: denovo synthesis of purine & pyrimidine synthesis and its regulation, salvage pathway.

UNIT –V **No. of Lecture: 8 Hours, Marks: 16**

Enzymes & Membrane transport

Enzymes: Introduction, Classification, mechanism of enzyme action, factors affecting enzyme activity (concentration of enzyme, substrate, temperature, pH), units of enzyme activity. Membrane transport: Architecture of membranes: Fluid mosaic model. Passive transport: Solutes, glucose, chloride-bicarbonate exchanger, Active transport: Na+. K+ ATPase, F-type ATPase, P-type ATPase.

Reference Books:

1. U Satyanarayana & U. Chakrapani, Biochemistry.
2. Donald Voet, Judith G. Voet, Charlotte W. Pratt, Principles of Biochemistry, International Student version
3. Lehninger A.L., Neston D.L., N.M. Cox "Principles of Biochemistry", CBS Publishers & Distributors.
4. Lubert Stryer "Biochemistry", W.H. Freemen & Co. , New York.
5. Weil J.H. "General Biochemistry", New Age International (Pvt. Ltd.).
6. Murray R.K. and others (Eds). Harper's Biochemistry, 25th Edn. Appleton and Lange Stanford.

Immunology

Course Outline

Immunology	IMM	BTL-402
Course Title	Short Title	Course Code

Course Objective:

This course is introduced for learning the basic fundamentals of the defense mechanism of human body. The prospectus includes a prior knowledge about the immunity, mechanisms and the therapy or treatment for curing the diseases.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	**03**	**15**	**40**	**03**
Tutorial	**01**	**15**	**12**	**01**

Prerequisite Course(s): 10th & 12th Std Zoology.

Objective of the Subject:

To build a necessary platform for analyzing the chemical basis of immune system, including the introduction to immune organs and their role in biological systems, antibodies, and other immune molecules, fundamentals of techniques used in immunology.

Learning outcomes:

- The course is designed to give an understanding of the basic principles of modern immunology and an introduction to methods used in immunological research.
- Students will be able to describe the cells, molecules and pathways involved in the induction and regulation of innate and adaptive immune responses and how regulatory responses can be exploited therapeutically.
- Demonstrate an understanding of how vaccines work and of the requirements for developing new safe and effective injectable and mucosal vaccines.
- Integrate information on the role of the immune system in asthma and chronic obstructive pulmonary disease and the use of this information to develop new therapies for these conditions.

Course Content

SE Biotechnology **Immunology -** **Semester - IV**

Teaching Scheme	**Examination Scheme**	
Lectures :3 Hrs/week	End Semester Exams (ESE)	: 80 Marks.
Practical : 2 Hrs/Week	Duration of Paper (ESE)	: 3 Hours.
Tutorial : 1Hr/Week	Internal Sessional Exam (ISE)	: 20 Marks.
	Internal Continuous Assessment (ICA)	: 25 Marks
	End Semester Exam (ESE) (PR)	: 25 Marks

UNIT – I **No of Lecture: 8 Hours, Marks: 16**

Introduction to Immunology

Properties of immune response, Innate and acquired Immunity, active and passive immunity.

Cells & Tissues of Immune System: Lymphocytes, Classes of lymphocytes, antigen presenting cells, NK Cells, Mast Cells, Dendritic Cell, LPT cells, Organs of the Immune System, Bone marrow, Thymus, Lymph node, Spleen, MALT.

UNIT – II **No. of Lecture: 8 Hours , marks :16**

Molecular Immunology

Molecular structure of antibody, Classification, Isotypes, Synthesis assembly and expression of immunoglobulin molecules, Nature of antigens, function and diversity, Generation of anti-body diversity, Antigens: Different characteristics of antigens, mitogens, Hapten, Adjuvants.

UNIT – III **No. of Lecture: 8 Hours, marks :16**

MHC Molecule & Immune Mechanism

Discovery of MHC complex, Role of MHC, Structure of MHC molecule, Binding of peptides to MHC molecules, MHC restriction.

Mechanism of Immune Response: Cytokines, T- cell receptors, B cell activation cell complement system, antigen processing and presentation, regulation of immune response.

UNIT – IV **No. of Lecture: 8 Hours, marks :16**

Immunological Techniques

Antigen- antibody reactions, Immuno diffusion, immuno - electrophoresis, ELISA, RIA, Rocket immuno - electrophoresis, Agglutination reaction, Precipitation reaction, Flow cytometry.

UNIT –V **No. of Lecture: 8 Hours , marks :16**

Applied Immunology

Immune system in health and disease, autoimmunity, hypersensitivity, Immunology of graft rejection methods and precautions, GVHD, Hybridoma technology: - Fusion of myeloma cells with lymphocytes, production of monoclonal antibodies and their application.

References:

1. C.V. Rao " A Textbook of Immunology" Narosa Publishing House.
2. Kuby " A Textbook of Immunology" Freeman Publication.
3. Roitt I.M. (1998) Essentials of Immunology. ELBS, Blackwell Scientific Publishers, London.
4. Ivan Riot- Essentials of Immunology (6th Edition), Blakswell Scientific Publications, Oxford, 1988.

Biostatistics

Course Outline

Biostatistics	**BST**	**BTL-403**
Course Title	**Short Title**	**Course Code**

Course Description

This course is a combination of both elementary probability and basic statistics with a strong emphasis on engineering and science applications. The course coverage explores the treatment of data; probability; probability distributions; probability densities; curve fitting; correlation and regression; sampling distributions; inferences concerning means; inferences concerning variances; inferences concerning proportions; analysis of variance; factorial experimentation. This course will create interest to the students for probability and statistics.

Lectures	Hours/Week	No. of Weeks	Total Hours	Semester Credits
	03	15	45	03
Tutorial	01	15	12	01

Objective of the subject:

1. Students will understand the Probability distribution. Namely, Binomial, Poisson and Normal distribution are discussed which will allow them to apply to engineering problems.
2. Students will understand what is meaning of bi-variate data and correlation between them.
3. Students will learn how to fit a curve to a given data.
4. Students will also understand the meaning of sampling.
5. Students will learn to test a hypothesis based on a sample.
6. Students will also learn various tests, for large sample and small sample.
7. Students will learn Experimental design.
8. Students will learn 2^2, 2^3 designs

Learning Outcomes:

1.Will be able to use Probability distributions effectively. Also will be able to know a given set of data will follow which distribution.

2.Will be able to calculate the mean and variance of a probability distribution.

3.Can correlate bivariate data and set relationship among data.

4.Can use sampling for performing any real experiment which is otherwise very expensive.

5.Will be able to use t-test, F-test and chi-square test etc. for Goodness of fit to test hypotheses.

6.Able to apply Randomization to avoid confounding the variable under investigation with other uncontrollable variables.

Course Content

SE Biotechnology **Biostatistics** **Semester - IV**

Teaching Scheme	**Examination Scheme**	
Lectures :3 Hrs/week	End Semester Exams (ESE)	: 80 Marks.
Tutorial : 1Hr/Week	Duration of Paper (ESE)	: 03 Hours.
	Internal Sessional Exam (ISE)	: 20 Marks.

UNIT – I **No of Lecture: 8 Hours, Marks: 16**

Probability Distributions

Random variables, The mean and variance of a Probability distribution, The Binomial and Poisson distributions, The Poisson's approximation to the Binomial Distribution. Continuous random variable, and Normal Distribution, Normal approximation to the Binomial Distribution.

UNIT – II **No of Lecture: 8 Hours, Marks: 16**

Curve Fitting

The method of Least Square, Curvilinear regression (quadratic, exponential), Correlation coefficient and its properties, Inferences about the correlation coefficient-(Normal Population)

UNIT – III **No of Lecture: 8 Hours, Marks: 16**

Sampling

Definitions of (population, sample, statistic, parameter, hypothesis, null hypothesis, alternative hypothesis, critical region, level of significance), Interval estimation, Confidence interval, confidence limit, Sampling, types of sampling, type-I error, type-II error. Test of sampling for single mean, two means.

UNIT – IV **No of Lecture: 8 Hours, Marks: 16**

Tests of Significance

Hypotheses concerning one proportion, Hypotheses concerning two proportions. Small sample test (1. Student t-test for an assumed mean and equality of means of two populations when sample observations are independent, 2. F-test for comparison of variances of two populations,) Chi-square test for independence of attributes, Goodness of fit and homogeneity of samples.

UNIT – V **No of Lecture: 8 Hours, Marks: 16**

Experimental Designs

Principles of experimental designs, Completely randomized, Randomized block and Latin square designs, Simple factorial experiments of 2^2, 2^3, 2^4, Confounding in factorial experiments (mathematical derivations not required); Analysis of variance (ANOVA) and its use in the analysis of RBD.

Reference Books:

1. Miller & Freund's Probability and Statistics for Engineers (Sixth Edition), by Richard A. Johnson.
2. A Text Book of Engineering Mathematics, by N. P. Bali and Manish Goyal.
3. Probability and Statistics for Engineers (India Edition), by Jay L. Devore
4. Gupta S.C. Fundamentals of Statistics. Himalaya Publishing House, New Delhi
5. Statistical methods in biology by Norman T.J. Bailey (3rd Edition), Cambridge University Press (1995).
6. Khan. Biostatistics. Tata Mc Graw Hill Publishers.
7. Daniel W.W.(9TH Edn., 2009). Biostatistics: A Foundation for Analysis in the Health Sciences. John Wiley and Sons Inc. New York.
8. Sharma N.K.(1996). Statistical Techniques. Mangal Deep Publications, Jaipur, India.

Unit Operation –II

Course outline

Unit Operation –II	**UO-II**	**BTL-404**
Course title	Short title	Course code

Course Description: The goals of the course are to understand the basic principles of mechanical operation and their applications in different areas of engineering and technology.The subject also includes solids handling and process characteristics for solids to process in industrial operations.

	Hours / Week	**No. of Weeks**	**Total Hours**	**Semester Credits**
Lecture	03	15	40	03

Prerequisite Course(s): Engineering Mechanics and Mathematics

Objective of the subject:

1. To make the student familiar with properties of solid.
2. To understand separation technique
3. To understand laws of crushing and grinding.
4. To study the industrial importance of mechanical operations.
5. To make student familiar with Fluidization and types of conveyors.

Learning Outcomes:

After successful completion of this course the student will be able to:

1. Understand the handling of solid and size reduction of solid.
2. Identify the separation technique.
3. Classify the solid according to size .
4. Understand the separation technique of fluid and solid.

5. Understanding basic principles of particles preparation and their characterization.

Course Content

SE Biotechnology **Unit Operation –II** **Semester -IV**

Teaching Scheme	**Examination Scheme**	
Lectures :3 Hrs/week	End Semester Exams (ESE)	: 80 Marks.
Practical : 2 Hrs/Week	Duration of Paper (ESE)	: 03 Hours.
	Internal Sessional Exam (ISE)	: 20 Marks.
	Internal Continuous Assessment (ICA)	: 50 Marks

UNIT-I **No. of Lecture: 8 Hours, marks :16**

Size Reduction

Properties of solids, Particle size, Specific surface area of the Mixture, Average particle size. Mechanism of size reduction , Energy utilization , crushing Efficiency , Energy for size reduction , Laws of crushing ,Types of equipment on the various stages of reduction such as Jaw crushers, Gyratory crusher, Hammer mill , Ball mill , Ultra fine grinders etc., Power requirement , Numerical based on above.

UNIT –II **No. of Lecture: 8 Hours, marks: 16**

Screening & Handling of Solids

Separation of solids by screening , Different types of screens , Capacity and efficiency of screen , Actual & ideal screens ,Screen analysis , Screening equipments such as Grizzly, Gyratory screens , Trommels , Shaking screens , Oscillating Screens. Material Balance over screen , Calculation of screen Effectiveness . Numerical based on above.

Handling of solids: Nature & characteristics of bulk solid, conveyor, Types of conveyor such as belt conveyor, Chain and flight conveyors, Screw conveyors and pneumatic conveyors.

UNIT III **No. of Lecture: 8 Hours, marks: 16**

Classification of solids & Sedimentation

Equipments for classification such as Gravity settling tank, Spitzkasten , Drag classifier , Elutriator , Cone classifier , Double cone classifier, Rake classifier, Cyclone separator, Magnetic separators, Electrostatic separator, Floatation Equipment , jigging , tabling etc.

Sedimentation: Laboratory batch sedimentation, Thickeners, Calculation of area & depth for continuous thickeners. Numerical based on sedimentation.

UNIT IV **No. of Lecture: 8 Hours, marks: 16**

Filtration & Centrifugation

Filtration: Equipments for filtration, constant pressure & constant rate filtration, filter calculations, Optimum time cycle, Handling of compressible cakes and use of filter aids , Washing of Cake .Numerical based on above .

Centrifugation: Centrifugation calculations, Filtration in a centrifuge, Equipments of centrifugal filtration .Problems on centrifugal Filtration. Comparison of sedimentation & centrifugation.

UNIT V **No. of Lecture: 8 Hours, marks: 16**

Fluid Solid Systems

Fluidization: Characteristics of fluidized systems, Effect of fluid velocity on pressure Gradient, Minimum fluidization velocity, types of fluidization , Application of fluidization such as fluidized bed catalytic cracking, in chemical and process industries, Fluidized bed combustion.

Numerical based on above.

References:

1. R. S. Hiremath and A.P. Kulkarni , Unit operations of Chemical Engg. (Mechanical operations Vol.-I: Everest publication.

2. Pauline M. Doran, Bioprocess Engineering Principles, Academic Press an Imprint of Elsevier.

3. W.L. McCabe and J.C. Smith, Unit Operations of Chemical Engg. : Tata McGraw Hill

4. J. M. Coulson and R.F. Richardson, Chemical Engg. Vol. I & II : Butter worth & Heinemann.

5. I. P. Chattopadhaya, Unit Operations of Chemical Engg. Vol. I : Khanna Publications, Delhi.

Process Heat Transfer
Course Outline

Process Heat Transfer	**PHT**	**BTL-405**
Course title	Short title	Course code

Course Description:

This course introduces students to key concepts and principles required to analyze problems involving heat exchange and energy conversion. Objective of the course is to study modes of heat transfer and development of relations to calculate hear transfer rate.

Lecture	**Hours / Week**	**No. of Weeks**	**Total Hours**	**Semester Credits**
	03	15	40	03

Prerequisite Course(s): 10^{th} and 12^{th} Std Physics, Chemistry, Mathematics.

Objective of the subject:

1. To make the student familiar with conduction, convection and radiation phenomenon.
2. To understand condensation and boiling operations with regards to the processing of bio chemicals.
3. To develop the relations for rate of heat transfer to achieve optimized operations.
4. To study the types of heat exchanger and their uses in different industrial operations.
5. To study the types of evaporator and their uses for various industrial processes and applications.

Learning Outcomes:

After successful completion of this course the student will be able to :

1. Demonstrate general applications of heat transfer modes as conduction, convection and radiation in biochemical process industry.
2. Control the different parameters which are required for various biochemical processes.
3. Know the working and principle of all types of evaporators which are used in industries.
4. Know working and principles of all types of Heat Exchanger equipments which are widely used in biochemical, fermentation and pharmaceutical industries.
5. Apply their knowledge to condensate and boiling the various types of biochemicals and other fluids used in industries.
6. Design of heat exchange equipments.

Course Content

SE Biotechnology **Process Heat Transfer** **Semester -IV**

Teaching Scheme	**Examination Scheme**	
Lectures :3 Hrs/week	End Semester Exams (ESE)	: 80 Marks.
Practical : 2 Hrs/Week	Duration of Paper (ESE)	: 3 Hours.
	Internal Sessional Exam (ISE)	: 20 Marks.
	Internal Continuous Assessment (ICA)	: 25 Marks
	End Semester Exam (ESE) (OR)	: 25 Marks

UNIT-I **No. of Lecture: 8 Hours, marks :16**

Conduction in solids

Fourier's law of heat conduction, steady state heat conduction through walls (single and multilayer), heat flow through cylinder, sphere, unsteady state heat conduction, Lumped capacity. Thermal insulation, Optimum thickness of Insulation, Critical radius of insulation.

Numericals based on above.

UNIT-II **No. of Lecture: 8 Hours, marks :16**

Convection

Classification of convection(natural convection and force convection), individual and over all Heat transfer coefficients, Fouling factor ,Flow arrangement in heat exchanger, Log mean temperature difference(LMTD), Wilson Plot .

Numericals based on above.

UNIT-III **No. of Lecture: 8 Hours, marks :16**

Radiation heat transfer

Fundamental of radiation, black body radiation, Kirchhoff's law, radiant heat exchange between nonblack surfaces, Combined heat transfer by conduction, convection and radiation.

Heat transfer to boiling liquids**:** Pool boiling of saturated liquid .Boiling point curve.

Numericals based on above.

UNIT-IV **No. of Lecture: 8 Hours, marks :16**

Condensation & Evaporation

Heat transfer to fluids with phase change: Condensation, Drop wise and film wise Condensation, Condensation on vertical plate .

Evaporation: Types of evaporator (Jacketed pan evaporator, Calendria type evaporator, single effect evaporator. forced circulation evaporator, Multiple effect evaporator.

Numericals based on single effect evaporator.

UNIT-V **No. of Lecture: 8 Hours, marks :16**

Heat exchange equipments

Heat exchangers (Double pipe ,Shell and tube ,Kettle type ,plate type Heat Exchangers).

Effectiveness factor, capacity and NTU.

Numericals based on above.

Reference Books:

1. W.L.McCabe and J.C.Smith , Unit operations in chemical engineering. McGraw Hill/Kogakusha Ltd.
2. Dawande S.D. Principals of Heat Transfer and Mass Transfer. Central Techno Publications, Nagpur.
3. Coulson & Richardson , Chemical engineering. – Volume. I, Pergamon Press
4. Kern D.Q. Process Heat Transfer, McGraw Hill Book 1NC New York, 1950
5. D.S. Kumar, Process Heat Transfer, S.K. Kataria and Sons Publisher, New Delhi
6. Pauline M. Doran, Bioprocess Engineering Principles, Academic Press an Imprint of Elsevier.

Course Outline

Lab Computer Applications	**Lab CA**	**BTP-406**
Course Title	Short Title	Course Code

Course Description: This laboratory course is dealing with applications of computers for designing the various formulas required for Bioprocess engineering programme with a comprehensive study of the C++ programming language.

	Hours per Week	**No. of Weeks**	**Total Hours**	**Semester Credits**
Lecture	**01**	**15**	**10**	**01**
Laboratory	**02**	**15**	**16**	**01**

Prerequisite Course(S): Computer Programming, Engineering Mathematics I and II.

General Objectives:

1. Students will learn to solve matrix equations using Matrix Inversion method.
2. Students will learn to solve Differential equation of first order by various methods like Taylor's series method, Modified Euler's method, Runge Kutta's 4^{th} order method.
3. Students will also learn to solve Numerical Integrations by various methods like, by Picards method, Trapezoidal Rule, by Simpson's $1/3^{rd}$ Rule, Simpson's $3/8^{th}$ rule.

Learning Outcomes:

Students completing this course will able to apply knowledge of Basic Science using knowledge of C and C++ language in Bioprocess Engineering Problems. Students will demonstrate their ability to solve Bioprocess Engineering Problems using computer interface. Students will be able to provide a definite solution to various designing problems in Bioprocess Engineering field.

Course Content

SE Biotechnology **Lab Computer Applications** **Semester – IV**

Teaching Scheme
Theory : 1 hours/ week
Practical : 2 hours/ week

Examination Scheme
Internal Continuous Assessment (ICA): 50 Marks

Theory:

Introduction to object oriented programming

(a) Structure of C++ programming.

(b) Tokens, keywords, constant in C++.

(c) Derived data types, operators, expression in C++.

(d) Function in C++.

(e) Classes and objects in C++.

Introduction to Polymath and Bioprocess Engineering problems based softwares.

Fundamental concepts of Matrices, Numerical Differentiation & Numerical Integration.

Lab Work: (Any Eight from the following)

1. To solve Matrices using Matrix Inversion Method.
2. To solve Matrices using Gauss Elimination method.
3. To solve Differential equation of first order by Taylor's series method
4. To solve Differential equation of first order by Modified Euler's method
5. To solve Differential equation of first order by Picards method
6. To solve Differential equation of first order by Runge Kutta's 4^{th} order method
7. To solve Numerical Integration by Weddle's rule.
8. To solve Numerical Integration by Trapezoidal Rule
9. To solve Numerical Integration by Simpson's $1/3^{rd}$ Rule
10. To solve Numerical Integration by Simpson's $3/8^{th}$ rule

Reference Books:

1. E Balagurusamy “Object Oriented Programming with C++”, Tata McGraw Hill, 4/E,2008.
2. Yashavant Kanetkar, “Let Us C” , BPB Publications ,10/E, 2010.
3. Steven C. Chapra, Raymond P. Canale, Numerical Methods for Engineers, 6^{th} Edition, Tata McGraw Hill.
4. David M. Himmelblau, Basic Principles & Calculations in Chemical Engineering, 6^{th} Edn., Pearson Education Pvt.Ltd., New Delhi.
5. S.S.Sastry, Introductory methods of Numerical Analysis, Prentice Hall

LAB Biochemistry

Lab Course Outline

LAB Biochemistry	LAB BCH	BTP-407
Course Title	Short Title	Course Code

Practical	Hours/ Week	No. of Weeks	Total Hours	Semester Credits
	02	15	26	1

Course Description:

In this laboratory, course emphasis is on the understanding of basics of qualitative and quantitative identification and estimation of biomolecules from the enormous diversity of source in environment. The learner here can use this knowledge and apply in allied branches of Biotechnology as required.

Prerequisite Course(s): Course of Chemistry & Biology at HSC level and FE.

General Objective:

The objective of the laboratory is to impart the fundamental knowledge of chemical basis of biology at the research level to the students and develop their ability to apply the specific procedures to analyze the experimental results.

In this lab, students will be familiar with the use and application of biomolecules in laboratory and various equipments which they can apply in research and Development in the field of Biotechnology

Learning Outcomes:

After successful completion of this lab student will be able to:

- Estimate the amount of different biomolecules like carbohydrates, proteins, nucleic acids from various sources.
- Understand the basic principle of isoelectric precipitation.
- To apply the basic properties of biomolecules for their separation from mixture.
- To extract the lipids from various biological sources.
- To understand the basic principles of thin layer chromatography and gel electrophoresis.

Lab Course Content

Practical -2 Hrs/ weeks

(Note: Minimum Eight Experiments from the following)

1 Estimation of carbohydrates.

a. Estimation of reducing sugars by Dinitrosalicylic acid method.

2. Estimation of proteins.

a. Estimation of proteins by Lowry method.

3. Estimation of nucleic acids:

4. Isoelectric precipitation.

5. Separation of amino acids by paper chromatography.

6. Separation of sugars by paper chromatography.

7. Extraction of Lipids.

8. Thin layer Chromatography.

9. Gel Electrophoresis.

10-11. Assay of enzyme activity and enzyme kinetics.

12. Identification and estimation of an intermediate of EMP pathway.

13. Cell fractionation.

14. Vitamin Assay.

LAB Immunology

Lab Course Outline

LAB Immunology **LAB IMM** **BTP-408**

Course Title Short Title Course Code

Laboratory	Hours/Week	No. of Weeks	Total Hours	Semester Credits
	2	15	16	01

Course Description:

Course emphasis is on the understanding of basic concepts in immunology. The learner here can use this knowledge and apply in allied branches of Biotechnology as required. The course is also helps for the study of antigen antibody interaction.

Course Objectives:

1) To study the antigen antibody interaction.
2) To study the analytical techniques such as ELISA, Ouchterlony diffusion.
3) To study the advanced techniques of the antigen antibody interactions such as Precipitin reaction, Antibody titer test, Agglutination reaction.

Course Outcomes:

By completion of this course students will able to:

1) To apply the basic fundamentals in antigen antibody reaction for designing the experiment.
2) To perform the analytical techniques in immunology is the industry.

Lab Course Content

Practical -2 Hrs/ weeks

(Note: Minimum Eight Experiments from the following)

Practical Work Shall be based on any 08 experiments mentioned below.

1. Immunoelectrophoresis.
2. Radial immunodiffusion.
3. Antigen –Antibody interaction: The Ouchterlony procedure
4. Introduction to ELISA reactions
5. Western Blot Analysis – demo.
6. Immunology of pregnancy test – demo.
7. Latex agglutination test
8. Precipitin reaction
9. Antibody titer test
10. Agglutination reaction.

LAB Unit Operation -II

Lab Course Outline

LAB Unit Operation-II	**LAB UO-II**	**BTP-409**
Course Title	Short Title	Course Code

Laboratory	Hours/Week	No. of Weeks	Total Hours	Semester Credits
	02	15	16	01

Course Description: This course is intended to provide engineering students with a background in important concepts and principles of Unit operation –II.

Prerequisite Course(s): Engineering Mechanics and Mathematics.

General Objective: The objective of the laboratory Course is to impart the fundamental knowledge of unit operations to the students and develop their ability to apply the specific procedures to analyze the experimental results.

Learning Outcomes:

After successful completion of this lab course the student will be able to:

1. Separate of solids by sedimentation techniques .
2. Ascertain the fineness number and to study the differential & cumulative screen analysis of the sand.
3. Determine power requirement for crushing.
4. Determine the rate of filtration ,specific cake resistance and filter medium resistance
5. Find out the rate of filtration
6. Calculate minimum fluidization velocity
7. Determine the effectiveness of the Vibrating screen.
8. Mini Pulveriser : To study the Mini Pulveriser
9. Cyclone Separator : To study the operating behavior of cyclone separator and to find out its efficiency.

Lab Course Content

Practical -2 Hrs/ weeks

TW / Practicals:

Term Work Shall be based on any 08 experiments mentioned below. List of the Experiments.

1. To study the separation of solid by sedimentation
2. Sieve Shaker: To ascertain the fineness number and to study the differential & cumulative screen analysis of the sand
3. Ball Mill :To verify the laws of crushing & grinding
4. Jaw Crusher : To verify the laws of crushing & grinding
5. Plate & Frame Filter Press: To determine the rate of filtration ,specific cake resistance and filter medium resistance
6. Rotary Vacuum Filter: To find out the rate of filtration
7. Fluidization : To observe and study the behavior of the bed during fluidization and to calculate minimum fluidization velocity
8. Sigma Kneader Mixer : To study the sigma Kneader Mixer
9. Vibrating Shifter : To find out the effectiveness of the Vibrating Shifter
10. Mini Pulveriser : To study the Mini Pulveriser
11. Cyclone Separator : To study the operating behavior of cyclone separator and to find out its efficiency
12. Ribbon Blender : To study the Ribbon Blender & to find out the mixing index

LAB Process Heat Transfer

Lab Course Outline

LAB Process Heat Transfer	**LAB PHT**	**BTP-410**
Course Title	Short Title	Course Code

Laboratory	Hours/ Week	No. of Weeks	Total Hours	Semester Credits
	02	15	16	01

Course Description:

In this laboratory course emphasis is on the understanding of basics of Process heat transfer

Prerequisite Course(s): Engineering Physics and Chemistry I and II, Mathematics.

General Objective: The objective of the laboratory is to impart the fundamental knowledge of Process heat transfer to the students and develop their ability to apply the specific procedures to analyze the experimental results.

Learning Outcomes:

After successful completion of this Lab course the student will be able to:

1. Demonstrate general applications and use of heat exchange equipments in industries.
2. Control the different parameters which are required for various processes industries .
3. Apply their knowledge to condensate and boiling the various types of fluids used in industries.
4. Determination of emissivity of test plate.
5. Determination thermal conductivity of metals and insulators.

Lab Course Content

Practical -2 Hrs/per Week

(Note: Minimum EIGHT Experiments from the following)

1) Conductivity of metals and / or insulator.
2) Experiment on Pin fins.
3) Experiment on forced convection apparatus.
4) Experiment on natural convection apparatus.
5) Determination of emissivity of test plate.
6) Stefan Boltzmann apparatus .
7) Parallel / counter flow heat exchanger.
8) Study of pool boiling phenomenon and critical heat flux.
9) Study of heat transfer in evaporator .
10) Temperature profile in a rod .
11) Study of evaporators .
12) Drop wise and film wise condensation .

NORTH MAHARASHTRA UNIVERSITY,

JALGAON (M.S.)

Second Year Engineering

(CIVIL ENGINEERING)

Faculty of Engineering and Technology

COURSE OUTLINE

SEMESTER – III

W.E.F 2013 – 2014

SE (Civil) : Semester - III

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory			Practical	Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
Engineering Mathematics - III	* A/D	3	1	---	4	20	80	---	---	100	4
Strength of Materials	B	3	1	---	4	20	80	---	---	100	4
Concrete Technology	D	3		---	3	20	80	---	---	100	3
Building Construction Techniques and Materials	D	3	---	---	3	20	80	---	---	100	3
Surveying I	D	3	---	---	3	20	80	---	---	100	3
Soft Skills – III	C	1	---	2	3	---	---	50	---	50	2
Strength of Materials lab	B	---	---	2	2	---	---	50	---	50	1
Concrete Technology lab	D	---	---	2	2	---	---	25	25	50	1
Building Construction Techniques and Materials lab	D	---	---	2	2	---	---	25	25	50	1
Surveying I lab	D	---	---	2	2	---	---	25	25(**PR**)	50	1
Total		**16**	**2**	**10**	**28**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination **ESE: End Semester Examination**
ICA: Internal Continuous Assessment

Note 1: For branches like Chemical Engineering and Biotech Engg, two laboratory hours can be merged to form a four hour slot. Note 2: Out of 3 practical ESE heads, at least 1 head should be practical.

*** E & TC, Mechanical, Automobile & Production Engineering branches shall have group D course and rest of the branches shall have group A course (e.g. Engineering Mathematics-III).**

ENGINEERING MATHEMATICS –III

COURSE OUTLINE

Course Title	Short Title	Course Code
Engineering Mathematics –III	**M-III**	

Course description:

The course deals with solution of n^{th} order LDE by different methods. Applications of PDE to solve Laplace's equation, heat equation etc. It also introduces students about real life problems of statistics and sampling theory. It includes vector differentiation with its applications.

Lecture	Hours / Week	No. of Weeks	Total Hours	Semester Credits
	03	13	39	04
Tutorial	01	13	13	

Prerequisite Course(s): Engineering Math's – I & II

COURSE CONTENT

Engineering Mathematics –III **Semester-III**

Lecture: 3 hours / week
Tutorial: 01/week

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

UNIT-I: Linear Differential Equations: (08 Hours, 16 marks)

- Solution of LDE of order n with constant coefficients.
- Method of variation of parameters (Only second order).
- Cauchy's linear equation.
- Legendre's linear equation.

UNIT-II: Applications of Linear Differential Equations and Partial Differential Equations

(08 Hours, 16 marks)

- Applications of linear differential equations to Strut, bending of beams, columns.
- Applications of Partial Differential equations to

i) One dimensional heat flow equation $\frac{\partial u}{\partial t} = C^2 \frac{\partial^2 u}{\partial x^2}$

ii) Two dimensional heat flow equation $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial y^2} = 0$

UNIT-III: Statistics and Probability distributions (08 Hours, 16 marks)

- Introduction to Mean, Mode, Median, standard deviation, Variance, Coefficient of variation.
- Moments, Skewness and Kurtosis.
- Correlation and Regression.
- Binominal distribution.
- Poisson distribution.
- Normal distribution.

UNIT-IV: Testing of Hypothesis and Significance (08 Hours, 16 marks)

- Introduction to population parameters and statistics.
- Testing of hypothesis, Null hypothesis and Alternative hypothesis.
- Level of significance.
- Test of significance of large sample.
- Chi-Square test.
- T-test.

UNIT-IV: Vector Differentiation (07 Hours, 16 marks)

- Gradient of scalar point function.
- Directional derivatives of scalar point function.
- Divergence and Curl vector field.
- Solenoidal and Irrotational vecor fields.
- Applications to Bernoulli's equation.

REFERENCE BOOKS:

1. H.K. Dass - Advanced Engineering Mathematics (S. Chand Publication) New Delhi.
2. Erwin Kreyszig - Advanced Engineering Mathematics (Wiley Eastern Ltd.)
3. B.S. Grewal - Higher Engineering Mathematics, Khanna Publication, Delhi
4. Wylie C.R. & Barrett - Advanced Engineering Mathematics - Mc Graw Hill
5. B.V. Raman - Engineering Mathematics - Tata Mc- Graw – Hill.
6. A Text Book of Engineering Mathematics, By N. P. Bali, Laxmi Publication.

STRENGTH OF MATERIALS
COURSE OUTLINE

Course Title	Short Title	Course Code
Strength of Materials	**SOM**	

Course Description:

The course deals with response of solid bodies under the action of loads. It is an application of principles of mechanics to study behavior of deformable bodies. The main objective of subject is to determine internal forces, stresses, strains and deformation of structure due to external loads.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Lecture	03	13	39	04
Tutorial	01	13	13	

Prerequisite Course(s): Engineering Mechanics

COURSE CONTENT

Strength of Materials **Semester-III**

Lecture: 3 hours / week
Tutorial: 01/week

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

UNIT-I: **No of Lect. – 9, Marks: 16**

Normal stress and strain, tensile, compressive and shear stresses Hooke's law, deformation in prismatic, stepped, & composite members due to concentrated load & self-weight, stress & strain in determinate and indeterminate members, temperature stresses.

UNIT-II: **No of Lect. – 7, Marks:16**

[A] Shear stress & strain, modulus of rigidity, Poisson's ratio, bulk modulus, relation between E, G & K, generalized Hooke's law, stress strain diagram, working stress, factor of safety.
[B] Strain energy, stresses due to various types of axial load using strain energy method.

UNIT-III: **No of Lect. – 8, Marks: 16**

[A] Concept of shear force and bending moment, shear force & bending moment diagrams for cantilevers, simple and compound beams due to concentrated, uniformly distributed, uniformly varying loads and couples, construction of loading diagrams and bending moment diagram from shear force diagram.

[B] Bending stresses in beams: Introduction to moment of inertia, parallel and perpendicular axis theorem, theory of simple and pure bending, section modulus, moment of resistance, bending stress distribution diagram.

UNIT-IV: **No of Lect. – 8, Marks: 16**

[A] Shear stresses in beams, shear stress derivation, and shear stress distribution in different cross sections of beams.

[B] Theory of pure torsion, torsional moment of resistance, power transmitted by shafts, torsional rigidity, shear stresses in shafts due to torsion, stress & strain in determinate shafts of hollow or solid cross-sections.

[C] Axially loaded columns: Euler's theory of long columns, assumptions made in Euler's theory, limitations of Euler's formula. Various end conditions & concept of equivalent length, Rankine's formula,

UNIT-V: **No of Lect. – 7, Marks: 16**

[A] Direct & bending stresses in short columns & other structural components due to eccentric or lateral loads, the middle third rule, core of section.

[B] Principal stresses & strain: Concept of principal stresses and planes, normal and tangential stress on any oblique plane, determination of principal stresses and principal planes, Mohr's circle method.

REFERENCE BOOKS:-

1. Strength of material by M. Passi, Tech-max Publications, Pune.
2. Strength of material by S. Rammurthum, Dhanpat Rai & Sons.
3. Strength of materials by S.S.Ratan, Tata McGraw Hill
4. Strength of material by D. S. Prakash Rao, University Press
5. Strength of Materials & Machine Elements by V.L. Shah and R.A. Ogale,Structures Publications, Pune.
6. Mechanics of Solids by E.P.Popov
7. Strength of Materials by Timoshenko.
8. Strength of Material by A.S. Basu, Dhanpat Rai & Sons.

CONCRETE TECHNOLOGY
COURSE OUTLINE

Course Title	Short Title	Course Code
Concrete Technology	**CT**	

Course description:-

This course introduces the students about properties of materials such as water cement, sand and aggregates and concrete. It describes various tests on fresh and hardened concrete. The course includes various admixtures and their effects, types of concrete and special concreting techniques. Various methods of concrete mix design are also discussed.

	Hours per weeks	Nos. Of weeks	Total Hours	Semester Credit
Lecture	3	13	39	03

COURSE CONTENT

Concrete technology **Semester-III**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

UNIT-I **No. of Lect. – 8, Marks: 16**

1. Cement: - Manufacture of cement, chemical composition, setting and hydration of cement. Types of cement, properties and testing of cement.
2. Aggregates – Classification, properties, grading, impurities in aggregates and testing of aggregates, its effect on strength of concrete. Quantity of water for concrete.

UNIT- II **No. of Lect. – 8, Marks: 16**

1. Fresh Concrete: - Definition and its ingredients, grades of concrete, concreting process, significance of water cement ratio. Properties of fresh concrete.
2. Hardened Concrete:
   Various properties of hardened concrete, factors affecting various properties, micro cracking, and stress - strain relation, testing of hardened concrete, creep.
3. Shrinkage of concrete, quality control during concreting.

UNIT-III **No of Lect. – 8, Marks: 16**

1. Admixtures, classification and their effects on various properties of concrete.

2. Types of Concrete: - Light weight concrete, polymer concrete, fiber reinforced concrete, ready mixed concrete, self compacting and high performance concrete, ferro cement concrete.

3. Special concrete- Transparent concrete, cellular light wt. concrete, pre-stressed concrete,
4. Under water concreting, concreting in extreme weather conditions.

UNIT-IV **No of Lect. – 8, Marks: 16**

Concrete mix design

1. Introduction, object of mix design, factors to be considered, statistical quality control, introduction to different methods of mix design. Scaffolding, shoring, under pinning and strutting, types, purposes and precautions.

2. Concrete mix design by I.S.(10262-456) method and IRC method

UNIT-V **No of Lect. – 7, Marks: 16**

1. Introduction to non-destructive testing of concrete, rebound hammer, ultrasonic pulse velocity, pull out test, impact echo test.

2. Deterioration of concrete, permeability, durability, chemical attack, carbonation of concrete, corrosion of reinforcement.

Text books:-

1. Concrete Technology by M.S.Shetty, S Chand Publication.
2. Concrete Technology by M. L. Gambhir, TMH Publication.
3. Concrete Technology by S.V.Deodhar, Central Techno Publication
4. Concrete Technology by N.V. Nayak & A.K. Jain, Narosa Publishing House Pvt. Ltd.
5. Concrete Technology by Kulkarni P.D. Ghosh, R.K. Phull Y.R., New Age International.

Reference books:-

1. Concrete Technology by A.N. Neville, J.J. Brooks, Addition Wesley

2. Concrete Technology by R.S. Varshney, Oxford & I B H.

3. Concrete Technology by P Kumar Mehta, Gujrat Ambuja

BUILDING CONSTRUCTION TECHNIQUES AND MATERIALS

COURSE OUTLINE

Course Title	Short Title	Course Code
Building Construction Techniques and Materials	**BCT&M**	

Course Description:-

This course deals with concepts in Building Construction Listed as below

- Types of building structures & various parts of building,
- Different types of masonry, scaffolding, shoring, under pinning and strutting.
- Description of building finishes and types
- Concrete and R.C.C. construction
- Types of foundations
- Study of building materials such as stone, bricks & timber, Aluminium, glass, heat insulating and sound absorbent materials.

	Hours per weeks	Nos. Of weeks	Total Hours	Semester Credit
Lecture	3	13	39	3

COURSE CONTENT

Building construction techniques and materials **Semester-III**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week **End Semester Examination (ESE) : 80 Marks**
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

UNIT-I

Types of building and foundation **No of Lect. – 8, Marks: 16**

Types of building, load bearing, framed structure, steel structure, timber structure, composite structure. Various parts of building, sub structure and super structure. Plinth, sill, floor, and roof level, plinth height, plinth protection, cornice, coping and their function.

Foundation: Purpose and classification, advantages and disadvantages of each and circumstances under which each is used. Factor considered for selection of foundation.

UNIT-II

Masonry and form work **No of Lect. – 8, Marks: 16**

1. Masonry: Principle of masonry construction, types of masonry, types of wall (load bearing, partition, timber partition, glass partition etc.)

2. Brick and brick masonry: Various types of bond in brick masonry, reinforced brick masonry, precautions to be taken in masonry construction, composite masonry, solid and hollow blocks used for masonry, cavity wall, etc.
3. Formwork: Function of form work, form erection, oiling and stripping of form, requirements of form and form work, material used for form work.

UNIT-III

Study of lintel doors & windows, circulation **No of Lect. – 8, Marks: 16**

1. Types of lintel, detailing of R.C.C. lintel, precast lintel and stone lintel.
2. Doors and windows: Type of each and circumference under which each is used, minimum area of window opening for different climatic conditions, various material used for doors and window, fixtures and fastening used. I.S. notations for doors and windows
3. Circulation: Horizontal and vertical, stair and staircase planning and design, types of staircase as per shape and material used, type of circulation.
4. Floor and roof: Ground floor, upper floor, mezzanine floor, design and constructional requirements, various types of floor finishes used, advantage and disadvantages, special flooring.

UNIT-IV

Truss and its type, R.C.C. framed structure **No of Lect. – 8, Marks: 16**

1. Steel trusses: Types, Methods of connections, connecting materials.

2. Scaffolding, shoring, under pinning and strutting, their types, purposes and precautions.

3. R.C.C. framed structure, column, beam, footing, slab and their connections, general requirements and details.

UNIT-V

Study of various material used in construction **No of Lect. – 7, Marks: 16**

1. Stone: Natural bed of stone, stone quarrying, uses of stones and qualities of good building stone, test's on stone.

2. Bricks: Composition of good brick earth, classification of burnt brick, manufacturing of bricks, qualities of good bricks, test on bricks.

3. Timber: Properties and uses, testing, conservation and sawing, defects in timbers, artificial timber, veneers, plywood and block board.

4. Other miscellaneous materials: Aluminium, glass, heat insulating materials, sound absorbent materials.

REFERENCE BOOKS

1. Building Construction by Rangwala- Published by Charotar Publishing House ISBN-13 9789380358482, ISBN-10 9380358482.
2. Building Construction by Sushil Kumar- Published by Standard Publishers Distributors, Publication Year2010, ISBN-13 9788180141683, ISBN-10 8180141683, Edition 19.
3. Building Construction by S.P. Bindra, S.P. Arora, Published by Dhanpat Rai Publications, Publication Year 2010, ISBN-13 9788189928803, ISBN-10 8189928805.
4. Building Construction by Ashok Kr. Jain, B. C. Punmia, Arun Kr. Jain, Published by Laxmi Publications, Publication Year 2009, ISBN-13 9788131804285, ISBN-10 8131804283, Edition 10thEdition.
5. Engineering Materials by Rangwala, Publisher Charotar Publishing House, Publication Year 2011, ISBN-13 9789380358260, ISBN-10 9380358261
6. Civil Engineering Material by Dr. S.V. Deodhar.

SURVEYING - I

COURSE OUTLINE

Course Title	Short Title	Course Code
Surveying- I	**SUR-I**	

Course Description:-

- This course is set keeping in mind the requirements of undergraduate students of Engineering. This course provides the fundamental knowledge of surveying and leveling which includes:
- Basic principles of surveying and certain general topics such as bench marks, reduced levels and important aspect of leveling.
- Engineering surveys such as profile leveling and cross-sections.
- Measurements of horizontal angles, vertical angles, magnetic bearings, deflection angle by using optical theodolite with different techniques.
- Traverse computation: Consecutive and independent co-ordinates.
- Tachometric Surveying: Measurement of horizontal distances and vertical distances without using chains and tapes, tachometric contour survey.
- Study of curves.
- Plane table surveying.
- Study of minor instruments.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Lecture	03	13	39	03
Tutorial	-	-	-	

Prerequisite Course(s): Knowledge of Element of Surveying

COURSE CONTENT

Surveying- I **Semester-III**

Teaching Scheme	**Examination Scheme**	
Lecture: 3 hours / week	**End Semester Examination (ESE)**	**: 80 Marks**
	Paper Duration (ESE)	**: 03 Hours**
	Internal Sessional Exam (ISE)	**: 20 Marks**

Unit-I: Part [A] Introduction to surveying **No of Lect. – 8, Marks: 16**

a) Surveying- Definition, principle of surveying, various types of surveying.
b) Bench mark and its types, reduced level, rise and fall method, height of instrument method.

Part [B] Leveling

a) Instruments used in leveling, dumpy level, automatic level, types of leveling staves.
b) Principal axes of dumpy level, reciprocal leveling curvature and refraction correction, distance to the visible horizon.
c) Profile leveling: L - section and cross -sections.

Unit-II: Theodolite **No of Lect. – 8, Marks: 16**

a) Principal axes and temporary adjustments of transit theodolite.
b) Uses of theodolite: measurement of horizontal angles, vertical Angles, magnetic bearings, measuring deflection angles.
c) Theodolite Traversing: Computation of consecutive and independent co-ordinates, adjustments of closed traverse, Gales traverse by co-ordinate method,

Unit-III: Tachometry **No of Lect. – 8, Marks: 16**

a) Principle of stadia method, fixed hair method with vertical staff to determine horizontal distances and elevations of the points.
b) Use of tachometry in surveying, contour, characteristics and uses, methods of interpolation, tachometric contour survey.

Unit-IV: Curves **No of Lect. – 8, Marks: 16**

a) Horizontal and vertical curves and their purposes.
b) Simple circular curves - Elements and setting out by linear & angular methods.
c) Compound curves -Elements and setting out of compound curves.
e) Transition curves -Types and uses, Length of transition curves,
(No numerical problem to be asked).

Unit-V: Plane Table Survey **No of Lect. – 7, Marks: 16**

a) Objective and equipment required for plane table survey.
b) Methods of plane tabling - radiation, intersection, traversing and resection.
c) Advantages, disadvantages, limitations and errors of plane Table surveying.
d) Minor instruments: Study and use of abney level, box sextant, digital planimeter.

REFERENCE BOOKS

1. Surveying and leveling (vol-I&II) by T.P. Kanitkar, & S.V. Kulkarni, Pune Vidarthi Griha Prakashan, Pune,
2. Surveying Vol. I and Vol .II by B.C.Punmia, Laxmi Publication (P) New Delhi.
3. Principles of surveying by Cliver and clendening
4. Advance surveying , Vol.I & II, Handbook by P.B. Shahani
5. A handbook of accurate surveying methods by S.P.Collins

Soft Skills – III
COURSE OUTLINE

Course Title	Short Title	Course Code
Soft Skills – III	**SK-III**	

Course Description: Through this course we have tried to prepare the students for the industry. Most companies test mathematical and logical ability through an aptitude test. This subject aims at working on these skills of a student through strategies formulae and practice exercises.

Lecture	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
	1	**13**	**13**	**2**

Prerequisite Course(s): Fundamental knowledge of high school mathematics.

COURSE CONTENT

Soft Skills – III **Semester-III**

Teaching Scheme **Examination Scheme**
Lecture: 1 hour / week **Internal Continuous Assessment (ICA): 50 Marks**

Unit-I

Arithmetic-1 **No. of Lect. – 3, Marks: 10**

a. Basic Formulae

i. Divisibility rules
ii. Speed maths
iii. Remainder theorem
iv. Different types of numbers
v. Applications

b. HCF, LCM and Linear Equations

i. HCF – Successive division and prime factorization methods
ii. LCM – Successive division and prime factorization methods
iii. Applications
iv. Linear Equations – Elimination method
v. Substitution method

vi. Applications

c. Averages and Mixtures

i. Concept of average
ii. Faster ways of finding it
iii. The allegation method
iv. Applications

Unit-II: Arithmetic–II **No of Lect. – 3, Marks: 10**

a. Percentages

i. Concept of percentage
ii. Working with percentages
iii. Applications

b. Profit and Loss

i. Difference between cost and selling price
ii. Concept of profit percentage and loss percentage
iii. Applications

c. Time and Work

i. Basic time and work formula
ii. Relation between time and work
iii. Applications

Unit-III: Arithmetic–III **No of Lect. –3, Marks: 10**

a. Permutations and Combinations

i. Sum rule of disjoint counting
ii. Product rule of counting
iii. Concept of factorial
iv. Permutations
v. Linear permutations
vi. Combinations
vii. Circular permutations
viii. Applications

b. Probability

i. Definition and laws of probability
ii. Mutually exclusive events
iii. Independent events
iv. Equally likely events
v. Exhaustive events
vi. Cards

vii. Dice
viii. Applications

c. Time and Distance

i. Speed
ii. Conversion factors for speed
iii. Average Speed
iv. Moving Bodies – Passing, crossing and overtaking
v. Relative speed
vi. Boats and streams
vii. Applications

Unit-IV: Non-Verbal Reasoning **No of Lect. 2, Marks: 10**

a. Analogies

i. Examples
ii. Applications

b. Classification

i. Examples
ii. Applications

c. Sequences

i. Examples
ii. Applications

Unit-V: Analytical Reasoning **No of Lect. – 3, Marks: 10**

a. Analytical Puzzles

i. Classification puzzles
ii. Ordering puzzles
iii. Assignment puzzles
iv. Applications

b. Letter and Number Series

i. Different types of letter series
ii. Different types of number series
iii. Mixed Series

c. Coding and Decoding

i. Letter coding
ii. Number coding
iii. Mixed coding
iv. Odd man out
v. Applications

Guide lines for ICA:

ICA will be based on credit tests and assignments submitted by the student in the form of journal.

Reference Books:

1. R. S. Aggarwal, “Quantitative Aptitude”, S. Chand Publication, New Delhi, 2012.
2. R. S. Aggarwal, “A Modern Approach to Verbal Reasoning”, S. Chand Publication, New Delhi, 2012.
3. R. S. Aggarwal, “A Modern Approach to Non-Verbal Reasoning”, S. Chand Publication, New Delhi, 2012.

STRENGTH OF MATERIALS
LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Strength of material	**SOM**	

ICA (Term Work): 50 Marks
Semester-III

Course description:-

In this Laboratory course emphasis is given on determining properties of metals & solving numerical's on all the topics in lab hours.

	Hours/ Week	No. Of weeks	Total Hours	Semester Credits
Practical	2	13	26	1

Lab course content:-

Group A (Practical exercise- Any five from list given below)

1. To determine tensile test on a metal.
2. To determine hardness of metal (mild Steel or aluminium).
3. Torsion test on mild steel rod.
4. To determine impact strength of steel. (By Izod test)
5. To determine impact strength of steel.(By Charpy test)
6. To determine Young's modulus of elasticity for beam materials simply supported at ends.
7. Shear test on metals.

Group B (Solve any five assignments.)

For each assignment two practical hours are assigned

1. Assignment 1

a. To solve numerical based on Normal stress and strain, tensile, compressive and shear stresses Hooke's law.

b. To solve problems based on deformation in prismatic, stepped, & composite members due to concentrated load & self-weight, Stress & strain in determinate and indeterminate members, temperature stresses.

2. Assignment 2

a. To solve numerical based on shear stress & strain, modulus of rigidity, Poisson's ratio, bulk modulus, generalized Hooke's law, stress strain diagram.

b. To solve numerical based on strain energy, stresses due to various types of axial load using strain energy method.

3. Assignment 3

a. To solve problems based on shear force and bending moment for cantilevers, simple and compound beams due to concentrated, uniformly distributed, uniformly varying load and couples.

b. To solve problems based on construction of loading diagrams and bending moment diagram from shear force diagram.

4. Assignment 4

a. To solve numerical based on bending stresses in beams, moment of inertia, parallel and perpendicular axis theorem, section modulus, moment of resistance, bending stress distribution diagram.

b. To solve numerical based on bending stresses in beams for unsymmetrical section

5. Assignment 5

a. To solve numerical based on shear stresses in beams, shear stress derivation, and shear stress distribution in different cross sections of beams.

b. To solve problems based on theory of pure torsion, torsional moment of resistance, power transmitted by shafts, torsional rigidity, Shear stresses in shafts due to torsion, Stress & strain in determinate shafts of hollow or solid cross-sections.

6. Assignment 6

a. To solve problems based on axially loaded columns: Euler's theory of long columns, Rankine's formula.

b. To solve problems based on direct & bending stresses in short columns & other structural components due to eccentric or lateral loads, the middle third rule, core of section.

c. To solve problems based on principal stresses & strain, normal and tangential stress on any oblique plane, determination of principal stresses and principal planes, Mohr's circle method.

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and assignment submitted by the student in the form of journal.

CONCRETE TECHNOLOGY
LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Concrete Technology	**CT**	

ICA (Term Work) : 25 Marks
ESE (Oral) : 25 Marks

Course description:-

In this Laboratory course emphasis is on the Knowing various tests on cement, sand, aggregates and concrete

	Hours/ Week	No. Of weeks	Total Hours	Semester Credits
Practical	2	13	26	1

LAB COURSE CONTENT:-

1. Testing of Cement

a. Fineness of cement
To calculate fineness of cement given as per IS

b. Consistency of cement
To find consistency of cement given as per IS

c. Setting time of cement
To know initial and final setting time of cement given as per IS

d. Compressive strength of cement
To calculate Compressive strength s of cement given as per IS

e. Soundness of cement
To calculate soundness of cement given as per IS.

2. Testing of aggregates

a. Sieve analysis
To calculate fineness modulus and to perform sieve analysis and calculate Fineness modulus as per IS

b. Crushing value test
To calculate crushing value of aggregates as per IS

c. Impact value test

To calculate impact value of aggregates as per IS

d. Moisture content
To calculate Moisture content of aggregates as per IS

e. Abrasion test
To calculate abrasive value of aggregates as per IS

f. Shape test
To calculate flakiness and elongation index of aggregates as per IS

g. Specific gravity test
To calculate Specific gravity of aggregates as per IS

3. Test on concrete

a. workability test
To calculate workability of concrete by slump cone and compaction factor method as per IS.

b. Compressive strength (Cubes and cylinders)
To calculate compressive strength of concrete cubes and cylinders as per IS

c. Split test
To calculate tensile test of concrete cylinders as per IS

Guide Lines for ICA:-
ICA shall be based on continuous evaluation of student performance throughout the semester and term work submitted by the students.

Guide lines for ESE:-
ESE will be based on term work submitted by the student. In ESE the student may asked to answer questions based on practical's performed /assignments. Evaluation will be based on performance in **oral** examination

Text books:-

1. Concrete Technology by M.S.Shetty, S Chand Publication.
2. Concrete Technology by M. L. Gambhir, TMH Publication.
3. Concrete Technology by S.V.Deodhar, Central Techno Publication
4. Concrete Technology by N.V. Nayak & A.K. Jain, Narosa Publishing House Pvt. Ltd.
5. Concrete Technology by Kulkarni P.D. Ghosh, R.K. Phull Y.R., New Age International.

BUILDING CONSTRUCTION TECHNIQUES AND MATERIALS

LAB COURSE OUTLINE

Course title:-Building Construction Techniques and Materials **Short title: -** BCT&M

Practical: 2Hours/Week **ICA (Term Work) : 25 Marks**
ESE (Oral) : 25 Marks

Course description:-

In this Laboratory course emphasis is on the understanding of Building Construction Techniques and Materials

	Hours/ Week	No. Of weeks	Total Hours	Semester Credits
Practical	2	13	26	1

LAB COURSE CONTENT:-

1) Orthographic, isometric, oblique and axonometric view.

- To draw the various (2D & 3D) views of building.

2) C.C.T.W. panelled door: plan, elevation, section

- To know the various types doors and draw the sketches.
- To describe the various types windows and draw the sketches.

3) Flush door: plan, elevation and section

- To know the various types doors and draw the sketches.
- To describe the various types windows and draw the sketches.

4) Lintel/ Arches in stone and bricks.

- To know various types lintel and arches and draw the sketches

5) Stone masonry: U.C.R., C.R. and Ashlars.

- To study various types of bonds in brick masonry, reinforced brick masonry, precautions to be taken in masonry construction, composite masonry, solid and hollow blocks used for masonry, cavity wall, etc. and draw the sketches

6) Bonds in brick masonry with isometric view for one bond for one brick.

- To describe and draw sketches of brick, brick bats and their various views.

7) Different types of roofs.

- To study king post and queen post roofs and draw the sketches.

8) Steel trusses

- To know steel trusses methods of connections, and their connecting materials, tubular structure used as a truss and draw the sketches.

9) Types of stairs.

- To study the Circulation: Horizontal and vertical, stair and staircase planning and design, types of staircase as per shape and material used, type of circulation and draw the sketches

10) Report regarding visit to the construction sites including drawing and photographs. (Minimum two visits are mandatory).

11) Market survey (Including rates)

- Prepare the report of market survey for different building materials.

REFERENCE BOOKS

1. Building Construction by Rangwala- Published by Charotar Publishing House ISBN-13 9789380358482, ISBN-10 9380358482.
2. Building Construction by Sushil Kumar- Published by Standard Publishers Distributors, Publication Year 2010, ISBN-13 9788180141683, ISBN-10 8180141683, Edition 19.
3. Building Construction by S.P. Bindra, S.P. Arora, Published by Dhanpat Rai Publications, Publication Year 2010, ISBN-13 9788189928803, ISBN-10 8189928805.
4. Building Construction by Ashok Kr. Jain, B. C. Punmia, Arun Kr. Jain, Published by Laxmi Publications, Publication Year 2009, ISBN-13 9788131804285, ISBN-10 8131804283, Edition 10thEdition.
5. Engineering Materials by Rangwala, Publisher Charotar Publishing House, Publication Year 2011, ISBN-13 9789380358260, ISBN-10 9380358261
6. Civil Engineering Material by Dr. S.V. Deodhar

Guide Lines for ICA:-

ICA shall be based on continuous evaluation of student performance throughout the semester and drawing sheets submitted by the students.

Guide lines for ESE:-

ESE will be based on drawing sheets submitted by the student. In ESE the student may asked to answer questions based on term work /assignments. Evaluation will be based on performance in oral examination.

SURVEYING- I

LAB COURSE OUTLINE

Semester-III

Course Title	Short Title	Course Code
Surveying- I LAB	**SUR-I LAB**	

ICA (Term Work) : 25 Marks
ESE (Oral) : 25 Marks

Course Description:

This laboratory covers experiments related to measurement of horizontal angle, vertical angle, horizontal distance, elevation, reduced levels, magnetic bearings, plane table survey and minor instruments.

Practical	Hours/Week	No. Of Weeks	Total Hours	Semester Credits
	2	13	26	1

Total Semester Credits: 1

Prerequisite Course(s): Element of civil engineering.

LAB COURSE CONTENT

(Note: All practical exercise in each group.)

Group A (Practical exercise)

1. **Use and Study of Dumpy level for finding the levels by various methods.**

   a) Explain basic principles of dumpy level.
   b) Explain different parts of a dumpy level.
   c) Explain temporary adjustments of dumpy level.
   d) Describe methods to fill data into a field book as well as the reduction of levels by height of collimation and rise and fall methods.

2. **Measurements of horizontal and vertical angles by transit Theodolite**

   a) Describe the main parts of a theodolite and their basic functions.
   b) Explain the relationship between the fundamental lines of a theodolite.
   c) Explain the temporary adjustment of a theodolite.
   d) Explain the methods to measure horizontal angle between lines.
   e) Explain the methods to measure vertical angle.
   f) Explain the errors and precautions to be taken while working with a theodolite.

3. **Measurements of horizontal angles of a triangle by repetition method.**

   a) Explain the procedure of repetition method.

b) Describe the method to fill the data into a field book.
c) Explain the errors which are eliminated by repetition method.
d). Verification of check by repetition method.

4. Computation of horizontal distances and elevations by Tachometry for horizontal and inclined sights.

a. Study about multiplying constant and additive constant of tachometer.
b. Measurement of stadia hair readings.
c. Calculation of horizontal distance with respect to instrument station.
d. Calculation of vertical elevation with respect to line of collimation.
e. Calculation of reduced level when station is in depression and elevation.

5. Radiation and intersection method in plane Table survey.

a. Study about different assoceries of plane table survey.
b. Sketch the layout of site by radiation method
c. Measurement of two point distance by intersection method.
d. Verification of distance by taping

6. Use of box sextant, Abney level and digital plan meter.

a. Study of minor instruments in surveying
b. Describe working and construction.

Group B (Projects)

Project-1:- Theodolite Traverse survey project of a closed traverse with at least four sides.

a. Fixing location of station by chaining and offsetting.
b. Measurement of horizontal angle between station by repetition method
c. Measurement of distance between station points and buildings corner points by taping.
d. Measurement of bearing of station points by prismatic compass.
e. Balancing the traverse at four corner points by Bowditch rule.
f. Drawing the sketch of traverse by applying suitable scale.

Project-2:- Tachometric contouring project with at least two instrument stations at 60 m apart.

a. Study about multiplying constant and additive constant of tachometer.
b. Divide the readings in requisite angle.
c. Measurement of stadia hair readings.
d. Calculation of horizontal distance with respect to instrument station.
e. Calculation of vertical elevation with respect to line of collimation.

f. Calculation of reduced level when station is in depression and elevation.

Project-3:- Road project for minimum length of 200m, including fixing of alignment, profile leveling, and cross sectioning.

a. Reconnaissance survey of site for selection of alignment of road
b. Fixing the alignment on ground by chaining, taping and offsetting at suitable interval.
c. Measurement of staff readings on ground points
d. Calculation of cutting and filling from RL calculation by HI and rise and fall method
e. Drawing the profile of ground and formation line of alignment by applying suitable scale.

Project-4:- Plane table survey project of a closed traverse of minimum four sides

a. Fixing location of station by chaining and offsetting.
b. Measurement of horizontal distance between station points and buildings corner points by taping.

The **Term Work** will consist of:

(i) Field book containing record of all exercises and projects listed above.
(ii) File of full imperial size drawing sheets as mentioned below

1) Theodolite Traverse survey project. 1 sheet
2) Tachometric contouring project……..1 sheet
3) Road project showing L- section, plan of road and typical cross -section…….Min -1 sheet
4) Plane Table Traverse survey project…..1 sheet

Guidelines for ICA :

ICA shall be based on continuous evaluation of student performance throughout semester and term work submitted by the student in the form of field book.

Guide lines for ESE:-

ESE will be based on laboratory field book and sheets submitted by the student. In ESE the student may asked to answer questions based on experiments/assignments. Evaluation will be based on performance in **oral/ practical** examination.

REFERENCES BOOKS

1. Surveying and leveling (vol-I&II) by T.P. Kanitkar, & S.V. Kulkarni, Pune Vidarthi Griha Prakashan, Pune,
2. Surveying Vol. I and Vol .II by B.C.Punmia, Laxmi Publication (P) New Delhi.
3. Principles of surveying by Cliver and clendening
4. Advance surveying , Vol.I & II, Handbook by P.B. Shahani
5. A handbook of accurate surveying methods by S.P.Collins

NORTH MAHARASHTRA UNIVERSITY, JALGAON (M.S.)

Second Year Engineering

(CIVIL ENGINEERING)

Faculty of Engineering and Technology

COURSE OUTLINE

SEMESTER – IV

W.E.F 2013 – 2014

SE (Civil) : Semester - IV

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory		Practical		Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
Engineering Geology	* A/D	3	---	---	3	20	80	---	---	100	3
Fluid Mechanics I	D	3	1	---	4	20	80	---	---	100	4
Theory of Structures I	D	3	1	---	4	20	80	---	---	100	4
Building Design & Drawing	D	3	---	---	3	20	80	---	---	100	3
Surveying II	D	3	---	---	3	20	80	---	---	100	3
Computer Graphics in Civil Engineering lab	B	1	---	2	3	---	---	50	---	50	2
Engineering Geology lab	D	---	---	2	2	---	---	50	---	50	1
Fluid Mechanics I lab	D	---	---	2	2	---	---	25	25	50	1
Building Design & Drawing lab	D	---	---	2	2	---	---	25	25	50	1
Surveying II lab	D	---	---	2	2	---	---	25	25(**PR**)	50	1
Total		**16**	**2**	**10**	**28**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination **ESE: End Semester Examination**
ICA: Internal Continuous Assessment

Note 1: For branches like Chemical Engineering and Biotech Engg, two laboratory hours can be merged to form a four hour slot. Note 2: Out of 3 practical ESE heads, at least 1 head should be practical.

*** E & TC, Mechanical, Automobile & Production Engineering branches shall have group D course and rest of the branches shall have group A course (e.g. Engineering Mathematics-III).**

ENGINEERING GEOLOGY

COURSE OUTLINE

Course Title	Short Title	Course Code
Engineering Geology	**EG**	

Course Description:

This course is designed to enable students to evaluate, to apply and to analyze the relevant geological principles. In this course, the related topics on rock types/classifications, geological structures and geological processes are covered. The principles of Structural geology are introduced mainly to highlight the relevancy of engineering properties of geological materials in designing rock engineering projects. At the end of the course, students acquainted with related knowledge and principles in geology and can be able to apply these knowledge and principles in designing safe and economic engineering structures in rock masses.

	Hours / Week	**No. of Weeks**	**Total Hours**	**Semester Credits**
Lecture	03	13	39	03

Prerequisite Course(s): Elements of Civil Engineering.

Course content

Engineering Geology **Semester-IV**

Teaching Scheme
Lecture: 3 hours / week

Examination Scheme
End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Unit-I: Mineralogy & Petrology **No of Lecture: 7 Hours, Marks: 16**

1. Introduction to the subject: - Objects, scope, rock forming minerals, primary and secondary minerals.
2. Silicate and non silicate minerals', felsic and mafic minerals, essentials and accessories minerals.
3. Origin, texture, structure, classification of igneous rocks, secondary rocks, metamorphic rocks and their engineering applications,
4. Study of common rock types prescribed in practical work.

Unit-II: Structural Geology, Plate Tectonics & Ground water

No of Lect.- 8 Hours, Marks: 16

a) Structural geology: Outcrop, dip and strike, conformeable series, unconformity and overlap.
b) Faults and their types, folds and their types, inliers and outliers.
c) Structural features resulted due to igneous intrusions, concordant and discordant igneous intrusions
d) Joints and their types and Introduction to plate tectonics.
e) Water table and depth zones, relation between surface relief and water table, perched water table
f) Natural springs and seepages, contact springs, hot springs and geysers, artesian wells.

Unit-III: Geomorphology, Historical Geology & Building stones

No of Lect. – 8, Marks: 16

a) Geomorphology: geological action of river, rejuvenation, land forms resulted due to river erosion, deposition and rejuvenation.
b) Physiographic divisions of india and their characteristics, geological history of peninsula, study of formations in peninsula and the significance of their structural characters in major civil engineering activities.
c) Requirements of good building stones, engineering properties of rocks. availability of blocks of suitable size and appearance on mineral composition, textures, structures.
d) Earthquake & its causes, classification, seismic zones of india & geological consideration for constructions of building.

Unit-IV: Preliminary Geological Studies, Remote function, Geo physical exploration.

No of Lect. – 8, Marks: 16

a) Verification of surface data by subsurface exploration, drill holes, test pits, trenches, exploratory tunnels, shafts, adits, drifts, etc.
b) Compilation and interpretation of information obtained from these. correlation of surface data with results of subsurface exploration.
c) Limitations of drilling, comparative reliability of data obtained by drilling and excavation.
d) Engineering significance of geological structures such as stratification, dips, folds, faults, joints, crush zones, fault zones, dykes etc.
e) Landslides and its causes, preventive measures and case studies.
f) Principles of geo physical exploration methods for sub surface survey.

Unit-V: Role of Engineering Geology in Dams and tunneling.

No of Lect. – 8, Marks: 16

a) Preliminary geological investigation for tunnels. important geological consideration while choosing alignment
b) Role of groundwater, geological conditions likely to be troublesome, suitability of common rock type for tunneling, unlined tunnels, case studies.
c) Geological requirements for construction of dams and geological structures influence of geological condition on the choice of type and design of dam.
d) Preliminary geological work on dam sites, favorable and unsuitable geological conditions for locating a dam, precaution to be taken to counteract unsuitable condition
e) Treatment of leaky rocks, faults, dykes, crush zones, joints, fractures, unfavorable dips, etc. and case studies.

Reference Books:

1. R.B. Gupte : A Text Book of Engineering Geology -P.V.G. Publications, Pune.
2. M. Anji Reddy : A Text Book of Remote Sensing and Geographical Information Systems by - 2nd Edition B S Publication.
3. R.Legget : Geology and Engineering - McGraw Hill Book Co., London.
4. Arthur Holmes : Physical Geology -ELBS Publication.
5. Tony Waltham : Fundamentals of Engineering Geology, SPON Press.
6. J.M. Treteth : Geology of Engineers, Princeton, Von. Nostrand.
7. K V G K Gokhale : Text Book of Engineering Geology, B S Publication
8. F G Bell : Fundamentals of Engineering Geology, B S Publication
9. B S Sthya narayanswami, “Engineering Geology”, Dhanpat Rai & Co.
10. P. K. Mukerjee : A text Book of Geology, Calcutta Word Publishers.
11. Blyth F.G.M. A Geology for Engineers, Arnold London.
12. Prabin Singh. Engg. And general Geology. Katson Publishing House.
13. D.S.Arrora: Geology for Engineers, Mohindra Capital Publishing Candigarh.

FLUID MECHANICS I

Course Outline

Course Title	Short Title	Course Code
FLUID MECHANICS I	**FM-I**	

General Objective:

The general objective of course is to teach fluid and flow properties and to analyze and solve fluid problems under static and dynamic conditions. Also it aims to explain flow measurement in pipes, open channels and tanks and to introduce dimensional analysis and similitude to students.

Course Description:

This course provides the elementary level knowledge of Fluid mechanics which includes:-

- Study of Fluid properties.
- Fluid statics – Fluid pressure, buoyancy and floatation and their civil engineering applications.
- Kinematics and dynamics of fluid flow.
- Dimensional analysis and hydraulic similitude.
- Analysis of laminar flow in pipes and measurement of viscosity of liquids.
- Flow measurement by Venturimeters, Pitot tubes, orifices, mouthpieces, weirs and notches.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	3	13	39	3
Tutorial	1	13	13	1

Prerequisite Course(s):

Mathematics (calculus and differential equations), statics and dynamics. Ability to (i) draw free body diagrams, (ii) solve dynamics problems using Newton's laws of motion.

COURSE CONTENT

Fluid Mechanics- I
Semester-IV

Teaching Scheme	**Examination Scheme**
Lecture: 3 hours / week	**End Semester Examination (ESE) : 80 Marks**
	Paper Duration (ESE) : 03 Hours
	Internal Sessional Exam (ISE) : 20 Marks

Unit I **No. of lectures: 07, Marks: 16**

A) **Introduction**: - Scope and applications of fluid mechanics, Newton's law of viscosity, classification of fluids: Newtonian and non-Newtonian fluids, ideal and real fluids.

B) **Physical properties of fluids** – Mass density, specific weight, specific volume, specific gravity, dynamic and kinematic viscosities, compressibility, surface tension, capillarity, vapour pressure.

Unit II - Fluid statics **No. of lectures: 08, Marks: 16**

A) **Fluid pressure measurement: -** Fluid pressure, pressure head, measurement of pressure: - Simple and differential manometers, introduction to mechanical gauges.

B) **Pressure on surfaces: -** Static fluid pressure forces on plane and curved surfaces and their simple civil engineering applications.

C) **Buoyancy: -** Archimedes's principle, buoyancy and flotation, metacentric height, stability of floating and submersed bodies.

Unit III **No. of lectures: 09, Marks: 16**

A) **Kinematics of fluid flow**- Types of fluid flows:–Steady and unsteady; uniform and non uniform; laminar and turbulent; one, two and three dimensional; rotational and irrational flows. Velocity & acceleration for one and three dimensional flows. Stream lines, equipotential lines and flow net, uses and limitations of flow net. Equations of continuity for one and three-dimensional flows.

B) **Dynamics of fluid flow** – Forces acting on fluids in motion. Mention of various equations of motion. Euler's equation of motion and Bernoulli's theorem for one and three dimensional flows, hydraulic gradient line and total energy line, kinetic energy correction factor. Simple applications of continuity and Bernoulli's equations such as Pitot tube and Venturimeter. Introduction to linear momentum principle.

Unit IV **No. of lectures: 07, Marks: 16**

A) **Dimensional analysis and Hydraulic similitude:**– Dimensions of physical quantities, dimensional homogeneity, Buckingham pi-theorem.
Model analysis: Geometric, kinematics and dynamic similitudes, important dimensionless parameters and their significance (Reynolds and Froude numbers only). Model laws: Reynolds and Froude model laws and their applications to simple fluid flow problems.

B) **Laminar flow**: – Laminar flow through pipes- Hagen-Poiseuilli's equation, Stoke's law. Mention of various methods of measurement of viscosity. Reynolds's experiment, transition from laminar to turbulent flow.

Unit V **No. of lectures: 08, Marks: 16**

A) **Flow through opening – Orifices:** Types, coefficients of velocity, contraction and discharge, small and large orifices, completely submerged orifices.
Mouthpieces: Types, external cylindrical mouthpiece.

B) **Flows over notches and weirs** – Rectangular, triangular and trapezoidal notches and weirs, Cipolletti weir, empirical formulae for discharge over rectangular weirs, corrections for velocity of approach and end contractions.

Reference Books:-

1. Fluid Mechanics by Dr. A. K. Jain, Khanna Publishers, Delhi.
2. Hydraulic and Fluid Mechanics by Dr. P.N.Modi , Dr. S.M. Seth, , Standard Publications, Delhi.
3. A Textbook of Fluid Mechanics & Hydraulic Machines by Dr. R.K.Bansal, Laxmi Publications (P) Limited.
4. 1000 Solved Problems in Fluid Mechanics by Dr. K. Subramanya, , Tata McGraw-Hill Publishing Company Ltd., New Delhi.
5. Fluid Mechanics by Dr.Garde and Mirajgaokar.
6. Introduction to Fluid Mechanics and Fluid Machines by Som S K and Biswas G, Tata McGraw-Hill Publishing Company Ltd., New Delhi.
7. Fluid Mechanics by Streeter and Wylie, McGraw-Hill Book Company.

THEORY OF STRUCTURE – I

Course outline

Course Title	Short Title	Course code
Theaory of Structures-I	**TOS-I**	

Course Description:

The object of the subject to analyze statically determinate and indeterminate structures such beams, trusses and arches subjected to external loads. Course focuses on different analytical tools for understanding the behavior of primarily, statically determinate structures, and also of indeterminate structures. It includes computation of deflections, internal axial forces, shear forces, and bending moments in simple trusses, beams, frames and arches. The study of influence line diagram includes identification of positions of load for maximum shear force and bending moments at specified sections.

Lecture	Hours/Week	No. of weeks	Total Hours	Semester Credits
	03	13	39	04
Tutorial	1	13	13	

Course Content

Theory of structures-I **Semester-IV**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week **End Semester Examination (ESE) : 80 Marks**
Tutorial: 1 hour / week **Paper Duration (ESE) : 03 Hours**
Internal Sessional Exam (ISE) : 20 Marks

UNIT-I **(09 Hours, 16 marks)**

a) Deflection of Beams: -

Relation between BM, slope and defection, Introduction to double integration method, Concept of moment area method, Mohr's theorems, Use of moment area method to calculate slope and deflections of beams such as simply supported, over hanging and of uniform cross sections and different cross sections. Conjugate beam method, Application of conjugate beam method to simply supported, overhanging and compound beams.

b)Strain Energy:- Castiglinao's first theorem and its application to find slope & deflection of simple beams and frames.

UNIT-II **(07 Hours, 16 marks)**

a) Deflection of trusses: -

Deflection of statically determinate plane trusses by Castigliano’s first theorem

b) Analysis of redundant trusses by Castiglino's second theorem, lack of fit and temperature changes in members, sinking of supports (degree of indeterminacy maximum upto 2 only).

UNIT-III **(08 Hours, 16 marks)**

a) Fixed Beams:- Concept, advantages and disadvantages, Nature of B.M. Diagrams, Fixed end moment due to various types of loads such as point, uniformly distributed, Uniformly varying, couples for beams, Effect of sinking of support, plotting of B.M. & S.F. diagrams.

b) Continuous Beams: - Analysis of continuous beam by three moment (Clapyeron's theorem) up to three unknowns, Effect of sinking of supports, plotting of B.M. & S.F. diagrams.

UNIT-IV **(07 Hours, 16 marks)**

b) Three hinged arch: - Concept of three hinged arch as a haunched beam, support reactions, B.M., S.F. and axial thrust diagrams for circular and parabolic three hinged arches.

b) Two hinged arches:-

Horizontal thrust at supports. Shear, normal thrust and BM at a point, BM diagrams for parabolic arch due to concentrated load and udl.

UNIT-V **(08 Hours, 16 marks)**

a) Influence lines: - Basic concepts, influence line for reactions, B.M. & S.F. for simply supported, overhanging beams, Calculations for S.F. & B.M. in beam using influence lines.

b) Moving loads: - Introduction, conditions for maximum B.M. and maximum S.F. at a section due to moving point loads, udl longer or shorter than span and train of moving loads, Absolute maximum B.M. & S.F., Construction of Max. S. F. and B.M. diagram.

REFERENCE BOOKS:-

1. Structural analysis Vol –I, II by S.S. Bhavikatti, Vikas Publishing House Pvt. Ltd.
2. Mechanics of structures Vol – II by S. B.Junnarkar and Dr. H.J. Shah, Charotar Publishing House.
3. Analysis of structures (Volume - I & II) by V.N.Vazirani, M.M. Ratwani and Dr. S.K. Duggal, Khanna Publications.
4. Theory of structures by S. Rammamrutham, Dhanpatrai Publishing Company.
5. Basic structural analysis by C.S.Reddy
6. Indererminate structures by C.K.Wang

BUILDING DESIGN AND DRAWING

COURSE OUTLINE

Course Title	Short Title	Course Code
Building Design and Drawing	**BDD**	

Course Description:

This course introduces the student about concepts in building design and drawing such as building definition, types of building, principle of planning, building rules, regulations and byelaws, building ventilation and air-conditioning, necessity of fire protection system, different building services with its importance like electrical, communications, plumbing, solar water heater, planning and designing of residential buildings of load bearing and frame structures, planning and designing of apartments (flats), one point and two point perspective drawings, Planning and designing of various public building buildings.

	Hours / Week	**No. of Weeks**	**Total Hours**	**Semester Credits**
Lecture	03	13	39	03

Prerequisite Course(s): Engineering graphics, Building construction techniques and materials

COURSE CONTENT

Building Design and Drawing **Semester-IV**

Teaching Scheme
Lecture: 3 hours / week

Examination Scheme
End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 04 Hours
Internal Sessional Exam (ISE) : 20 Marks

Unit-I **No. of Lect. – 8, Marks: 16**

1. Introduction:-
   Building definition and types of building as per occupancy, principles of planning of residential buildings, plan sanctioning procedure, building bye laws & its necessity.
2. Ventilation and Air conditioning of buildings:-
   Ventilation: -Necessity of ventilation, functional requirements, systems of ventilation and their choice, movement of wind through building, wind effect etc.

Air conditioning: - Classification, comfort and comfort conditions, principles and system of comfort, object and necessity of air conditioning.

3. Fire protection: - Fire load, fire safety, grading of occupancy by fire load, considerations in fire protection, fire resistant construction & wall openings, fire escape elements.
4. Building services: Its importance, constructional requirements for different building services-like electrical, Tele communication service & plumbing services : Layout of water supply and drainage system, one pipe and two pipe system, storage & disposal arrangement, septic tank, garbage disposal arrangements, solar water heater.

Unit-II **No of Lect. – 7, Marks: 16**

a) Planning and designing of residential buildings (load bearing or frame Structure)
b) Working drawings: - importance and use of all types of working drawings at site.

Unit-III: **No of Lect. – 8, Marks: 16**

a) Planning and designing of apartment houses(flats) (framed Structure only)
b) Perspective drawings : one point and two point perspective drawings

Unit-IV: **No of Lect. – 8, Marks: 16**

a) Planning and designing of Educational buildings, hostel buildings, library buildings, Restaurants, Hotels/lodging-boarding buildings, and primary health centers/hospitals. (frame Structure only)

Unit-V: **No of Lect. – 8, Marks: 16**

a) Planning and designing of bus stand buildings, commercial complex buildings, bank buildings, post office buildings, Community/marriage halls, factory buildings. (frame Structure only)

Note: 1) Theory questions shall be asked on **Units I.**
2) Only drawing questions shall be asked to draw on drawing sheets from **Unit II, III, IV & V**

Reference Books:

1. Building Drawing - M.G. Shah, C.M. Kale, S.Y. Patki - Tata Mcgraw Hills pvt. Ltd.New Delhi.
2. Y.S.Sane - Planning & Designing Building.
3. Building Science and Planning by Dr . S.V. Deodhar
4. National building Code (Latest)

SURVEYING - II

COURSE OUTLINE

Course Title	Short Title	Course Code
Surveying- II	**SUR-II**	

Course Description:

This course introduces the students about concepts in Surveying such as:

- Scope of geodetic surveying and triangulation in civil Engineering society.
- Adjustment of triangulation figure by using different methods
- Terrestrial and Aerial photography for large scale survey
- Distortion and displacement in photography
- Principles of remote sensing and its methods
- Locating of sounding in hydrographic surveying
- Importance and principles of electronic distance meters

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Lecture	03	13	39	03
Tutorial	-	-	-	

Prerequisite Course(s): Surveying- I

Course content

Surveying- II **Semester-IV**

Teaching Scheme
Lecture: 3 hours / week

Examination Scheme
End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Unit-I: Geodetic Surveying: **No of Lect. – 8, Marks: 16**

a) Objects, methods in geodetic surveying

b) Triangulation figure, Strength of figure, Classification of triangulation system

c) Selection of stations, intervisibility of height of station towers, signal and their classification
d) Phase of signals , satellite station and Reduction to centre Eccentricity of signals
e) Base line measurement, Apparatus used, Base net; equipment used for base line measurement, Extension of a base.

Unit-II: Triangulation Adjustments. **No of Lect. – 8, Marks: 16**

a) Kinds of errors; laws of weights,
b) Determination of the most probable values of quantities; The method of least squares; Indirect observations on independent quantities; normal equation; conditioned quantities
c) The probable error and its determination ; distribution of error to the field measurements ,
d) Method of correlates, station adjustment and figure adjustment;
e) Adjustment of a geodetic triangle , figure adjustment of a triangle ; calculation of spherical triangle ;
f) Adjustment of geodetic quadrilateral, Adjustment of a quadrilateral with a central station by method of least squares.

Unit-III: Photogrammetry **No of Lect. – 8, Marks: 16**

a) Objects ; application to various fields, terrestrial photogrammetry (only general idea) and aerial photogrammetry ;
b) Aerial camera;
c) comparison of map and vertical photograph ;
d) Vertical tilted and oblique Photographs ;
e) Concept of principal point nadir point, isocentre, horizon point and principal plane,
f) Scale of vertical photograph; computation of length and height from the photograph;
g) Relief displacement on vertical photograph;
h) Flight planning; ground control ; radial line method;
i) Mirror and lens Stereoscopes.

Unit-IV: Hydrographic Surveying **No of Lect. – 8, Marks: 16**

a) Objects; establishing controls; shore line survey, river surveys;
b) Soundings, tide gauges, Equipment for taking soundings; signals.
c) Nautical sextant; measuring horizontal and vertical angles with the nautical sextant,
d) Sounding party, ranges making the soundings, methods of locating the soundings ;reduction of soundings ,
e) The three point problem and methods of solution.

Unit-V: Remote Sensing **No of Lect. – 7, Marks: 16**

a) Basic principles, importance, scope,
b) Sensors used in remote sensing, platforms,
c) Applications of remote sensing to Civil Engineering.

Use of advance electronics instruments in Surveys:-

a) Study and use of various electronics equipments like EDM and Total station.

Reference Books:

1. Surveying and leveling (vol-II) by T.P. Kanitkar, & S.V. Kulkarni, Pune Vidarthi Griha Prakashan, Pune,
2. Surveying Vol. II and Vol .III by B.C.Punmia, Laxmi Publication (P) New Delhi.
3. Advance surveying by P.Som , B.N.Ghosh, TMH Publication.
4. Surveying by Norman Thomas
5. Elements of Photogrammetry by Paul Richard Wolf, McGraw-Hill Education (India) Pvt Limited.
6. Plane and geopdesic surveying by David Clark, J. E. Jackson
7. Principal of remote sensing by A. N. Patel

COMPUTER GRAPHICS IN CIVIL ENGINEERING

Course outline

Course Title	Short Title	Course Code
Computer Graphics	**CG**	

Course Description:

AutoCAD stands for Automatically Computer Aided Drafting/Designing. It is an electronic tool that enables you to make quick and accurate drawings with the use of a computer. Unlike the traditional methods of making drawings on a drawing board, with CAD you can sit back in an easy chair and create wonderful drawings just by clicking the buttons of a keyboard. Moreover, drawings created with CAD have a number of advantages over drawings created on a drawing board. CAD drawings are neat, clean and highly presentable. Electronic drawings can be modified quite easily and can be presented in a variety of formats.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Lecture	01	13	13	-

Prerequisite Course(s): Basic Knowledge of Computer.

Course Content

Computer Graphics **Semester-IV**

Teaching Scheme

Lecture: 1 hour/ week

Unit-I

Introduction to AutoCAD (Automatically Computer Aided Drafting/Designing)
No of Lectures: 7 Hours

a) Introduction to CAD, Introduction to drafting software.

b) Explanation to precision Drawing & Drawing tools, Geometric Shapes, Basic Printing, Editing Tools. .

Unit-II

Engineering and Architectural Views **No of Lect.- 6Hours**

a) Engineering and Architectural Views, Drafting Views, Layers, Templates & Design Center, Dimensioning, Blocks

b) Office Standards, Drafting symbols, Introduction to 3D.

COMPUTER GRAPHICS IN CIVIL ENGINEERING

Lab course outline

Course Title	Short Title	Course Code
Computer Graphics	**CG LAB**	

ICA (Term Work) : 50 Marks

Course Description:

In this laboratory course emphasis is given on understanding the practical oriented knowledge related to civil engineering software AutoCAD and their applications used for drawing .

Practical	**Hours/Week**	**No. Of Weeks**	**Total Hours**	**Semester Credits**
	2	13	26	02

Total Semester Credits: 2

Prerequisite Course(s): Basic knowledge of Computer.

Lab course content

Term Work

Term Work shall consist of drawings on A4 size sheets of the following

1) Practice assignments on CAD drafting tools (Min. 2 Assignments). (06 Hours)
   a) Hands on practice on Basic AutoCAD software.
   b) One drawing showing use of Basic CAD commands.
   c) One Drawing sheet showing various objetcs such as Circle, Arc,Rectangle, Ellipse,Polygon,Chamfer,Mirror etc.
   d) Familiar with AotoCAD interface commands

2) Detailed Plan of 2 BHK house. (12 Hours)
a) Foundation plan.
b) Typical Floor Plan.
c) Elevations.
   1) Drawing of 2BHK Plan (Separate plan for individual should be drawn)
   2) A foundation plan of drawn 2BHK showing various column footings.
   3) Elevation of floor plan showing various structural elements of building.
   4) Drawing of sectional elevation passing through a staircase

3) Detailed drawing of structural elements from given data. (8 Hours)
a) Detailing of RCC isolated column footing
   To draw RCC Isolated Column Footing showing each component as per data given.

b) Detailing of RCC column and beam.
   Drawing of RCC Column & Beam showing each component description as per data given.

Guide lines for ICA

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

ENGINEERING GEOLOGY LAB

Lab course outline

Semester-IV

Course Title	Short Title	Course Code
Engineering Geology	**EG LAB**	

ICA (Term Work): 50 Marks

Course Description:
In this laboratory course emphasis is given on understanding the practical oriented knowledge related to civil engineering and their applications in the field.

Laboratory	**Hours/Week**	**No. Of Weeks**	**Total Hours**	**Semester Credits**
	2	13	26	1

Total Semester Credits: 1

Prerequisite Course(s): Elements of Civil Engineering

Lab Course Content

Following experiments are to be performed. Term works shall consist of journal giving details of the experiments performed.

1. Identification of following minerals in hand specimens.
   Quartz and its varieties, common varieties of cryptocrystalline and amorphous silica, orthoclase, plagioclase, muscovite, biotite, zeolites, calcite, gypsum, fluorite, barites, tourmaline, beryl, asbestos, talc, kyanite, garnet, galena, magnetite, haematite, limonite, iron pyrites, chromite, bauxite.
   a. To know chemical composition of mineral.
   b. To know Mohs Scale of Hardness of standard minerals.
   c. To identify colour, streak, cleavage, fracture, luster, hardness, crystal form etc.
   d. To identify special property of mineral
   e. Identify mineral name based on physical properties.
2. Identification of following different rock types in hand specimens.
   Granites, Syenites, Diorites, Gabbros, Rhyolites, Trachytes, Andesites, Basalts, Varieties of Deccan Trap rock, Volcanic breccias, Pegmatites, Dolerites, Graphic granites, Laterites, Bauxites, Conglomrates, Breccias, Sand stones, Quatzites, Grits, Arkose, Shales, Chemical and organic lime stone. Marbles, Quartzites, Varieties of Gneisses, Slates, Phyllites and varieties of Schists.
   a. To know colour, texture/structure of rock specimen
   b. To identify mineral composition of rock specimen
   c. Based on mineral composition classify rock specimen.

d. Identify rock name based on properties.

3. Construction of geological section from contoured geological maps.
   a. To draw geological section from geological contour map.
   b. To identify various structural features such faults, folds, joints, dykes etc. from the section.
   c. To identify the nature of topography below the ground level.
4. Interpreting geological features without drawing section
   a. To identify geological features without drawing section
   b. Identifying faults, folds, joints, divisional planes etc.
5. Solution of engineering geological problems such as alignment of dam, tunnels, roads, canals, bridges, etc. based on geological maps.
   a. To draw the geological section from contour geological map
   b. To find out the solution of geological problems based on geological maps.
   c. To find the alternative solution or exact solution related to geological problems.
6. Logging of drill core and interpretation of drilling data with graphical representation of core log.
   a. To represent the Core-Box data in the form of Core-log & representing the same in the form of Graph by using Litholog OR
   b. To solve Numerical based on core data with graphical representation of core-log.
7. One site visit is desirable to study geology and its engineering applications, submission of field report.
   1. To get acquainted with various geological structural phenomenons, one site visit is important.
   2. Can get knowledge of faults, folds, dykes, joints etc. in the context of geology & its applications on engineering point of view.
   3. Beneficial for determining amount of dip, apparent dip in the field.

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

FLUID MECHANICS I LAB

Lab course content

(Note: All practical exercise in each group.)

Course Title	Short Title	Course Code
Fluid Mechanics I Lab	**FM I lab**	

ICA (Term Work) : 25 Marks

ESE (Oral) : 25 Marks

Semester-IV

Course Description:

This laboratory covers experiments related to measurement of fluid and flow properties and basic principles of statics, kinematics and dynamics of fluid flow. These include:-

- Measurement of viscosity of liquids.
- Measurement of fluid pressure by manometers.
- Buoyancy and floatation.
- Study of Bernoulli's theorem.
- Measurement of discharge using Venturimeter, orifice and notch.
- Study of flow net by electrical analogy method.
- Study of laminar flow in Reynolds apparatus / Heleshaw's apparatus.
- Study of momentum principle.

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Laboratory	2	13	26	1

General Objective:

In this laboratory students will be introduced to the applications of basic principles of fluid mechanics to measure fluid and flow properties such as viscosity, pressure, discharge in pipes, open channels and tanks. Also students are introduced to verification and simple applications of equations of continuity, energy and momentum.

Objective to develop following Intellectual skills:

1. To understand basic laws of fluid statics and equations of energy and momentum and to apply the same to solve problems.
2. To learn use of Venturimeter, orifice, notch for discharge measurement.
3. To identify principles and working of different apparatus in laboratories.

Objective to develop following Motor skills:

1. Ability to draw diagrams of equipments and graphs.

2. Ability to perform the experiments and record the observations of pressure, weight, temperature, volume, time, discharge, voltage and current etc.
3. Ability to apply various discharges and measure the corresponding effects.
4. Ability to apply the basic principles in various field conditions.

Outline of Content: These experiments contain

1. Measurement and study of variation of viscosity of oil with temperature.

a. To calculate kinematic viscosity of oil at different temperatures by measuring time to collect 50 ml of oil from the cylinder of viscometer.
b. To plot graph of viscosity versus temperature and hence to find the viscosity of the oil at room temperature.

2 Study of simple and differential manometers.

a. To measure fluid pressure at any point by simple U – tube mercury manometer.
b. To measure difference of pressure by differential U – tube mercury manometer.

3 Buoyancy: metacentric height of ship model.

a. To calculate metacentric height of cargo and war ship by knowing total weight of ship, movable weight and measuring its distance from centre and angle of tilt of ship.
b. To compare and analyze metacentric heights of cargo and war ships.

4 Study of Bernoulli's theorem.

a. To measure pressure by piezometers at various points along the conduit.
b. To calculate discharge through the conduit by measuring volume of water and the required time.
c. To calculate velocities at the points by knowing the discharge and the cross sectional areas of the conduit at these points.
d. To compute total energy of flow at these points and thus to verify Bernoulli's theorem and calculate losses of energy.
e. To plot graphs of total energy head and piezometric head and length of the conduit.

5 Calibration of Venturimeter.

a. To calculate discharge experimentally through the venturimeter by measuring volume of water and the required time.

b. To compute the discharge analytically by knowing the diameters of inlet and throat and measuring the pressure difference between the inlet and throat by differential mercury manometer.
c. To calculate the coefficient of discharge of the venturimeter.
d. To plot the graph of discharge and the pressure head difference and hence to evaluate the calibration equation for the venturimeter.

6 Electrical analogy method.

a. To identify equipotential lines by observing equal voltage at different points and

hence to draw the same.

b. To draw, in the same way, the streamlines and hence the flow net.

c. To analyze the flow net at different cross sectional areas of the flow passage.

7 Study of laminar flow in Reynolds apparatus.

a. To calculate discharges through the conduit by measuring volume of water and the required time.

b. To calculate velocity and hence the Reynolds number of flow.

c. To observe and analyze the dye filament and hence the type of flow as laminar / turbulent.

8 Determination of coefficients of Orifice / Mouthpiece

a. To calculate discharge experimentally through the orifice by measuring volume of water and the required time.

b. To compute the discharge analytically by knowing the diameter of orifice and measuring the head over the orifice

c. To measure coordinates of any point on the jet.

d. To calculate the coefficients of discharge, velocity and contraction.

e. To plot the graph of discharge and the head and hence to evaluate the calibration equation for the orifice.

9 Calibration of notch.

a. To calculate discharge experimentally through the notch by measuring volume of water and the required time.

b. To compute the discharge analytically by knowing the dimensions of the notch and measuring the head over the notch.

c. To calculate the coefficient of discharge.

10 Study of Impact of jet.

a. To calculate discharge through the nozzle by measuring volume of water and the required time.

b. To find the velocity of the jet striking the plate by knowing the diameter of nozzle.

c. To compute analytically the force exerted by the jet on the plate by using the momentum principle.

d. To calculate experimentally the force exerted by the jet on the plate by measuring the weights and the liver arm.

e. To compute the coefficient of impact of the plate and thus to discuss the momentum principle and its applications.

11 Visit to WALMI, Aurangabad or any other such relevant place.

a. To study measurement of discharge on field (in open channels) by using triangular and other notches.

Note: The Term Work will consist of a laboratory journal consisting of eight experiments/assignments. At least eight out of 11 experiments/assignments should be performed.

Guidelines for ICA :

ICA shall be based on continuous evaluation of students' performance throughout the semester and practical assignments submitted by the students in the form of journal.

Guide lines for ESE:-

ESE will be based on laboratory journal submitted by the student. In ESE the student may asked to answer questions based on experiments/assignments. Evaluation will be based on performance in **oral** examination.

Reference Books:-

1. Fluid Mechanics by Dr. A. K. Jain, Khanna Publishers, Delhi.
2. Hydraulic and Fluid Mechanics by Dr. P.N.Modi , Dr. S.M. Seth, , Standard Publications, Delhi.
3. A Textbook of Fluid Mechanics & Hydraulic Machines by Dr. R.K.Bansal, Laxmi Publications (P) Limited.
4. Fluid Mechanics by Dr.Garde and Mirajgaokar.
5. Introduction to Fluid Mechanics and Fluid Machines by Som S K and Biswas G, Tata McGraw-Hill Publishing Company Ltd., New Delhi.

BUILDING DESIGN AND DRAWING

Lab course outline

Semester-IV

Course Title	Short Title	Course Code
Building Design and Drawing	**BDD**	

Practical: 2 Hours/Week **ICA (Term Work) : 25 Marks**
ESE (Oral) : 25 Marks

Course Description:
In this laboratory course emphasis is on the planning, design and drawing of various class buildings.

	Hours/Week	No. Of Weeks	Total Hours	Semester Credits
Laboratory	2	13	26	1

Total Semester Credits: 1

Prerequisite Course(s): Engineering Graphics, Building construction techniques

Lab course content

Group A

a. Planning of a small residential buildings/bungalow/duplex from given data (load bearing or framed structure).

a. Draw furniture arrangement
b. Draw front elevation, sections (preferably through staircase)
c. Site plan, built up area calculations
d. Schedules of area & openings.

b. Perspective view of plan drawn in sheet no- 1 with suitable scale

a. Draw real perspective view of residential building in sheet No. 1

Group B

Project work

Project work shall consist of preparation of working drawings after planning and designing of any one building mentioned in Unit II, III, IV & V. Every student shall select different type mentioned in above units; individual work is expected from the students.

1. **Layout plan of project building**
   a. Showing internal roads ,other structures (if any) Compound walls
   b.Entrance gate, garden, electrical Line & poles, Tree plantation etc. (project sheet no -1)

2. **Typical floor plans.**
   a. Draw all details units of each floor.

3. **Foundation Plan**
   a. Draw all foundation details
4. **Front and Road side elevations**
   a. Draw all detail elevation with elegance
5. **Sections.**
   a. Draw section through staircase and toilet with all constructional details
6. **Layout plan showing water supply and drainage arrangements**
   a. Draw plan showing water supply line from municipal connection to various required tap connections within project building
7. **Drawings-**
   a. Layout/Floor plan and elevation using computer drafting software on A4 size sheets.
   b. Assembly & dissembling of starter.
   c. Connection of starter according to wiring diagram.
8. **Line plans –**
   a. Various public buildings. (any five types) using computer drafting software on A4 size Sheets.
9. **Visit report-**
   a. Report regarding visit of any advanced building construction site, preferably visit to the site of building given for the project work with photos/drawings etc.
   (visit is mandatory)

Guidelines for ICA:
ICA shall be based on continuous evaluation of students' performance throughout the semester and term work drawing sheets submitted by the students.

Guide lines for ESE:
ESE will be based on drawing sheets submitted by the student. In ESE the student may be asked to answer questions based on term work /assignments. Evaluation will be based on performance in **oral** examination.

Reference Books:

1. Building Drawing - M.G. Shah, C.M. Kale, S.Y. Patki - Tata Mcgraw Hills pvt. Ltd.New Delhi.
2. Y.S.Sane - Planning & Designing Building.
3. Building Science and Planning by Dr . S.V. Deodhar
4. National building Code (Latest)

Surveying- II
Lab course outline

Semester-IV

Course Title	Short Title	Course Code
Surveying- II LAB	**SUR-II LAB**	

ICA (Term Work) : 25 Marks
ESE (Oral) : 25 Marks

Course Description:
It covers experiments related to measurement of horizontal angle, vertical angle, oblique angle, horizontal distance by using 1" theodolite . Use of nautical sextant, stereoscope and EDM/ Total station.

	Hours/Week	No. Of Weeks	Total Hours	Semester Credits
Practical	2	13	26	1

Total Semester Credits: 1

Prerequisite Course(s): Surveying-1

Lab course content

1. **Measurement of horizontal and vertical angles by One Second Theodolite**

a. Study the component parts of One Second Theodolite.
b. Measurement of horizontal angles by face left and right position.
c. Measurement of vertical angles by face left and right position.

2. **Measurement of horizontal angles by reiteration method.**

a. Measurement of horizontal angles by face left and right position.
b. Verification of check by reiteration method.

3. **Study and use of mirror stereoscope and finding out the air base distance**

a. Find out the location of principal point on photograph
b. Fix the photograph along the line of principal point and conjugate principal point
c. Measurement of air base distance by mirror sterescope

4. **Hydrographic survey**
i) Study and use of nautical sextant for measurement of angles.
ii) Solution of three point problem.

a. Study of components parts of nautical sextant
b. Measurement of horizontal, vertical and oblique angle
c. Find out the location of station point by three well defined points (three point problem)

4. **Measurement of angles and elevation by Total Station / Study and use of E.D.M**

a. Study of components parts of total station
b. Measurement of horizontal and vertical angles by total station
c. Measurement of vertical elevation by total station
d. Measurement of horizontal distance by total station.

Note: The practical examination will be based on the above exercises.

Guidelines for ICA:
ICA shall be based on continuous evaluation of students' performance throughout the semester and practical assignments submitted by the students in the form of field book.

Guide lines for ESE:-
ESE will be based on laboratory field book submitted by the student. In ESE the student may asked to answer questions based on experiments/assignments. Evaluation will be based on performance in **oral/ practical** examination.

REFERENCE BOOKS –

1. Surveying and leveling (vol-II) by T.P. Kanitkar, & S.V. Kulkarni, Pune Vidarthi Griha Prakashan, Pune,
2. Surveying Vol. II and Vol .III by B.C.Punmia, Laxmi Publication (P) New Delhi.
3. Advance surveying by P.Som , B.N.Ghosh, TMH Publication.
4. Surveying by Norman Thomas
5. Elements of Photogrammetry by Paul Richard Wolf, McGraw-Hill Education (India) Pvt Limited.
6. Plane and geopdesic surveying by David Clark, J. E. Jackson
7. Principal of remote sensing by A. N. Patel

Syllabus

S.E. Chemical Engineering

(With effect from 2013-14)

Faculty of Engineering and Technology

North Maharashtra University, Jalgaon

NORTH MAHARASHTRA UNIVERSITY, JALGAON
STRUCTURE OF TEACHING & EVALUATION
S.E. (CHEMICAL ENGINEERING) W.E.F.2013-2014

SEMESTER III

COURSE CODE	NAME OF THE COURSE	GROUP	TEACHING SCHEME				EVALUATION SCHEME					CREDITS
							THEORY		PRACTICAL		TOTAL	
			THEORY HRS/week	TUTORIAL HRS/week	PRACTICAL HRS/week	TOTAL	ISE	ESE	ICA	ESE		
	Engineering Mathematics-III	A	3	1	--	4	20	80	--	--	100	4
CHL 301	Chemical Engineering Materials	B	3	--	--	3	20	80	--	--	100	3
CHL 302	Fluid Flow Operation	D	3	1	--	4	20	80	--	--	100	4
CHL 303	Applied Inorganic Chemistry	D	3	--	--	3	20	80	--	--	100	3
CHL 304	Applied Organic Chemistry	D	3	--	--	3	20	80	--	--	100	3
	Soft Skills-III	C	1	--	2	3	--	--	50	--	50	2
CHP 305	LAB Chemical Engineering Materials	B	--	--	2	2	--	--	50	--	50	1
CHP 306	LAB Fluid Flow Operation	D	--	--	2	2	--	--	25	25(OR)	50	1
CHP 307	LAB Applied Inorganic Chemistry	D	--	--	2	2	--	--	25	25	50	1
CHP 308	LAB Applied Organic Chemistry	D	--	--	2	2	--	--	25	25	50	1
	TOTAL		**16**	**2**	**10**	**28**	**100**	**400**	**175**	**75**	**750**	**23**

SEMESTER IV

COURSE CODE	NAME OF THE COURSE	GROUP	TEACHING SCHEME				EVALUATION SCHEME					CREDITS
							THEORY		PRACTICAL		TOTAL	
			THEORY HRS/week	TUTORIAL HRS/week	PRACTICAL HRS/week	TOTAL	ISE	ESE	ICA	ESE		
CHL 401	Chemical Engineering Processes-I	D	3	--	--	3	20	80	--	--	100	3
CHL 402	Process Calculations	D	3	1	--	4	20	80	--	--	100	4
CHL 403	Mechanical Operation	D	3	1	--	4	20	80	--	--	100	4
CHL 404	Applied Physical Chemistry	D	3	--	--	3	20	80	--	--	100	3
CHL 405	Chemical Engineering Processes-II	D	3	--	--	3	20	80	--	--	100	3
CHP 406	*LAB Computer Applications	B	1	--	2	3	--	--	50	--	50	2
CHP 407	#LAB Chemical Processes	D	--	--	2	2	--	--	50	25	75	1
CHP 408	LAB Mechanical Operation	D	--	--	4	4	--	--	50	25(OR)	75	2
CHP 409	LAB Applied Physical Chemistry	D	--	--	2	2	--	--	25	25	50	1
	TOTAL		**16**	**2**	**10**	**28**	**100**	**400**	**175**	**75**	**750**	**23**

NOTE: As Mechanical Operation practical requires 4 hrs workload for performance of practical hence two laboratory hours are merged to form a four hours slot.

*computer based Numerical Methods in Chemical Engineering.

should include practicals of Chemical Engineering Processes-I & Chemical Engineering Processes-II.

S.E. Chemical Engineering

Semester-III

Faculty of Engineering and Technology

North Maharashtra University, Jalgaon

Course Outline

Engineering Mathematics -III | **EM-III**

Course Title | Short Title | Course Code

Course Description:

This course is aimed at introducing the fundamentals of basic Mathematics to undergraduate students. The background expected includes a prior knowledge of Mathematics from first year engineering or diploma and familiarity with various laws, principles and theories. The goals of the course are to understand the basic principle of Mathematics and its application in different area.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	**03**	**15**	**45**	**03**
Tutorial	**01**	**15**	**15**	**01**

Prerequisite Course(s): EM-I, EM-II/ Diploma Mathematics.

General Objective:

The basic necessity for the foundation of Engineering and Technology being Mathematics, the main aim is to teach mathematical methodologies and models, develop mathematical skill and enhance thinking and decision making power of student.

Learning Outcomes: After completion of this course learner will be able to:

1. Apply knowledge of mathematics in engineering and technology.

2. Identify, formulate and solve engineering problems.

3. Design Mathematical models for engineering problems and solve them.

SE Chemical Engineering **Semester – III**

Engineering Mathematics-III
(Course Content)

Teaching Scheme
Theory : 3 hours/ week
Tutorial : 1 hour/ week

Examination Scheme
End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Examination (ISE) : 20 Marks

UNIT-I: Linear Differential Equations: **(08 Hours, 16 marks)**

- Solution of LDE of order n with constant coefficients.
- Method of variation of parameters (Only second order).
- Cauchy's linear equation.
- Legendre's linear equation.

UNIT-II: Applications of Linear Differential Equations and Partial Differential equations

(08 Hours, 16 marks)

- Applications of linear differential equations to Chemical Engineering.
- Applications of Partial Differential equations to

  i) One dimensional heat flow equation $\frac{\partial u}{\partial t} = C^2 \frac{\partial^2 u}{\partial x^2}$

  ii) Two dimensional heat flow equation $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial y^2} = 0$

UNIT-III: Laplace Transform **(08 Hours, 16 marks)**

- Definition and Existence of Laplace transforms.
- Laplace Transform of elementary/standard functions.
- Theorems & Properties of Laplace Transform (without proof).
- Inverse Laplace Transform.
- Laplace Transform of Unit step function.
- Solution of differential equations using LT.

UNIT-IV: Statistics and Probability distributions (08 Hours, 16 marks)

- Introduction to Mean, Mode, Median standard deviation, Variance, Coefficient of variation.
- Moments, Skewness and kurtosis.
- Correlation and Regression.
- Binominal Distribution.
- Poisson distribution.
- Normal distribution.

UNIT-V: Vector Calculus (08 Hours, 16 marks)

- Introduction to Gradient, Divergence, Curl, Solenoidal and Irrotational vector fields.
- Vector integration: Line Integral, Surface and Volume integrals.
- Gauss's, Stoke's and Green's Theorems (without proof).

REFERENCE BOOKS:

1. H.K. Dass - Advanced Engineering Mathematics (S. Chand Publication) New Delhi.
2. Erwin Kreyszig - Advanced Engineering Mathematics (Wiley Eastern Ltd.)
3. B.S. Grewal - Higher Engineering Mathematics, Khanna Publication, Delhi
4. Wylie C.R. & Barrett - Advanced Engineering Mathematics - Mc Graw Hill
5. B.V. Raman - Engineering Mathematics - Tata Mc- Graw – Hill.
6. A Text Book of Engineering Mathematics, By N. P. Bali, Laxmi Publication.

Course Outline

Chemical Engineering Materials **CEM** **CHL 301**
Course Title Short Title Course Code

Course Description: This course provides the knowledge of materials to undergraduate engineering students, and is designed to strengthen the fundamentals so that they can build their own interface of material selection in chemical industries with their industrial applications in the branch of chemical engineering.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	03	15	40	03

Prerequisite Course(S): Engineering Chemistry-I&II

General Objectives:

1. To introduce the basics of material science and its significance in chemical process industry.
2. To study the metallurgical & mechanical properties of materials in chemical process industry.
3. To study industrially important materials.

Learning Outcomes:

Students completing this course will able to know the sources and importance of materials in context to chemical process industries. They will also study the technique of selection of linings to be used in chemical process industries. Students will be also in a position to identify industrially important materials on the basis of their mechanical, physical and chemical properties.

SE Chemical Engineering Semester – III

Chemical Engineering Materials

(Course Content)

Teaching Scheme

Theory : 3 hours/ week

Practical : 2 hour/ week

Examination Scheme

End Semester Examination (ESE) : 80 Marks

Paper Duration (ESE) : 03 Hours

Internal Sessional Examination (ISE) : 20 Marks

Internal Continuous Assessment (ICA) :50 Marks

UNIT-I **No. of Lect. – 08, Marks: 16**

Introduction to materials and their properties:

Simple stresses and strains, Concept of stress, strain, shear stress, shear strain, Hooks law, Elastic limit, stress-strain curve for mild steel and elastomeric materials, factor of safety, Poisson's ratio, Strain energy due to axial load and impact. Introduction to determination of mechanical properties of materials ASTM methods.

UNIT-II

No. of Lect. – 08, Marks: 16

Metallic Materials:

Cast iron, Wrought iron and steel, effect of addition of elements such as Si, C,P, Mn,N to Iron. Elastic and plastic deformation, heat treatments alloys such as stainless steel, brass, bronze, duralumin, alnico, Nichrome, solder material.

UNIT-III **No. of Lect. – 08, Marks: 16**

Selection of materials for fabrication and erection of chemical plant:

Testing of materials, destructive and nondestructive tests, structure of atom and chemical bonds, crystal structures and their influence on material properties, Deformation and slip processes

UNIT-IV **No. of Lect. – 08, Marks: 16**

Electrical and Magnetic Materials

Factors affecting the resistivity of conductors, properties of materials such as Ag, Cu, Al, Nichrome and Ca as dielectric characteristics, insulating materials such as mineral oil, PVC, Mica fibers, glass and asbestos, Magnetisation, soft and hard magnetic materials such as a silicon iron, Alnico types alloys and ferrites.

UNIT-V **No. of Lect. – 08, Marks: 16**

Selection of materials and linings

1. Selection of Material of Construction
a) Selection materials of construction for sulfuric acid, Nitric acid, Phosphoric acid & phosphate fertilizers, Hydrogen & Ammonia plants.
b) Selection of materials for Urea synthesis reactors and CO_2 absorption systems.
2. Linings for process equipments
Metal lining, glass linings, ceramic linings & plastic linings.
Glassed steel for process equipment, Thermomechanical properties of glass lined equipments. Membrane linings for vessels holding corrosive liquids.

Textbooks:

1 R.B. Gupta, Material science, Satya Prakashan, 1981
2. V.K. Manchanda, A text book of material science.New India Publishing House
3. V. Raghavan, Material science and engineering, Prentice Hall of India
4. James F. Shacketford, Introduction to material science, McMillan publishing company, New York ISBN 1990.
5. D.Z. Jestrazebaski, Properties of Engg. Materials, 3rd Ed. Toppers.Co. Ltd.
6. J.L.Lee & Evans "Selecting Engineering materials for chemical & process plants" Business Works 1978.
7. Materials Engineering-II-Controlling corrosion in process equipments, Edited by Kenneth J. McNaughton and staff of Chemical Engineering, McGraw Hill Publication Co. ,New York,N.Y.

References:

Don W. Green, Perry's Chemical Engineers Handbook, 8th Edn., McGraw-Hill

Course Outline

Fluid Flow Operation | **FFO** | **CHL 302**
Course Title | Short Title | Course Code

Course Description:

This course provides the students basic understanding of fluids (liquids and gases) and the forces on them. Fluid mechanics can be divided into fluid statics, the study of fluids at rest; fluid kinematics, the study of fluids in motion; and fluid dynamics, the study of the effect of forces on fluid motion. It includes fluids transportation, filtration, and solids fluidization.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	15	40	03
Tutorial	01	15	13	01

Prerequisite Course(S): - Engineering Mechanics, Mathematics

General Objectives:

1. To study fluid properties
2. To study velocity concept, the continuity equation, Eulers equation of motion a long streamline, Bernoullis equations for different conditions.
3. To study flow through pipeline system: Reynolds experiment, Laws of friction, Major and minor losses, friction factor chart, effect of heat transfer on friction factor, distribution of flowing fluids through branched pipes, hydraulic gradient line and total energy line.
4. To understand flow of compressible fluids, Continuity equation, total energy balance, mechanical energy balance, ideal gas equations, flow past immersed bodies , drag coefficient-friction in flow through bed of solids and Boundary layer theory:
5. To study flow and pressure measurement
6. To understand pumping of fluids

Learning Outcomes:

After completing the course the students will able to understand the role of mechanical and hydro dynamical unit operations in the field of chemical engineering. The students will also understand key concepts and fundamental principles, together with the assumptions made in their development, pertaining to fluid behavior, both in static and flowing conditions. The students will learn to deal effectively with practical engineering situations, including analysis and design of engineering systems and devices involving fluids and flow. Students will clearly understand the knowledge of piping & pumping system which is important in chemical industries.

SE Chemical Engineering **Semester – III**

Fluid Flow Operation
(Course Content)

Teaching Scheme

Theory : 3 hours/ week
Practical : 2 hour/ week
Tutorial : 1 hour/ week

Examination Scheme

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Examination (ISE) : 20 Marks
Internal Continuous Assessment (ICA) : 25 Marks
End Semester Examination (ESE) (OR):25 Marks

UNIT-I **No. of Lect. – 08, Marks: 16**

Fundamental concepts of fluid flow, mechanism of compressible and non compressible fluid flow, equation of continuity, Reynolds number, significance, Bernoulli's theorem, distribution of velocities and fluid flow profiles, friction factor and friction losses in pipes, roughness factor and its significance, pipe fittings, equivalent length of fittings etc. Energy losses due to sudden contraction and expansion.

UNIT-II **No. of Lect. – 08, Marks: 16**

Boundary layer theory, Velocity profile and boundary layer growth along a flat plate, thickness of boundary layer (definition and formulae only), separation of boundary, boundary layer calculations for turbulent flows.
Dimensional analysis and model studies: Dimensional analysis, Buckingham's PI theorem, dimensionless numbers, application to fluid flow problem.

UNIT-III **No. of Lect. – 08, Marks: 16**

Flow measuring devices for incompressible and compressible fluids: orificemeter, venturimeter, pitot tube, rotameters, notches and weirs, gas flow meters, coefficient of discharge and calculations.

UNIT-IV **No. of Lect. – 08, Marks: 16**

Transportation of fluids, reciprocating and centrifugal pumps, pump characteristics, Diaphragm pumps, rotary pumps, screw pumps, gear pumps, pump power calculations, pump selection and trouble shooting of pumps, priming, cavitation , NPSH of pumps.

UNIT-V **No. of Lect. – 08, Marks: 16**

Fluidization, aggregate and particulate fluidization, minimum fluidization velocity, entrainment in fluidization. Packed Bed, pressure drop in packed beds, packing materials and their selection criteria, Loading and flooding in packed beds, Kazenger karma equation,- Industrial application.

Textbooks:

1) Dr.R.K. Bansal, Fluid Mechanics: Laxmi Publications, New Delhi.
2) Coulson J.M. and Richardson J.F.; Backhurst J.R. and Harker J.H.; Chemical Engineering, Vol. I , II & IV, Publishers: Butterworth - Heinmann, 2001-2002.
3) R.P.Vyas Fluid Mechanics, Denett Publication.
4) W.L. McCabe & J.C. Smith, Unit operations in chemical engineering: McGraw Hill/Kogakusha Ltd
5) I P. Chattopadhyay, Unit operations of chemical engineering-volume I: Khanna Publication New Delhi, 2nd edition 1996.

References:

Don W. Green, Perry's Chemical Engineers Handbook, 8th Edn., McGraw-Hill

Course Outline

Applied Inorganic Chemistry **AIOC** **CHL 303**
Course Title Short Title Course Code

Course Description:

This course provides the students basic understanding of theoretical inorganic chemistry and to apply this understanding in how solid-state inorganic materials are used in current and emerging applications.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	**03**	**15**	**40**	**03**

Prerequisite Course(S): Engineering Chemistry-I & II

General Objectives:

1. To differentiate between the essential features and properties of covalent, ionic and metallic bonding & the concept of hybridization and its types.
2. To study the atomic orbital concept, molecular orbital theory, VSEPR theory of chemical bonding.
3. To recognize different types of transition metals and recall their industrially important compounds with basic properties.
4. To study basics of metallurgical operations for extracting metals from ores.
5. To know the Gibb's phase rule with basic terms involved in it and its importance.
6. To study the construction of phase diagrams for alloy systems.
7. To study the inorganic engineering materials & composites.

Learning Outcomes:

Students completing this course will able to differentiate between ionic and covalent interactions observed in molecules. They would also able to construct molecular orbital diagrams for simple molecules and will predict the shapes of small molecules based on VSEPR theory. They will also identify the engineering materials best suited for particular application in industry.

SE Chemical Engineering **Semester – III**

Applied Inorganic Chemistry
(Course Content)

Teaching Scheme
Theory : 3 hours/ week
Practical : 2 hour/ week

Examination Scheme
End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Examination (ISE) : 20 Marks
Internal Continuous Assessment (ICA) : 25 Marks
End Semester Examination (ESE) (PR):25 Marks

UNIT-I **No. of Lect. – 08, Marks: 16**

Chemical Bonding:
Ionic bond : The ionic model, Lattice energy, The Born- Haber cycle, Applications of lattice energy.
Metallic bond: Electron sea model , explanation of metallic properties on the basis of electron sea model.
Covalent bond: Polarity in covalent bonds, important characteristics of covalent bond : Bond length, bond angle, bond strength, Atomic orbital overlap concept, Valence bond & Molecular Orbital treatment of covalent bond, VSEPR theory.
Hybridisation , Wander Wall's forces.
Hydrogen bond: Intramolecular & intermolecular hydrogen bonding.

UNIT-II **No. of Lect. – 08, Marks: 16**

Principal & processes of metallurgy
Occurrence of metals, Mineral wealth of India, Ore dressing, Roasting, Calcination, Smelting, Fluxes, Slag, Types of Furnaces , Refining of metals.
Metallurgical Industries:
Iron & Steel Industries: Production of Pig Iron.
Production of Steel, Heat treatment of steel by annealing, Hardening, Tempering & by normalising
Aluminium Industries: Purification of alumina from bauxite by Bayer process, Production of Aluminium by electrolytic reduction of alumina.

UNIT-III **No. of Lect. – 08, Marks: 16**

Transition metal Chemistry:
Introduction: General characteristics of d block elements.
Titanium: Occurrence, Extraction, Properties and Uses
Preparation of TiO_2,$TiCl_4$, Ziegler Natta catalyst.
Vanadium: Occurrence, Extraction, Properties and Uses.
Preparation of vanadium metal, V_2O_5 , Ferro vanadium alloy.
Chromium: Occurrence, Extraction, Properties, Industrial applications.
Preparation of CrO_3 , $K_2Cr_2O_7$

Nickel : Occurrence, Extraction, Preparation by Mond process, Electrolytic process, Uses
Silver : Occurrence, Extraction, Properties, Uses, Silver Plating.
Platinum: Occurrence, Extraction, Properties, Uses.

UNIT-IV **No. of Lect. – 08, Marks: 16**

Inorganic Engineering Materials & Composites:
Abrasives: Introduction, Natural abrasives & synthetic abrasives
Glasses: Introduction, Manufacture of glass, Types of glasses & their applications
Composite Materials:
Introduction, constituents of composites, Types of composites, Processing of fiber-reinforced composites.

UNIT-V: **No. of Lect. – 08, Marks: 16**

Phase rule: Definition of phase rule, definitions of terms used in phase rule, Derivation of phase rule, one component water system, two component systems.
Phase diagrams: Definition, Usefulness of phase diagrams, Classification of phase diagram, Construction of phase diagrams., Phase diagram of Steel, Phase diagram of brass, Cu-Ni.

Textbook:

1) B. R. Puri & L. R. Sharma ,Principles of Inorganic Chemistry, S.Chand & Co.Delhi.
2) P.C.Jain & Monika Jain, Engineering Chemistry (15^{th} Edn.) , Dhanpat Rai & Sons, New Delhi.

References:

1) J. D. Lee ,Concise Inorganic Chemistry , D.Van Nostrand Co.
2) P.L.Soni ,Textbook of Inorganic Chemistry, S.Chand & Sons ,New Delhi.
3) Dryden's .Outlines of Chemical Technology, Editors Gopal Rao& Marshall Sitting,East West Press, New Delhi.
4) M.M.Uppal , Engineering Chemistry ,Khanna Publications, New Delhi.
5) Raghupati Mukhopadhyay, R.K.Das's Industrial Chemistry: Metallurgy, Kalyani Publishers, New Delhi

Course Outline

Applied Organic Chemistry **AOC** **CHL 304**
Course Title Short Title Course Code

Course Description: This course provides the knowledge of organic concept to undergraduate engineering students, and is designed to strengthen the fundamentals so that they can build their own interface of applied organic chemistry concept with their industrial applications in the branch of chemical engineering.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	**03**	**15**	**40**	**03**

Prerequisite Course(S): Engineering Chemistry-I & II

General Objectives:

1. To introduce the basics of organic chemistry and its significance in chemical process industry.
2. To recognize the factors affecting electron availability in organic reactions and thereby study the characteristics of electrophilic and nucleophilic reagents.
3. To study the name reactions with their mechanisms.
4. To study stereoisomerism in organic compound & influence of it on molecular properties.
5. To study the basic mechanism of electrophilic substitution reactions and its significance in industrially important products preparations.
6. To familiar the students with typical industrial manufacturing processes through flow diagram and procedures.
7. To recognize structure, preparation and applications of heterocyclic compounds.
8. To study industrially important polymers.

Learning Outcomes:

Students completing this course will able to know the sources and importance of organic compounds in context to chemical process industries. They would also study the technique of drawing the three dimensional molecule on two dimensional paper. They will also recognize the influence of spatial arrangement of atoms or groups on the chemical & physical properties of molecules. After finishing the course they will be able to identify industrially important polymers on the basis of their mechanical, physical and chemical properties.

SE Chemical Engineering **Semester – III**

Applied Organic Chemistry
(Course Content)

Teaching Scheme
Theory : 3 hours/ week
Practical : 2 hour/ week

Examination Scheme
End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Examination (ISE) : 20 Marks
Internal Continuous Assessment (ICA) :25 Marks
End Semester Examination (ESE) (PR) :25 Marks

UNIT-I **No. of Lect. – 08, Marks: 16**

Types of Intermediate & Reaction Mechanism:

Concept of organic chemistry. Importance of organic chemistry. Sources of Organic Compounds. Covalent bonds, , Bond fission. Structure & formation of Carbonium ion & Carbanion , Free radicals & their stability. Factors affecting electron availability: Inductive, Resonance, Hyperconjugation & Steric effects., Electrophiles & Nucleophiles,

Study of reactions with reference to the mechanism involved.

Aldol condensation, Cannizzaro & cross Cannizzaro reactions, Claisen ester condensation, Reimer Tiemann reaction, .,Grignard reactions. , SN^1 & SN^2 reactions. Fridel Crafts alkylation& acylations.

UNIT-II **No. of Lect. – 08, Marks: 16**

Stereochemistry:

Basic concept of stereochemistry , Structural Isomerism, Different methods of representation of three dimensional molecule on paper , Conformational isomerism: Conformations of Ethane & n-Butane & their relative stability. Conformations of Cyclohexanes Geometrical isomerism: Cis-Trans isomerism shown by alkenes.

Optical isomerism: Measurement of Optical activity by Polarimeter , Specific rotation, Enantiomerism, Necessary conditions of optical activity, Optical isomerism of Lactic acid & Tartaric acid., Distereoisomerism , Baeyer's angle strain concept.

UNIT-III **No. of Lect. – 08, Marks: 16**

Chemistry of heterocyclic compounds:

Classification of heterocyclic compouds.
Furan: Structure , Preparation, Properties, Reactions & Uses.
Pyrrole: Preparation, Properties, Reactions & Uses.
Thiophene: Preparation, Properties, Reactions & Uses.
Pyridine: Structure, Preparation, Properties, Reactions & Uses.
Quinoline : Skraup synthesis, Properties, Reactions & Uses

Petroleum:

Origin and composition , Petroleum mining, refining, compositions and uses of main petroleum fractions., Cracking & its importance in chemical industries, Octane number , Improving octane number, Chemicals from petroleum.

UNIT-IV **No. of Lect. – 08, Marks: 16**

Nitration

Nitration, Mechanism of nitration of benzene.

Typical Industrial Nitration Processes: Nitration of benzene with HNO_3-fortified spent acid, Prepation of p-Nitroacetanilide, Preparation of α-Nitronaphthalene

Sulphonation

Sulphonation , Mechanism of sulphonation of benzene

Technical indusrial sulphonation processes: Continuous partial pressure sulphonation of benzene, Sulfation of : Lauryl Alcohol, Dimethyl ether.

UNIT-V **No. of Lect. – 08, Marks: 16**

Halogenation

Halogenation, mechanism of halogenation.

Technical preparation of chloral, DDT, BHC and vinyl chloride from acetylene.

Principle of Polymer chemistry & practice:

Principle of polymer chemistry, Study of Industrially important polymers with respect to synthesis, properties & applications: Polyethylene, Polypropylene, Polyvinyl acetate, Urea Formaldehyde, Phenol Formaldehyde, Nylon

Textbooks:

1) Arun Bahl & B.S.Bahl, Textbook of organic chemistry: S.Chand & Co.Ltd. New Delhi.
2) P. H. Groggins, Unit Processes in Organic Synthesis- , Tata McGraw-Hill

References:

1) Stanley H. Pine, Organic Chemistry: McGraw Hill Int.Co.
2) Morrison & Boyd, Organic Chemistry: Allyn Bacon Inc.
3) V.R. Gowarikar, N.V.Vishwanathan, Jayadev Sreedhar, Polymer Science: Wiely Eastern Ltd., New Delhi
4) John McMurry, Organic Chemistry, 5th Edn., Brooks/Cole Thomas Learning
5) P.S.Kalsi, Stereochemistry: Conformation & Mechanism, 4th Edn., New Age International Publishers
6) G.S.Mishra, Introductory Polymer Chemistry, New Age International Publishers

Course Outline

Lab Chemical Engineering Materials **Lab CEM** **CHP 305**
Course Title Short Title Course Code

Course Description: This course intended to fulfill the need for comprehensive laboratory course in Chemical Engineering Materials

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**02**	**15**	**16**	**01**

Prerequisite Course(S): Engineering Mechanics, Engineering Chemistry-I & II

General Objectives:

1 To induce knowledge of properties of materials through experimentation.
2. To impart practical knowledge of study of metals and alloys.
2 To train the students for studying the strength of materials which are used in chemical Industries.

Learning Outcomes:

Students completing this laboratory course will be able to apply the knowledge of testing of materials for identification of materials for fabrication of different chemical process equipments and also linings of vessels.

Course Content:

(Any eight experiments from the following)

List of Experiments:

1.Microstructure observation and study of metals and alloys. (Minimum five) low carbon steel, medium carbon steel, high carbon Steel, tin, bronze, brass, phosphor bronze.
2. Study of properties of polymeric materials; impact test and polymeric Tests.
3. Different types of hardness test on metals. i.e. Rockwell hardness test, Brinell hardness test.
4. Izod and Charpy impact test on mild steel, copper, brass and aluminum.
5. Macrostructure observation: (flow lines observation in forging by macro etching sulphur printing of steel.)
6. Study experiments based on, i) Dye penetration ii) Rubber lining iii) Heat treatments. iv) Ultrasonic Test
7.Tension test on mild steel for studying stress, strain & Young's modulus
8. Bending test on steel sheets
9. Bending test on copper sheets
10.Chemical analysis of metals and alloys (Any one element to be analysed e.g.molybdenum from stainless steel, carbon from steel, copper from brass etc.)

References for Practicals:

1. Don W. Green, Perry's Chemical Engineers Handbook, 8th Edn., McGraw-Hill
2. V.D. Kodgire and S.V. Kodgire "Material Science & Metallurgy" Everest Publisher, Pune

Course Outline

Lab Fluid Flow Operation — Course Title
Lab FFO — Short Title
CHP 306 — Course Code

Course Description: This course intended to fulfill the need for comprehensive laboratory course in. Unit Operation-I

Laboratory	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	02	15	16	01

Prerequisite Course(S): Engineering Mechanics, Mathematics

General Objectives:

1. To induce knowledge of flow of fluids through experimentation.
2. To impart practical knowledge of study of measurement of flow of fluids.

Learning Outcomes:

Students completing this laboratory course will be able to apply the knowledge of fluid flow for controlling heat and mass transfer. They will also get knowledge about properties of fluids. They will also able to design piping , pumping systems .Also they will also know the measurement of the flow rate of fluids which is important in chemical industries.

Course Content:

(Any eight experiments from the following)

List of Experiments:

1. Study of Bernouillis theorem
2. Measurement of coefficient of discharge for venturimeter
3. Measurement of coefficient of discharge for orificemeter
4. Measurement of coefficient of discharge for notch
5. Study of Reynolds experiment
6. Study of characteristics of centrifugal pump
7. Study of characteristics of reciprocating pump
8. Study of characteristics of diaphragm pump
9. Study of Rotameter.
10. Study of manometers

References for Practicals :

R.K.Bansal "A textbook of fluid mechanics and hydraulic machines" Firewall Media, 2005

Course Outline

Lab Applied Inorganic Chemistry | **Lab AIOC** | **CHP 307**
Course Title | Short Title | Course Code

Course Description: This course dealing with the fundamentals of quantitative chemical analysis both on volumetric and gravimetric basis.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**02**	**15**	**16**	**01**

Prerequisite Course(S): Engineering Chemistry-I & II

General Objectives:

1. To expertise the students in proper techniques for making solutions of different concentrations.
2. To train the students in analyzing techniques used for presence of compounds in solutions.
3. To develop skills in students for gravimetric analysis.
4. To induce proficiency amongst students in finding strength of solutions.

Learning Outcomes:

Students completing this course will be capable of making solutions of desired concentrations required for analysis. They will also study the safety precautions for handling the chemical reagents in analysis, estimation and in preparation. After finishing the laboratory course they will also have proficiency in volumetric and in gravimetric analysis.

Course Content:

(Any eight experiments from the following)

List of Experiments:

1. To find strength of solution in g/l & in normal terms
2. Determination of the amount of Magnesium volumetrically by using disodium EDTA
3. Determination of amount of Manganese by Volhards Method
4 Estimation of Manganese dioxide in pyrolusite ore
5. Gravimetric determination of Fe as Fe_2O_3
6. Gravimetric determination Ni as Ni-DMG
7 Determination of amount of Copper(II) volumetrically from the given solution of $CuSO_4$
8. Preparation of tetramine copper (II) sulphate
9. Preparation of tris-ethylenediamine nickel(II) thiosulphate.
10.Preparation of potassium tri-oxalato aluminate tri-hydrate

References for Practicals:

Vogel's. , Text book of Quantitative Chemical Analysis : ELBS with Longman

Course Outline

Lab Applied Organic Chemistry **Lab AOC** **CHP 308**
Course Title Short Title Course Code

Course Description: This course intended to fulfill the need for comprehensive laboratory course in organic chemistry.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**02**	**15**	**16**	**01**

Prerequisite Course(S): Engineering Chemistry-I & II

General Objectives:

1. To introduce the basics of qualitative and quantitative analysis techniques for organic compounds and its importance in chemical process industry.
2. To induce knowledge of estimation of organic compounds through experimentation.
3. To impart practical knowledge of single stage preparation of chemical compounds and preparation of derivatives on laboratory scale.
4. To train the students for analysis of chemical compounds with due care and precautions.

Learning Outcomes:

Students completing this laboratory course will able to apply the knowledge of organic qualitative and quantitative analysis for identification of unknown chemical compounds. They would also study and can apply the laboratory techniques in preparation of organic compound and their derivatives along with estimation of physical constants of chemical compounds.

Course Content:

(Any eight experiments from the following)

List of Experiments:

1. Purification of organic compound by crystallization
2. Purification of organic compound by distillation
3. Estimation of Acetone
4. Estimation of Glucose
5. Preparation of p-nitro acetanilide by nitration.
6. Preparation of Quinone.
7. Preparation of Urea Formaldehyde resin
8. Preparation of acetyl derivative of $-NH_2$ / -OH group.
9. Preparation of benzoyl derivative of $-NH_2$ / -OH group.
10. Preparation of 2:4 dinitro-phenyl hydrazone (2,4 DNP) derivative of –CHO / -CO group.

References for Practicals:

1) Kulkarni , A laboratory handbook of organic quantitative analysis & separation, Dastane Ramchandra & Co., Pune
2) S.K.Bhasin, Laboratory manual on engg. Chemistry: Dhanpat Rai Pub.New Delhi
3) B.S.Furniss,A.J.Hannaford, P.W.G.Smith,A.R.Tatchell, Vogels textbook of practical organic chemistry, Pearson Edn.

S.E. Chemical Engineering

Semester-IV

Faculty of Engineering and Technology

North Maharashtra University, Jalgaon

Course Outline

Chemical Engineering Processes-I **CEP -I** **CHL 401**
Course Title Short Title Course Code

Course Description:

This course provide the students basic understanding of unit operations & unit processes involved in inorganic chemical process industries thus they can understand the value of chemicals, the type of problems met in their production and the effective measures for solving these problems.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	03	15	40	03

Prerequisite Course(S): Applied Inorganic Chemistry

General Objectives:

1. To know the basics of manufacturing of chemicals and work of chemical engineer in chemical process industries.
2. To learn the unit processes and unit operations with symbols involved in manufacturing of useful inorganic chemical products.
3. To study the techniques of drawing of flow diagram for conversion of reactants into products.
4. To identify the engineering problems encountered during production of chemicals with achievable best appropriate solutions.
5. To learn the proper techniques of storage, transportation and handling of raw materials as well as finished products.

Learning Outcomes:

Students finishing this course will learn the drawing techniques of symbols of unit operation and flow diagram and its importance in manufacturing procedures for various industrially important inorganic chemicals. They will also identify the major engineering problems involved in manufacturing operations and best possible solutions for the same.

SE Chemical Engineering **Semester – IV**

Chemical Engineering Processes-I
(Course Content)

Teaching Scheme
Theory : 3 hours/ week

Examination Scheme
End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Examination (ISE) : 20 Marks

UNIT-I **No. of Lect. – 08, Marks: 16**

Fuel & Industrial Gases:
Chemical Processing and work of chemical engineer.
Industrial Gases: Hydrogen, Oxygen, Nitrogen, Carbon Dioxide, Acetylene.
Fuels and Fuel gases: Producer gas, Synthesis gas

UNIT-II **No. of Lect. – 08, Marks: 16**

Chlor-Alkali Industries:
Soda ash, Sodium bicarbonate ,caustic soda, Chlorine , Bleaching powder.
Electrochemical industries:
Fuel Cells: Principle& Efficiency of Fuel cells, Kinds of Fuel cells & advantages of Fuel cells.

UNIT-III **No. of Lect. – 08, Marks: 16**

Phosphorous Industries:
Phosphate industries: Elemental phosphorous, Wet process & electric furnace process for phosphoric acid production, Manufacturing of ammonium phosphate, Baking powder, Fire retardant chemicals. Manufacturing of Superphosphate & Triple Superphosphate

UNIT-IV **No. of Lect. – 08, Marks: 16**

Nitrogen industries & Inorganic Acids : Synthetic ammonia process for ammonia production , Nitric acid, Ammonium nitrate, Urea.,Hydrochloric acid manufacture.
Sulfur industries: Manufacture of elemental sulfur by Frasch & Finnisch process, sulfuric acid.

UNIT-V **No. of Lect. – 08, Marks: 16**

Sodium compounds: Sodium sulphate, Sodium sulfide, Sodium thiosulphate, Sodium silicate, Sodium peroxide.

Chemicals from Sea Water:
Production of common salt by solar evaporation of sea water, production of salt from brine, Bromine Manufacture from sea water & by steaming out process.

References:

1) George T. Austin, “Shreeve’s Chemical Process Industries”, 5th Edition , Mc Graw Hill Book Company
2) C.E. Dryden, Outlines of Chemical Technology, Affiliated East WestPress.1973
3) G.N.Pandey, A textbook of chemical technology, Vol.I, Vikas publishing house pvt.ltd.

Course Outline

Process Calculation **PCAL** **CHL 402**
Course Title Short Title Course Code

Course Description:

This course provide the students basic understanding of Industrial Process Calculations and to apply this in designing the various chemical process equipments.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	**03**	**15**	**40**	**03**
Tutorial	**01**	**15**	**13**	**01**

Prerequisite Course(S): Engineering Chemistry-I & II

General Objectives:

1. To present fundamentals of chemical engineering in a simple manner.
2. To provide broad background for applying principles to industrial and theoretical problems.

Learning Outcomes:

Students completing this course will be able to analyze a particular process in whole or part. They will also in a position in evaluating the economics of the various processes. Using elemental & material balances & energy balances students will be able to design various equipments. Thus they will also study how to increase the efficiency of the chemical processes.

SE Chemical Engineering **Semester – IV**

Process Calculations
(Course Content)

Teaching Scheme		**Examination Scheme**	
Theory	: 3 hours/ week	End Semester Examination (ESE)	: 80 Marks
Tutorial	: 1 hour/ week	Paper Duration (ESE)	: 03 Hours
		Internal Sessional Examination (ISE)	: 20 Marks

UNIT-I **No. of Lect. – 08, Marks: 16**

Properties of Gases ,liquid and solids:

Units their dimensions and conversions , Mass and volume relations, Stoichiometric and composition relations, Excess reactants, Degree of completion, Conversion, selectivity and yield.
Ideal gas law, Dalton's Law, Amagat's Law, and Average molecular weight of gaseous mixtures.
Effect of temperature on vapour pressure, Vapour pressure plot (Cox chart), Vapour pressures of miscible and immiscible liquids and solutions, Raoult's Law and Henry's Law

UNIT-II **No. of Lect. – 08, Marks: 16**

Humidity
Humidity and saturation, Relative Humidity and percent saturation, Dew point, Dry and Wet bulb temperatures, Use of humidity charts for engineering calculations, problems on psychometric chart.

UNIT-III **No. of Lect. – 08, Marks: 16**

Stoichiometry & Material Balance

Material balances for systems with and without chemical reactions, species and elemental balance. Analysis of systems with by-pass, recycle and purge.

UNIT-IV **No. of Lect. – 08, Marks: 16**

Energy balance
Energy capacity of gases, liquids and solutions, Heat of fusion and vaporization, Steady state energy balance for systems with and without chemical reactions. Calculations and application of heat of reaction, combustion, formation, neutralisation and solution. Enthalpy-concentration charts. Combustion of solids, liquids and gaseous fuels, Calculation of theoretical and actual flame temperatures.

UNIT-V: **No. of Lect. – 08, Marks: 16**

Fuels & Combustion

Heating value of fuels, calculations involving theoretical and excess air. Heat & material balances of combustion processes. Chemical ,metallurgical and petrochemical processes.

Textbook:

1) Bhatt., B.I. and Vora S.M. "Stoichiometry" IInd edition, Tata McGraw Hill (1984)
2) K.A.Gavhane "Introduction to process calculations" Nirali Publications
3) Felder, R.M. & Rousseau, R.W**.** "Elementary Principles of Chemical Processes ", 3rd edition. JohnWiley. (1999).
4) O.A.Hougen , K.M.Watson, Ragatz, Chemical Process Principles, Vol.I, Asia Publishing House, New Delhi.

References:

1. Don W. Green, Perry's Chemical Engineers Handbook, 8th Edn., McGraw-Hill
2. Shekhar Pandharipande and Samir Musharaf "Process Calculations" Pune Vidyarthi Griha Prakashan, Pune
3. R.W. Gaikwad "Chemical Process Calculations" Dennet & Co. Nagpur
4. Richard M. Felde,Ronald W. Rousseau, John Wiley & sons, New Delhi
5. S. N. Ghosh, Bidisha Khatua "A textbook of Chemical Calculations" Dhanpat Rai & Co., Delhi
6. Himmelblau, D.M**.** "Basic Principles and Calculations in Chemical Engineering", 6th edition. Prentice Hall .

Course Outline

Mechanical Operation **MO** **CHL 403**
Course Title Short Title Course Code

Course Description: This course provides the knowledge and concept of mechanical operations to undergraduate engineering students, and is designed to strengthen the preliminary operation so that it can provide the platform for the further operation of machines with industrial applications in the branch of chemical engineering.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	**03**	**15**	**40**	**03**
Tutorial	**01**	**15**	**13**	**01**

Prerequisite Course(S): Fluid Flow Operation

General Objectives:

1. To study the importance of size reduction and its laws and significance in chemical process industry.
2. To recognize the factors influencing the size of the product, difference between crushing and grinding.
3. To study the size of the balls required for grinding.
4. To study sedimentation of suspended solids and design of continuous thickener.
5. The students should know the working of filter presses, its operation at constant rate filtration and constant pressure filtrations.
6. To familiar the students with typical industrial manufacturing processes through diagram and design procedures for cyclone separator.
7. To study the various mixing operations, and flow pattern of mixing. Baffles, impeller action during mixing.
8. To study characteristics of fluidized system and its types.
9. To study industrially importance of mechanical operations and its utilizations for handling bulk solids and its conveying system.
10. To study the power utilization of conveyors, mixing operations, and design of belt and screw conveyors.

Learning Outcomes:

Students shall be able to understand the importance of screening equipments in the industry point of view and will able to visualize, analyze and solve basic engineering problems for designing chemical engineering equipments. They shall understand scientific principles and apply them to the practice of engineering problems during maintenance. Students will predict the applications of filtration processes and its working principle to carry out the designs at constant rate of filtration and constant pressure filtrations. After completing the course students shall be able to design and fabricate the screw conveyor, chain and flight as per capacity of equipments.

SE Chemical Engineering **Semester-IV**

Mechanical Operation
(Course Content)

Teaching Scheme

Theory : 3 hours/ week
Practical : 4 hour/ week
Tutorial : 1 hour/week

Examination Scheme

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Examination (ISE) : 20 Marks
Internal Continuous Assessment (ICA) :50 Marks
End Semester Examination (ESE) (OR) :25 Marks

UNIT-I **No. of Lect. – 08, Marks: 16**

Size Reduction: Properties of solids , Particle size, shape; mixed particle size & size analysis, specific surface of mixture, average particle size; energy utilization, Crushing efficiency, Laws of crushing, Types of equipments for coarse, intermediate & fine size reduction; energy & power requirement; open & closed loop circuit. Screening: Equipment, ideal screen. Screen analysis methods & std. screen series; capacity & effectiveness of screen Problem based on above.

UNIT-II **No. of Lect. – 08, Marks: 16**

Handling of transport of Solids- Bins, bunker, Silos. Introduction about conveyors, belt conveyors – checking/determining conveyor capacity, belt speed. Belt tension, belt sag, motor power. Screw conveyor, advantage and disadvantage of screw conveyor. Bucket elevators – types of bucket,Chain conveyor and its type's chain pull conveyor.
Mixing and Agitation:- Necessity of mixing and agitation in chemical industries. Impellers, flow pattern , Calculation of power requirement of mixing equipments, Mixing Index, Types of mixers, paste & plastic masses, rate of mixing. Mixing & Agitation of Liquids: Agitation equipment &; circulation velocities & power consumption in agitated vessel; blending & mixing. problem based on above.

UNIT-III **No. of Lect. – 08, Marks: 16**

Fluid Solid System: Drag force, drag coefficient, Stokes law, Cozeny- Carman equation. Motion of particles in a fluid. Drag force on spherical particle. free settling velocity, & hindered settling. Fluidization: Minimum fluidization velocity, types of fluidization, application of fluidization in catalytic cracking, pneumatic conveying system, spouted beds , etc. problem based on above.

UNIT-IV **No. of Lect. – 08, Marks: 16**

Sedimentation: Clarification & thickening, separation ratio; equipment for centrifugal & gravity classification; cyclone separator & design; hydro cyclones; principle of magnetic & electrostatic separation. Kynch theory of sedimentation, Determination of thickener area Gravity; laboratory batch & continuous sedimentation, Continuous centrifuges, disc type centrifuge.

UNIT-V **No. of Lect. – 08, Marks: 16**

Filtration: Objectives of filtration, preparation stages of filtration Filter aids, classification of filters, selection of filter media. Basic equation of filtration, Relation between thickness of cake and volume of filtrate. Principle of batch filtration: constant pressure & constant rate filtration, factors affecting filtration. Flow of filtrate through the cloth and cake combined. Compressible filter cake, optimum time cycle, Continuous, centrifugal,vacuum, gravity filtration & related equipments. Washing of filter cake, and numerical based on above.

References:

1.Mc Cabe W. L. & Smith J. C. " Unit Operation for Chemical Engg." 5th Edt. McGraw Hill Kogakusha Ltd.

2. Coulson J. M. & Rechardson J. F. " Chemical Engg.- Vol. II" Butterworth Heinemann

3. Badger W. L. & Banchero J. T. " Introduction to Chemical Engg." McGraw Hill International Book Co. New Delhi

4.Narayan & Bhatacharya " Mechanical Operation In Chemical Engg." NCBA Calcutta

5.P. Chattopadhaya " Unit Operation In Chemical Engg. Vol. I " Khanna Publication Delhi

6.R.S.Hiremath and A.P.Kulkarni, Unit Operation of Chemical Engineering. Everest publishing House

7.Shrikant S.Barkade , Sunita S. Desai, “Mechanical Operations” , Denett and Co.

Course Outline

Applied Physical Chemistry **APC** **CHL 404**
Course Title Short Title Course Code

Course Description:

For undergraduate students this course provides the significant understanding of physical chemistry principles and thus they can relate the concepts for sustainable development in operations encountered in chemical process industries.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	03	15	40	03

Prerequisite Course(S): Engineering Chemistry-I & II

General Objectives:

1. To introduce the ideal and real gas concept and causes of deviation of gases from ideal behavior.
2. To study the role of critical constants in liquefaction of gases.
3. To study the rate expressions and order of reactions.
4. To understand the influence of various parameters on rate of reactions.
5. To study the basics of chemical thermodynamics and thermochemistry.
6. To learn the chemical equilibrium and applications of Le Chatelier's principle on reaction equilibrium.
7. To study the significance of change in vapor pressure of a solution and colligative properties of dilute solutions.
8. To study the changes in colligative properties of dilute solutions and their role in molecular weight determination.
9. To study the catalysis phenomenon and its influence on activation energy.

Learning Outcomes:

Students finishing this course will be capable to use fundamental physical chemistry principles to make predictions about ideal and real gases. Learners will apply chemical kinetics principles to investigate the order of reaction, effect of temperature and catalysts on reaction kinetics and time taken by reactants to change their initial concentration. They will also learn how the measurable changes in colligative properties of solutions used for determination of molecular mass of solute.

SE Chemical Engineering **Term – II**

Applied Physical Chemistry
(Course Content)

Teaching Scheme
Theory : 3 hours/ week
Practical : 2 hour/ week

Examination Scheme
End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Examination (ISE) : 20 Marks
Internal Continuous Assessment (ICA) :25 Marks
End Semester Examination (ESE) (PR) :25 Marks

UNIT-I **No. of Lect. – 08, Marks: 16**

Kinetic theory of gases: Gas Laws, Kinetic gas equation, Equation of state of ideal & real gases, compressibility factor, critical constants, mol. velocities, probability distribution of velocities, mean free path, collision diameter, collision no., diffusion, Graham's law of diffusion, liquefaction of gases, Heat capacity of gases: C_p & C_v problems.

UNIT-II **No. of Lect. – 08, Marks: 16**

Chemical kinetics: Objective of chemical kinetics, rate of reaction, velocity constant of a reaction, elementary reaction steps & rate expressions, order & molecularity of reaction, factors influencing the reaction rates, integrated rate expressions for 1^{st}, 2^{nd} , 3^{rd} , & zero order reaction (with example), methods for determining order of reactions. Arrhenius equation. Problem based on above topics.
Photochemical reactions, Set up for study of photochemical reactions.

UNIT-III **No. of Lect. – 08, Marks: 16**

Classical chemical thermodynamics:
Objective & scope, definition of thermodynamic systems, state property etc.
Heat work reversibility, maximum work, isothermal & adiabatic process, first law of thermodynamics, thermo chemistry, thermo chemical law, standard heat of formation, second law of thermodynamics, entropy, entropy changes, enthalpy & free energy, Gibbs Helmholtz equation, Third law of thermodynamics. Problems based on above topics.

UNIT-IV **No. of Lect. – 08, Marks: 16**

Chemical Equilibrium
Criteria of chemical equilibrium, Le Chatelier's theorem, its application to some systems likes ammonia, sulphuric acid, and nitric acid.
Catalysis:
Catalysis: Types of catalysis, characteristics of catalytic reactions, Promoters, Catalytic poisoning, Autocatalysis, Negative catalysis, Activation energy & catalysis, Theories of catalysis, Acid-base catalysis & mechanism, Enzyme catalysis: Mechanism & characteristics.

UNIT-V **No. of Lect. – 08, Marks: 16**

Colligative properties:

Colligative properties, lowering of vapour pressure, measurement of vapour pressure lowering determination of molecular weights from vapour pressure, lowering.

Osmosis, osmotic pressure, measurement of osmotic pressure, the law of osmotic pressure, determination of molecular weight from osmotic pressure, osmosis & semipermeability, reverse osmosis.

Elevation in boiling point, determination of molecular weight from boiling point elevation, measurement of boiling point elevation.

Depression in freezing point, determination of molecular weight from freezing point depression, determination of freezing point depression.

Textbook:

1) B. S.Bahl,, G.D.Tuli, Arun Behl, ,Essentials of physical Chemistry: S.Chand & Co.Ltd.Delhi.

References:

1) Maron-Prutton, Principles of Physical chemistry: Oxford & IBH publishing Co.Pvt.Ltd. New Delhi
2) S. Glasstone & Lewis, Elements of physical chemistry : McMillan India Ltd.
3) B.R.Puri & L.R.Sharma, A textbook of physical chemistry : S. Chand & Co. Delhi

Soft Skills – III

COURSE OUTLINE

Course Title	Short Title	Course Code
Soft Skills – III	**SK-III**	

Course Description: Through this course we have tried to prepare the students for the industry. Most companies test mathematical and logical ability through an aptitude test. This subject aims at working on these skills of a student through strategies formulae and practice exercises.

Lecture	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
	1	14	14	2

Prerequisite Course(s): Fundamental knowledge of High School Mathematics.

COURSE CONTENT

Soft Skills – III **Semester-III**

Teaching Scheme **Examination Scheme**

Lecture: 1 hour / week **Internal Continuous Assessment (ICA): 50 Marks**

Unit-I: Arithmetic-1 **No. of Lect. – 3, Marks: 10**

a. Basic Formulae

i. Divisibility Rules.
ii. Speed Maths.
iii. Remainder Theorem.
iv. Different Types of Numbers.
v. Applications.

b. HCF, LCM and Linear Equations

i. HCF – Successive Division and Prime Factorization Methods.
ii. LCM – Successive Division and Prime Factorization Methods.
iii. Applications.
iv. Linear Equations – Elimination Method.
v. Substitution Method.
vi. Applications.

c. Averages and Mixtures

i. Concept of Average.
ii. Faster Ways of Finding It.
iii. The Allegation Method.
iv. Applications.

Unit-II: Arithmetic–II **No of Lect. – 3, Marks: 10**

a. Percentages

i. Concept of Percentage.
ii. Working with Percentages.
iii. Applications.

b. Profit and Loss

i. Difference between Cost and Selling Price.
ii. Concept of Profit Percentage and Loss Percentage.
iii. Applications.

c. Time and Work

i. Basic Time and Work Formula.
ii. Relation between Time and Work.
iii. Applications.

Unit-III: Arithmetic–III **No of Lect. –3, Marks: 10**

a. Permutations and Combinations

i. Sum Rule of Disjoint Counting.

ii. Product Rule of Counting.
iii. Concept of Factorial.
iv. Permutations.
v. Linear Permutations.
vi. Combinations.
vii. Circular Permutations.
viii. Applications.

b. Probability

i. Definition and Laws of Probability.
ii. Mutually Exclusive Events.
iii. Independent Events.
iv. Equally Likely Events.
v. Exhaustive Events.
vi. Cards.
vii. Dice.
viii. Applications.

c. Time and Distance

i. Speed.
ii. Conversion Factors for Speed.
iii. Average Speed.
iv. Moving Bodies – Passing, Crossing and Overtaking.
v. Relative Speed.
vi. Boats and Streams.
vii. Applications.

Unit-IV: Non-Verbal Reasoning **No of Lect. 2, Marks: 10**

a. Analogies

i. Examples.
ii. Applications.

b. Classification

i. Examples.
ii. Applications.

c. Sequences

i. Examples.
ii. Applications.

Unit-V: Analytical Reasoning **No of Lect. – 3, Marks: 10**

a. Analytical Puzzles

i. Classification Puzzles.
ii. Ordering Puzzles.
iii. Assignment Puzzles.
iv. Applications.

b. Letter and Number Series

i. Different Types of Letter Series.
ii. Different Types of Number Series.
iii. Mixed Series.

c. Coding and Decoding

i. Letter Coding.
ii. Number Coding.
iii. Mixed Coding.
iv. Odd Man Out.
v. Applications.

Guide lines for ICA:

ICA will be based on credit tests and assignments submitted by the student in the form of journal.

Reference Books:

1. R. S. Aggarwal, "Quantitative Aptitude", S. Chand Publication, New Delhi, 2012.
2. R. S. Aggarwal, "A Modern Approach to Verbal Reasoning", S. Chand Publication, New Delhi, 2012.
3. R. S. Aggarwal, "A Modern Approach to Non-Verbal Reasoning", S. Chand Publication, New Delhi, 2012.

Course Outline

Chemical Engineering Processes-II **CEP -II** **CHL 405**
Course Title Short Title Course Code

Course Description:

This course provide the students basic understanding of unit operations & unit processes involved in organic chemical process industries thus they can understand the flowcharts which gives great deal of information to be collected and examined and which represents an overall viewpoint for industrial manufacturing processes.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	**03**	**15**	**40**	**03**

Prerequisite Course(S): Applied Organic Chemistry

General Objectives:

1. To know the basics of manufacturing of organic chemicals.
2. To learn the unit processes and unit operations with symbols involved in manufacturing of industrially important organic chemical products.
3. To identify the major engineering problems encountered during production of organic chemicals with achievable best appropriate solutions.
4. To learn the proper techniques of storage, transportation and handling of raw materials as well as finished products.
5. To study the manufacturing steps involved in the production of important chemicals.

Learning Outcomes:

Students finishing this course will learn the drawing techniques of symbols of unit operation and flow diagram and its importance in manufacturing procedures along with major engineering problems & solutions for them involved in the manufacturing of industrially important organic chemicals. Apart from this they will gain knowledge and can apply the same in the manufacturing steps involved in the production of important chemicals.

SE Chemical Engineering **Semester – IV**

Chemical Engineering Processes-II
(Course Content)

Teaching Scheme
Theory : 3 hours/ week

Examination Scheme
End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Examination (ISE) : 20 Marks

UNIT-I **No. of Lect. – 08, Marks: 16**

Oil and Waxes:
Vegetable oil extraction, hydrogenation of oils
Waxes: Introduction, types & their uses.
Soaps , Glycerin and Detergents: Introduction, Raw materials for production of soap & detergents, method of soap production, manufacture of detergents, glycerin production & its uses.

UNIT-II **No. of Lect. – 08, Marks: 16**

Sugar and Starch Industries: Extraction of sucrose from sugar cane, by-products of the sugar industry, properties & structure of starch, production of starch from maize, production of dextrin by starch hydrolysis.
Fermentation Industries:
Manufacture of ethyl alcohol by fermentation, production of beer, wines and liquors, vinegar, citric acid ,lactic acid.
Pulp and paper industries: Manufacturing of pulp, manufacturing of paper, and structural boards.

UNIT-III **No. of Lect. – 08, Marks: 16**

Agrochemical Industries: Insecticides, pesticides, herbicides, plant growth , nutrients and regulators, compound fertilizers, bio-fertilizers, complex fertilizers, various grades of N.P.K. fertilizer.
Pharmaceuticals Industries: Classification of pharmaceuticals products, manufacture of penicillin & tetracycline.

UNIT-IV **No. of Lect. – 08, Marks: 16**

Petrochemicals : Manufacturing of Methanol , Formaldehyde , Ethylene and Acetylene , Ethylene dichloride, Ethylene oxide, Isopropanol, Acetone, Isopropyl benzene ,Butadiene.

UNIT-V **No. of Lect. – 08, Marks: 16**

Explosives: Types of Explosives, explosive characteristics, industrial explosives, propellants, rockets, missiles, pyrotechnics, matches, toxic chemical weapons.
Plastic industries: Raw Materials, manufacturing processes, general polymerization processes, compounding and moulding operation.

References:
1) George T. Austin, "Shreeve's Chemical Process Industries", 5th Edition , Mc Graw Hill Book Company
2) C.E. Dryden, Outline of Chemical Technology, Affiliated East WestPress.1973
3) G.N.Pandey, A textbook of chemical technology, Vol.II, Vikas publishing house pvt.ltd.
4) Casida, Jr. L.E., Industrial Microbiology, New Age International, New Delhi.
5) Reed G., Prescott & Dunn Industrial Microbiology, CBS Publisher, New Delhi.

Course Outline

Lab Computer Applications **Lab CA** **CHP 406**
Course Title Short Title Course Code

Course Description: This laboratory course is dealing with applications of computers for designing the various formulas required for chemical engineering programme with a comprehensive study of the C++ programming language.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	**01**	**15**	**10**	**01**
Laboratory	**02**	**15**	**16**	**01**

Prerequisite Course(S): Computer Programming, Engineering Mathematics I and II.

General Objectives:

1. Students will learn to solve matrix equations using Matrix Inversion method.
2. Students will learn to solve Differential equation of first order by various methods like Taylor's series method, Modified Euler's method, Runge Kutta's 4^{th} order method.
3. Students will also learn to solve Numerical Integrations by various methods like, by Picards method, Trapezoidal Rule, by Simpson's $1/3^{rd}$ Rule, Simpson's $3/8^{th}$ rule.

Learning Outcomes:

Students completing this course will able to apply knowledge of Basic Science using knowledge of C and C++ language in Chemical Engineering Problems. Students will demonstrate their ability to solve Chemical Engineering Problems using computer interface. Students will be able to provide a definite solution to various designing problems in Chemical Engineering field.

SE Chemical Engineering **Semester – IV**

Lab Computer Applications
(Course Content)

Teaching Scheme
Theory : 1 hours/ week
Practical : 2 hours/ week

Examination Scheme
Internal Continuous Assessment (ICA): 50 Marks

Theory:

Introduction to object oriented programming

(a) Structure of C++ programming.
(b) Tokens, keywords, constant in C++.
(c) Derived data types, operators, expression in C++.
(d) Function in C++.
(e) Classes and objects in C++.

Introduction to Polymath and Chemical Engineering problems based softwares.
Fundamental concepts of Matrices, Numerical Differentiation & Numerical Integration.

Lab Work: (Any Eight from the following)

1. To solve Matrices using Matrix Inversion Method.
2. To solve Matrices using Gauss Elimination method.
3. To solve Differential equation of first order by Taylor's series method
4. To solve Differential equation of first order by Modified Euler's method
5. To solve Differential equation of first order by Picards method
6. To solve Differential equation of first order by Runge Kutta's 4^{th} order method
7. To solve Numerical Integration by Weddle's rule.
8. To solve Numerical Integration by Trapezoidal Rule
9. To solve Numerical Integration by Simpson's $1/3^{rd}$ Rule
10. To solve Numerical Integration by Simpson's $3/8^{th}$ rule

Reference Books:

1. E Balagurusamy "Object Oriented Programming with C++", Tata McGraw Hill, 4/E,2008.
2. Yashavant Kanetkar, "Let Us C" , BPB Publications ,10/E, 2010.
3. Steven C. Chapra, Raymond P. Canale, Numerical Methods for Engineers, 6^{th} Edition, Tata McGraw Hill.
4. David M. Himmelblau, Basic Principles & Calculations in Chemical Engineering, 6^{th} Edn., Pearson Education Pvt.Ltd., New Delhi.
5. S.S.Sastry, Introductory methods of Numerical Analysis, Prentice Hall

Course Outline

Lab Chemical Processes **Lab CP** **CHP 407**
Course Title Short Title Course Code

Course Description: This laboratory course is dealing with manufacturing procedures of industrially important organic and inorganic chemicals on laboratory scale and safe analysis of the same.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**02**	**15**	**16**	**01**

Prerequisite Course(S): Lab Engineering Chemistry-I & II

General Objectives:

1. To induce importance of unit operations & unit processes in chemical process industries through experimental work.
2. To make the students capable of handling chemicals with due care & precautions.
3. To create confidence amongst students for safe synthesis of industrially important chemicals on laboratory scale.
4. To induce proficiency in students for preparation, purification, analysis of chemical compounds on laboratory scale.

Learning Outcomes:

Students finishing this laboratory course will understand importance of unit operations & unit processes in manufacturing of chemicals through experimentation. They will also acquire necessary knowledge of safe handling, synthesis and analysis of industrially important chemicals with due care and precautions.

SE Chemical Engineering **Semester – IV**

Lab Chemical Processes

Teaching Scheme
Practical : 2 hours/ week

Examination Scheme
Internal Continuous Assessment (ICA): 50 Marks
End Semester Examination (ESE)(PR): 25 Marks

Course Content:

(Any Eight experiments from the following)

1. Determination of the Na_2CO_3 content of washing soda.
2. To determine the loss per gram and the percentage purity of the given sample of sodium bicarbonate by heating.
3. Estimation of available chlorine in bleaching powder.
4. Preparation of Sodium thiosulphate
5. Preparation of biuret from urea
6. Preparation of soap
7. Preparation of drug aspirin
8. Estimation of formaldehyde.
9. Determination of TFM in soap
10. Preparation of acetaldehyde by the oxidation of ethanol

References for Practicals:

1) Vogel's. , Text book of Quantitative Chemical Analysis : ELBS with Longman
2) F.G.Mann & B.C.Saunders, Practical Organic Chemistry, Orient Longman

Course Outline

Lab – Mechanical Operation **Lab MO** **CHP 408**
Course Title Short Title Course Code

Course Description: This course intended to fulfill the need for comprehensive laboratory course in unit operations.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**04**	**15**	**32**	**02**

Prerequisite Course(S): Fluid Flow Operation

General Objectives:

1. To understand and apply engineering experimentation techniques and safety procedures common to the chemical industry.
2. To apply principles developed in chemical engineering courses to the analysis of chemical engineering processes and unit operations.
3. To improve technical skills for particle size reduction and screening during process.
4. To study various Laws of crushing, Energy utilization, crushing Efficiency, Energy for size reduction.
5. To give the knowledge of various equipment for classification of particulate matter such as Gravity settling tank, Cyclone separator, Magnetic separators, Electrostatic separator, Equipment etc.

Learning Outcomes:

At the end of the laboratory course students will be able to apply the principles of unit operations through experimentation and will demonstrate the ability to design various equipments used in chemical and allied process industry.

Course Content:

(Any eight experiments from the following)

List of Experiments:

1.To study the separation of solids by sedimentation.
2.To study the differential and cumulative screen analysis of sand.(Sieve analysis)
3.To verify the laws of crushing and grinding by ball mill
4.To verify the laws of crushing and grinding by Jaw crusher
5.To determine the rate of filtration, cake resistance and filter medium resistance.
6.To determine the rate of filtration by vacuum filter.
7.To study the behavior of the bed during fluidization and to calculate minimum fluidization velocity.
8.To study the sigma Kneader Mixer.
9.To study the operating behavior of cyclone separator and to find out its efficiency.
10To study the Ribbon Blender and to find out the mixing index.

Course Outline

Lab Applied Physical Chemistry **Lab APC** **CHP 409**
Course Title Short Title Course Code

Course Description: This course is planned to induce proficiency in students for experimental planning, data analyzing and drawing logical conclusions based on the fundamentals principles of physical chemistry.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**02**	**15**	**16**	**01**

Prerequisite Course(S): Engineering Chemistry-I & II

General Objectives:

1. To teach basic manipulative skills. Skills, including the proper techniques for making solutions, weighing, and statistical data analysis.
2. To study the rate expressions and order of reactions through experimentation.
3. To induce knowledge of thermochemistry through experimental work.
4. To develop skills in students for determination of molecular weight by experimently measuring changes in colligative properties.
5. To develop skills for the determination of atomic weight , equivalent weight of metals.

Learning Outcomes:

Students completing the laboratory course will be capable of applying knowledge for investigations of order of simple chemical reactions, heat of neutralization. They would also in a position to estimate molecular weight through changes in colligative properties of dilute solution due to addition of non volatile solute in it.

Course Content:

(Any Eight experiments from the following)

1) Determination of equivalent weight of metal eudiometrically.
2) Detrmination of atomic weight of the metal using Dulong-Petit law.
3) Determination of surface tension of liquids by Stalagmometer.
4) Determination of rate constant of hydrolysis of methyl acetate by dilute HCl & to show that the reaction is of first order.
5) Determination of rate constant of hydrolysis of ethyl acetate by NaOH & to show that the reaction is of second order.
6) Determination of energy of activation for the reaction between potassium pursulphate and potassium iodide.
7) Determination of heat of solution of KNO_3.
8) Determination of water equivalent of copper calorimeter & heat of neutralization of strong acid & strong base by calorimeter.
9) To determine ΔH, ΔG, ΔS of a reaction.
10) Determination of molecular weight of substance by depression in freezing point method.

References for Practicals:

S.K.Bhasin, Laboratory manual on Engineering Chemistry: Dhanpat Rai Pub.New Delhi

NORTH MAHARASHTRA UNIVERSITY, JALGAON (M.S.)

Second Year Engineering (Computer)

Faculty of Engineering and Technology

COURSE OUTLINE

Semester – III

W.E.F 2013 – 2014

Annexure - I

SE Semester - III

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory			Practical	Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
Engineering Mathematics-III	A	3	1	---	4	20	80	---	---	100	4
Analog & Digital Electronics	B	3	---	---	3	20	80	---	---	100	3
Discrete Structure & Graph Theory	D	3	1	---	4	20	80	---	---	100	4
Microprocessor & Microcontroller	D	3	---	---	3	20	80	---	---	100	3
Object Oriented Technology	D	3	---	---	3	20	80	---	---	100	3
Soft Skills – III	C	1	---	2	3	---	---	50	---	50	2
Analog & Digital Electronics Lab	B	---	---	2	2	---	---	50	---	50	1
Discrete Structure & Graph Theory Lab	D	---	---	2	2	---	---	25	25 **(PR)**	50	1
Microprocessor & Microcontroller Lab	D	---	---	2	2	---	---	25	25 **(PR)**	50	1
Object Oriented Technology Lab	D	---	---	2	2	---	---	25	25 **(PR)**	50	1
Total		**16**	**2**	**10**	**28**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination **ESE: End Semester Examination** **ICA: Internal Continuous Assessment**

SE Semester - IV

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory		Practical		Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
Data Communication	D	3	---	---	3	20	80	---	---	100	3
Microprocessor & Microcontroller Interfacing	D	3	1	---	4	20	80	---	---	100	4
Data Structures	D	3	1	---	4	20	80	---	---	100	4
Computer Organization	D	3	---	---	3	20	80	---	---	100	3
Computer Graphics	D	3	---	---	3	20	80	---	---	100	3
Application Development Lab	B	1	---	2	3	---	---	50	---	50	2
Data Communication Lab	D	---	---	2	2	---	---	50	---	50	1
Microprocessor & Microcontroller Interfacing Lab	D	---	---	2	2	---	---	25	25 **(PR)**	50	1
Data Structures Lab	D	---	---	2	2	---	---	25	25 **(PR)**	50	1
Computer Graphics Lab	D	---	---	2	2	---	---	25	25 **(PR)**	50	1
Total		**16**	**2**	**10**	**28**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination **ESE: End Semester Examination** **ICA: Internal Continuous Assessment**

Engineering Mathematics –III

COURSE OUTLINE

Course Title	Short Title	Course Code
Engineering Mathematics -III	**EM-III**	

Course Description:

This course is aimed at introducing the fundamentals of basic Mathematics to undergraduate students. The background expected includes a prior knowledge of Mathematics from first year engineering or diploma and familiarity with various laws, principles and theories. The goals of the course are to understand the basic principle of Mathematics and its application in different area.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Lecture	**03**	**15**	**40**	**04**
Tutorial	**01**	**15**	**13**	

Prerequisite Course(s): Engineering Mathematics-I, Engineering Mathematics-I / Diploma Mathematics.

COURSE CONTENT

Engineering Mathematics -III **Semester- III**

Teaching Scheme	**Examination Scheme**	
Lecture: 3 hours / week	**End Semester Examination (ESE)**	**: 80 Marks**
Tutorial: 1 hour / week	**Paper Duration (ESE)**	**: 03 Hours**
	Internal Sessional Exam (ISE)	**: 20 Marks**

1. Laplace Transform (08 Hours, 16 marks)

- Definition and Existence of Laplace transforms.
- Laplace Transform of elementary/standard functions.
- Theorems and Properties of Laplace Transform (without proof).
- Inverse Laplace Transform.
- Laplace Transform of Unit step function.
- Solution of differential equations using LT.

2. Fourier Transform and Z-Transform (08 Hours, 16 marks)

A) Fourier Transform:

- Introduction to Fourier Integral theorem.
- Fourier Transforms, Fourier Cosine Transforms, Fourier Sine Transform and their inverse.

B) Z- Transform:

- Definition and standard properties (without proof)
- Region of Convergence.
- Z-Transform of standard / elementary sequences.
- Inverse Z-transform.

3. Statistics and Probability distributions (08 Hours, 16 marks)

- Introduction to Mean, Mode, Median standard deviation, Variance, Coefficient of Variation.
- Moments, Skewness and kurtosis.
- Correlation and Regression.
- Binominal Distribution.
- Poisson distribution.
- Normal distribution.

4. Testing of Hypothesis and Significance (08 Hours, 16 marks)

- Introduction to population parameters and statistics.
- Testing of Hypothesis, Null Hypothesis and Alternative Hypothesis.
- Level of Significance.
- Test of Significance of large sample.
- Chi-Square test.

5. Fuzzy Sets and System (08 Hours, 16 marks)

- Introduction to Fuzzy sets.
- Standard Fuzzy sets operations.
- Crisp sets, Crisp sets verses Fuzzy sets.
- Fuzzy arithmetic.
- Constructing Fuzzy sets and operations on Fuzzy sets and systems
- Applications of Fuzzy sets.

Text Book:

1. Debashis Dutta, “Textbook of Engineering Mathematics”, New Age International Publishers.
2. Witold Pedrycz and Fernando Gomide, “An Introduction to Fuzzy Sets: Analysis and Design”, Prentice Hall of India, New Delhi.

Reference Books:

1. H.K. Dass, “Advanced Engineering Mathematics”, S. Chand Publication, New Delhi.
2. Erwin Kreyszig, “ Advanced Engineering Mathematics”, Wiley Eastern Ltd.
3. B.S. Grewal, “Higher Engineering Mathematics” , Khanna Publication, Delhi.
4. Wylie C.R. & Barrett , “ Advanced Engineering Mathematics”, Mc Graw Hill
5. B.V. Raman, “Engineering Mathematics”, Tata Mc Graw Hill.
6. N. P. Bali , “A Text Book of Engineering Mathematics”, Laxmi Publication.
7. George J. Klir and Bo Yuan, ‘‘Fuzzy Sets and Fuzzy Logic: Theory and Applications”.

Analog and Digital Electronics

COURSE OUTLINE

Course Title	Short Title	Course Code
Analog & Digital Electronics	**ADE**	

Course Description:

This course provides an introduction to Operational Amplifier & its applications. Digital electronics & its applications covering: different types of codes, Boolean laws, sop and pos form, K map technique, Arithmetic circuits such as Adder, Substractor. Multiplexer, Demultiplxer and their application; different types of flip-flops.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	**15**	**45**	**03**

Prerequisite Course(s): Fundamental knowledge of EEEE (Elements of Electronics and Electrical Engineering).

COURSE CONTENT

Analog & Digital Electronics **Semester-III**

Teaching Scheme	**Examination Scheme**
Lecture: 3 hours / week	**End Semester Examination (ESE) : 80 Marks**
Tutorial: 1 hour / week	**Paper Duration (ESE) : 03 Hours**
	Internal Sessional Exam (ISE) : 20 Marks

1 Operational Amplifier Basics & applications (08 Hours, 16 marks)

a Advantages of ICs over discrete components
b Block diagram of op-amp ,op-amp symbol, op-amp IC 741- pin diagram
c Basic arithmetic operation circuits.
d Instrumentation amplifier
e V to I and I to V converter, its applications
f Sample and hold circuit

2 Comparators and Signal Generators (08 Hours, 16 marks)

a Inverting and non inverting comparator.

b Zero crossing detector, window detector
c Schmitt trigger, its advantages.
d Limitation of op-amp as comparator.
e Waveform generator circuits.
f Timer IC 555 & its operating modes.

3 Review of fundamental concepts (08 Hours, 16 marks)

a Basic gates, universal gates & Exclusive gates
b Digital Signal, Positive & Negative logic
c Boolean Algebra: Boolean postulate and Theorems
d Examples of realization of Boolean functions using Boolean algebra
e Introduction to digital logic families: DTL, TTL & CMOS

4 Combination logic design (08 Hours, 16 marks)

a Standard representation of logical function.
b K map representation of logical function.
c Simplification of logical function using K map for 2, 3 & 4 variables.
d K map with Don't care condition.
e Design of half adder, full adder half substractor, full substractor.

5 Combination logic design examples (08 Hours, 16 marks)

a Example of combinations logic circuit.
b Implementation with the help of Basic/Universal gates.
c Design of multiplexer & Demultiplexer.
d Design of comparator circuits using logic gates.
e Design of parity generator & checker circuit using logic gates.
f Introduction to sequential logic circuit.

Text Books:

1. D. Roy Chaudhary, Shail Jain "Linear Integrated Circuit", New Age International, Second edition.
2. R.P. Jain "Modern Digital Electronics", TMH, Third edition.

Reference Books:

1. Ramakant A. Gaikward "Op amp and Integrated circuit", PHI, Fourth edition, 2012.
2. Coughling, Driscoll "Op amps and Linear Integrated Circuits", Pearson education, Sixth edition.
3. M. Morris Mano "Digital Logic and Computer Design", Pearson.
4. A Anandkumar "Fundamentals of Digital Circuits", Pearson.

5. Sergio Franco “Design with Operational Amplifier and Analog Integrated Circuits”, TMH- Third edition.
6. Botkar “Integrated circuits”, Khanna Pub.

Discrete Structure and Graph Theory

COURSE OUTLINE

Course Title	Short Title	Course Code
Discrete Structure and Graph Theory	**DSGT**	

Course Description:

The objective of this course is to introduce the students to the fundamentals of Discrete Structures and also with Graph Theory with concepts of the C programming language and enable them to apply these concepts for solving real world problems.

Lecture	Hours / Week	No. of Weeks	Total Hours	Semester Credits
	03	15	45	04
Tutorial	01	15	15	

Prerequisite Course(s): Fundamental knowledge of C

COURSE CONTENT

Discrete Structure and Graph Theory **Semester-III**

Teaching Scheme	Examination Scheme	
Lecture: 3 hours / week	**End Semester Examination (ESE)**	**: 80 Marks**
Tutorial: 1 hour / week	**Paper Duration (ESE)**	**: 03 Hours**
	Internal Sessional Exam (ISE)	**: 20 Marks**

1. Propositions, Sets, Probability (08 Hours, 16 marks)

a Propositions, compound proposition, basic logical operations, truth tables, tautology, contradiction.

b Quantifiers: universal and existential quantifiers.

c Theory: Set, Combinations of Sets, Mathematical Induction Principle.

d Cardinality of finite Sets, Rule of sum, Rule of product.

e Permutations, Combinations.

f Discrete Probability.

2. Relations and Functions: (08 Hours, 16 marks)

a Definitions, properties of Binary relations.

b Equivalence Relations and partitions, Partial ordering relations.

c Lattice, chains and antichains.

d Transitive Closure and Warshall's Algorithm.

e Functions Definitions, Composition of Functions, Types of Function.

f Recursive Functions, Pigeonhole principle.

3. Recurrence Relation and Analysis of Algorithms (08 Hours, 16 marks)

a Recurrence Relation, Linear Recurrence Relations with constant Coefficients.

b Homogeneous Solutions, Particular Solutions, total solutions, Solution by the method of generating functions.

c Introduction, Largest number algorithm, sorting algorithms: Bubble sort.

d Divide and conquer algorithms: binary search algorithm.

e strassens matrix multiplication, Time Complexity of Algorithms.

f Complexity of Problems, Tractable and Intractable Problems.

4. Graphs and Trees (08 Hours, 16 marks)

a Basic terminology, multigraphs and weighted graph , paths and circuits.

b Dijkstra's shortest path algorithms.

c Euler and Hamiltonian Paths and circuits .

d factors of a graph, Planner graph.

e Trees, rooted trees, path length in rooted trees.

f prefix code, binary search trees.

g spanning trees and cut set, minimum spanning trees.

h kruskal's and prim's algorithms for minimum spanning tree.

5. Algebraic system Boolean algebra (08 Hours, 16 marks)

a Semigroup, Subsemigroup, Monoid, Submonid.

b Abelian Group, Subgroups.

c Isomorphism, Automorphism,Homomorphism .

d Ring, Integral domain ,field .

e Lattice and Algebraic systems, Principle of duality.

f basic properties of lattice defined by lattices, distributive and complemented lattices.

g Boolean lattices and Boolean algebras, Boolean functions and Boolean Expressions.

h Number system and Interconversion of number systems.

Text Books:

1. C.L. Liu , " Elements of Discrete Mathematics", Second edition, TMH.
2. Seymour Lipschutz, Marc Lipson, " Discrete Mathematics", Second edition, TMH.

Reference Books:

1. Kenneth H. Rosen, Discrete Mathematics and its Application, Fifth edition, TMH.
2. V. K. Balakrishnan, " Graph Theory", TMH.
3. B. Kolman , R. Busby and S. Ross, "Discrete Mathematical Structures" Fourth edition, Pearson .
4. J. Treamblay , R. Manohar ," Discrete Mathematical structures with application to computer science" , TMH.
5. Sukhendu dey, "Graph theory and its applications", Shroff publications.
6. John Dossey,Otto,Spence,Eynden, "Discrete Mathematics", Pearson publications, Fifth edition.

Microprocessor and Microcontroller

COURSE OUTLINE

Course Title	Short Title	Course Code
Microprocessor and Microcontroller	**MPMC**	

Course Description:

The objective of this course is to introduce the students to the fundamentals of microprocessor, microcontroller and microprocessor programming and enable them to apply these concepts for solving real world problems.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	**15**	**45**	**03**

Prerequisite Course(s): Fundamental knowledge of microprocessor basics.

COURSE CONTENT

Microprocessor and Microcontroller **Semester-III**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. **8086/8088 Microprocessor (08 Hours, 16 marks)**
   a. 8086 Architecture
   b. 8086 Programming Model
   c. 8086 Memory Segmentation
   d. 8086 Instruction Set
   e. DOS & BIOS Interrupts
   f. Macro and Procedure

2. **8086 Configuration & Other Peripherals (08 Hours, 16 marks)**
   a. 8086 Minimum Mode

b. 8086 Maximum Mode
c. 8259A PIC block diagram
d. 8259A operating modes
e. DMA Basics
f. 8237 DMAC

3. Main Memory Design (08 Hours, 16 marks)

a. 8086 interfacing with RAM
b. 8086 interfacing with ROM
c. Address decoding
d. Address decoding techniques: Full, Block and Block
e. Troubleshooting the memory module

4. Multiprocessor Configuration (08 Hours, 16 marks)

a. Tightly & loosely coupled system
b. Bus arbitration schemes
c. NDP Basics
d. 8087 architecture and programming model
e. 8087 data types
f. 8087 instruction set and programming
g. Interconnection of 8087 with 8086

5. Microcontroller (08 Hours, 16 marks)

a. Introduction to Microcontroller
b. 8051 microcontroller Architecture
c. 8051 hardware Features
d. Input/output pins and Internal RAM organization
e. Ports and Circuits and External memory
f. Counters and Timers and Serial data I/O, Interrupts

Text Books:-

1. A. Ray, K. Bhurchandi, "Advanced Microprocessors and Peripherals: Architecture, Programming & Interfacing", Tata McGraw Hill, Third edition, 2004.
2. Kenneth Ayala, "The 8051 Microcontroller Architecture, Programming & Applications", Penram International, Second edition, 2006.

Reference Books:

1. Soumitra Kumar Mandal, “Microprocessor and Microcontroller: Architecture, Programming and Interfacing using 8085, 8086 and 8051”, Tata McGraw-Hill.
2. Douglas V Hall, “Microprocessor and Interfacing, Programming and Hardware”, Tata McGraw Hill, Second edition.
3. Peter Abel, “IBM PC Assembly Language and Programming”, Pearson, 5th edition.
4. Ramesh Gaonkar, “Microprocessor architecture, programming and applications”, Second edition.
5. K Uma Rao, “8051 Microcontroller: Internals, Instructions, Programming and Interfacing”, Pearson.
6. John E. Uffenbeck, “The 8086/ 8088 Family: Design, Programming and Interfacing”, Pearson, 1987.
7. Barry B Bray, “The Intel Microprocessors-Architecture, Programming and Interfacing”, Pearson LPE/PHI, Second edition.
8. M.T.Savaliya, “8086 Programming and Advanced Processor Architecture”, Wiley India.
9. V Udayashannkra, “8051 Microcontroller”, Mc-Graw-Hill.
10. I. Scott Mackenzie, “The 8051 Microcontroller”, Pearson.

Object Oriented Technology

COURSE OUTLINE

Course Title	Short Title	Course Code
Object Oriented Technology	**OOT**	

Course Description:

The objective of this course is to introduce the students to the concepts of C++ programming language and enable them to apply these concepts for solving real world problems.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	**15**	**45**	**03**

Prerequisite Course(s): C Programming.

COURSE CONTENT

Object Oriented Technology **Semester-III**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Introduction to Object Oriented Programming

(08 Hours, 16 marks)

a. Introduction to procedural, modular and object-oriented programming techniques.
b. Limitations of procedural programming.
c. Need of object-oriented programming. Advantages, disadvantages and applications of OOP.
d. Class, objects, abstraction, encapsulation, data hiding, inheritance, polymorphism and message passing.
e. The basics of C++
f. Expressions

2. Classes and Objects, Function and Operator Overloading
(08 Hours, 16 marks)

a. Class and objects
b. Constructors and destructors:
c. Functions in C++
d. Function Overloading
e. Operator overloading

3. Pointers and Arrays (08 Hours, 16 marks)

a. Introduction, pointer declaration, voids pointers.
b. Pointers to class objects, this pointer.
c. Pointers to members, accessing private members with pointers.
d. Characteristics of arrays, initialization of arrays.
e. Arrays within a class, arrays of objects.
f. Dynamic memory allocation using new and delete operators.
g. One dimensional and two dimensional arrays using pointers.

4. Inheritance, Virtual functions and Polymorphism
(08 Hours, 16 marks)

a. Introduction, base and derived classes. Inheritance types, access modifiers.
b. Single inheritance, multiple and multilevel inheritance, hybrid, hierarchical, multipath inheritance and virtual base classes.
c. Overriding base class members. Constructors and inheritance, calling base class constructor.
d. Static and dynamic binding. Pointers to base and derived classes.
e. Virtual functions, rules for virtual functions, working of virtual functions, pure virtual functions.
f. Virtual base classes.

5. Files and Streams, Managing Console I/O Operations and Templates
(08 Hours, 16 marks)

a. Concept of a file, file stream operations.
b. Opening a file using constructor and open function, closing a file, detecting end-of-file, file modes, file pointers.
c. Introduction to C++ streams, stream classes, unformatted and formatted I/O.
d. ios class functions and flags, manipulators.
e. Introduction to function template and class template.

f. Overloading of templates functions.
g. Member function templates and template arguments.

Text Books:

1. E. Balagurusamy, "Object Oriented Programming with C++", Fifth Edition, Tata McGraw Hill, 2011.
2. Robert Lafore, "Object Oriented Programming in C++", Fourth Edition, Pearson Education, 2002.

Reference Books:

1. Ashok N. Kamthane, "Object-Oriented Programming with ANSI and Turbo C++", Pearson Education, 2006.
2. Rajesh K. Shukla, "Object-Oriented Programming in C++", Wiley India, 2008.
3. Bjarne Stroustrup, "C++ Programming Language", Third Edition, Addison Wesley, 2002.
4. Yashavant P. Kanetkar, "Let Us C++", Second Edition, BPB Publications, 2003.
5. Venugopal K.R., "Mastering C++", First Edition, TMH, 1999.
6. Mahesh Bhave, Sunil Patekar, "Object Oriented Programming with C++", Second Edition, 2012.
7. Herbert Schildt, "The Complete Reference C++", Fourth Edition, TMH, 2003.

Soft Skills – III

COURSE OUTLINE

Course Title	Short Title	Course Code
Soft Skills – III	**SK-III**	

Course Description:

Through this course we have tried to prepare the students for the industry. Most companies test mathematical and logical ability through an aptitude test. This subject aims at working on these skills of a student through strategies formulae and practice exercises.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	1	**14**	**14**	**2**

Prerequisite Course(s): Fundamental knowledge of High School Mathematics.

COURSE CONTENT

Soft Skills – III **Semester-III**

Teaching Scheme **Examination Scheme**

Lecture: 1 hour / week **Internal Continuous Assessment (ICA): 50 Marks**

Unit-I: Arithmetic-1 **(03 Hours, 10 marks)**

a. Basic Formulae

i. Divisibility Rules
ii. Speed Maths
iii. Remainder Theorem
iv. Different Types of Numbers
v. Applications

b. HCF, LCM and Linear Equations

i. HCF – Successive Division and Prime Factorization Methods
ii. LCM – Successive Division and Prime Factorization Methods
iii. Applications

iv. Linear Equations – Elimination Method
v. Substitution Method
vi. Applications

c. Averages and Mixtures

i. Concept of Average
ii. Faster Ways of Finding It
iii. The Allegation Method
iv. Applications

Unit-II: Arithmetic–II **(03 Hours, 10 marks)**

a. Percentages

i. Concept of Percentage
ii. Working with Percentages
iii. Applications

b. Profit and Loss

i. Difference between Cost and Selling Price
ii. Concept of Profit Percentage and Loss Percentage
iii. Applications

c. Time and Work

i. Basic Time and Work Formula
ii. Relation between Time and Work
iii. Applications

Unit-III: Arithmetic–III **(03 Hours, 10 marks)**

a. Permutations and Combinations

i. Sum Rule of Disjoint Counting
ii. Product Rule of Counting
iii. Concept of Factorial
iv. Permutations
v. Linear Permutations
vi. Combinations
vii. Circular Permutations
viii. Applications

b. Probability

i. Definition and Laws of Probability
ii. Mutually Exclusive Events
iii. Independent Events
iv. Equally Likely Events
v. Exhaustive Events
vi. Cards
vii. Dice
viii. Applications

c. Time and Distance

i. Speed
ii. Conversion Factors for Speed
iii. Average Speed
iv. Moving Bodies – Passing, Crossing and Overtaking
v. Relative Speed
vi. Boats and Streams
vii. Applications

Unit-IV: Non-Verbal Reasoning (02 Hours, 10 marks)

a. Analogies

i. Examples
ii. Applications

b. Classification

i. Examples
ii. Applications

c. Sequences

i. Examples
ii. Applications

Unit-V: Analytical Reasoning (03 Hours, 10 marks)

a. Analytical Puzzles

i. Classification Puzzles
ii. Ordering Puzzles
iii. Assignment Puzzles
iv. Applications

b. Letter and Number Series

i. Different Types of Letter Series
ii. Different Types of Number Series
iii. Mixed Series

c. Coding and Decoding

i. Letter Coding
ii. Number Coding
iii. Mixed Coding
iv. Odd Man Out
v. Applications

Guide lines for ICA:
ICA will be based on credit tests and assignments submitted by the student in the form of journal.

Reference Books:

1. R. S. Aggarwal, "Quantitative Aptitude", S. Chand Publication, New Delhi, 2012.
2. R. S. Aggarwal, "A Modern Approach to Verbal Reasoning", S. Chand Publication, New Delhi, 2012.
3. R. S. Aggarwal, "A Modern Approach to Non-Verbal Reasoning", S. Chand Publication, New Delhi, 2012.

Analog & Digital Electronics Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Analog & Digital Electronics	**ADE**	

Course Description:

This laboratory provides students with a comprehensive study of operational amplifier, its various applications & digital circuits.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**02**	**15**	**30**	**01**

Total Semester Credits: 1

Prerequisite Course(s): Fundamental knowledge of Elements of Electrical and Electronics Engineering.

LAB COURSE CONTENT

Outline of Content:

(Note: Minimum FOUR Experiments from group A and FOUR from group B.)

Group A

1. **Design of Inverting & non –inverting summing amplifier**.
   Performing simple arithmetic operations of addition using op-amp in both configurations.

2. **Design of Instrumentation amplifier**.
   Find out the gain of instrumentation amplifier theoretically & practically.

3. **Design of active integrator and differentiator circuits.**
   Take the response of circuit for different waveforms.

4. **Find out the hysteresis voltage of Schmitt trigger circuit**
   Measure the hysteresis voltage.

5. **Generate square, triangular and saw tooth wave using op-amp.**

   Measure the output frequency.

6. **Timer using IC 555 in monostable and astable mode.**

   Calculate the delay provided by IC 555.

Group B

1. **Verification of the truth table of logic gates and verification of De Morgan's theorem.**

   Implement the circuit to verify the operation of logic gates & De-Morgan's theorem.

2. **Construction of basic gates using universal gate (NAND / NOR)**

   To verify the truth table of basic gates using universal gates.

3. **Construction of half adder & full adder circuit. Implementation of full adder with the help of two half adder circuit & one OR gate.**

   Construct the circuits & verify the truth table.

4. **Construction of Half substractor & full substractor Circuit.**

   Construct the circuits & verify the truth table.

5. **Conversion of Gray to Binary and Binary to gray code.**

   a. Prepare the truth table of Gray to binary code.
   b. All the 16 combinations of inputs are given at respective pins
   c. Verify the truth tables of Gray to binary code.

6. **Verification of truth table of multiplexes & flip flops.**

   a. Prepare the truth table of multiplexer & flip-flops.
   b. Based on the select line one of the input will be selected at the output.
   c. Observe the output of multiplexer and verify the truth table.
   d. Examine the output of flip-flops and validate the truth table.
   e. Check out the output for J-K flip-flops, when J and k both inputs are at logic .

Guide lines for ICA:

- ICA will be based on the practical assignments submitted by the students in the form of journal.
- Evaluation will be based on the circuit diagram, understanding of the operation of circuit, observations, type of input and output for circuit.

Reference Books:

1. Ramakant A. Gaikward – "Op amp and Integrated circuit", PHI, Fourth edition, 2012.
2. Coughling, Driscoll - Op amps and Linear Integrated Circuits, Pearson education, Fourth edition.
3. Digital Logic and Computer Design by M. Morris Mano, Pearson.
4. Fundamentals of Digital Circuits by A Anandkumar, Pearson.
5. Sergio Franco - Design with Operational Amplifier and Analog Integrated Circuits, TMH- Third edition.

Discrete Structure and Graph Theory Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Discrete Structure and Graph Theory	**DSGT**	

Course Description:

This laboratory provides students with a comprehensive study of the C programming language in discrete structures and graph theory. Classroom lectures stress the strengths of C which provide students with the means of writing efficient codes for discrete structures and graph theory.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**02**	**15**	**30**	**01**

Total Semester Credits: 1

Prerequisite Course(s): Fundamental knowledge of C.

LAB COURSE CONTENT

Outline of Content:

(Note: Minimum FIVE experiments from the group A and minimum FIVE experiments from the group B.)

(Group A)

1. **A program for logical operations using bitwise operators.**
   Perform logical operations like AND,OR,NOT,IF THEN,IF AND ONLY IF
2. **A program for set operations: Union, Intersection, Difference, Symmetric difference.**
   Perform set operations like union, intersection, difference, symmetric difference, complement
3. **A program for generation of Power set of a given set.**
   Producing power set for a given input set.
4. **A program for generation of permutations.**
   Producing permutations set for a given input set.
5. **A program for generation of combinations.**

Producing permutations set for a given input set.

6. **A Program for Bubble sort.**

   Sorting of given numbers by using Bubble sort.

(Group B)

1. **A Program for Matrix multiplication.**

   Performing Multiplication of two matrices.
2. **A Program for Binary search.**

   Searching of a given number using binary search.
3. **A Program for Shortest Path algorithm using Dijkstra's.**

   Finding shortest path in a graph using Dijkstra's algorithm.
4. **A program for implementation of Kruskal's algorithm.**

   To find minimum spanning tree using kruskals algorithm.
5. **A program for implementation of Prim's algorithm.**

   To find minimum spanning tree using kruskals algorithm.
6. **A program for Inter conversion of number system.**

   Interconverting numbers from one base to another base.

Text Books:

1. C.L. Liu , " Elements of Discrete Mathematics", Second edition, TMH
2. Seymour Lipschutz,Marc Lipson, " Discrete Mathematics", Second edition, TMH

Reference Books:

1. Kenneth H. Rosen, Discrete Mathematics and its Application, Fifth edition, TMH
2. V. K. Balakrishnan, " Graph Theory", TMH.
3. B. Kolman , R. Busby and S. Ross, "Discrete Mathematical Structures", Fourth edition, Pearson.

Microprocessor and Microcontroller Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Microprocessor and Microcontroller	**MPMC**	

Course Description:

This laboratory provides students with a comprehensive study of the basic concepts of microprocessor and microcontroller. Classroom lectures stress the strengths of microprocessor programming, which provide students with the means of writing efficient, maintainable, and portable code.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**02**	**15**	**30**	**01**

Total Semester Credits: 1

Prerequisite Course(s): Fundamental knowledge of assembly programming language.

LAB COURSE CONTENT

Outline of Content:

(Note: Concerned faculty should suitably frame at least 10 experiments related to 8086 and 8087 only. Program based on 8087 are compulsory.**)**

(Group A)

1. **Program using Macro**

   Display personal information using Macro

1. **Program using NEAR and FAR Procedure**
   Addition of two numbers using NEAR and FAR Procedure Perform

2. **Perform addition/subtraction/multiplication of two numbers**

Addition/subtraction/multiplication of two numbers using NEAR and FAR Procedure

3. **Find factorial of given number**
   Find factorial of given number using recursive instruction

4. **Program for Password Verification**
   Program for Password Verification

5. **Perform the BCD Addition**
   Add two 16 bit BCD numbers

6. **Program to Display System Time & Date**
   Display current Time & Date of system

7. **Program for addition of first 50 BCD Numbers**

   Add first 50 BCD Numbers, result is also BCD number

(Group B)

1. **Program for HEX to BCD Conversion and vice versa**

   Convert HEX no. to BCD no. and BCD no. to HEX no**.**

2. **Generate sine wave using 8087 instructions**
   Generate sine wave using 8087 instructions

3. **Generate sum of series using 8087 instructions**
   Generate sum of series such as 1+x/1!-x/2!

4. **Solve the Quadratic Equations using 8087 instructions**
   Simplify the Quadratic Equations using 8087 instructions

5. **Generate Fibonacci series**
   Generate Fibonacci series

Guide lines for ESE:

1. Emphasis should be given to assembly language programming based on 8086 and 8087.
2. In programming, emphasis should be given to algorithm, program with proper comments and input-output.
3. Simple assembly language program (for 8086 and 8087only) may be asked based on above syllabus.

Reference Books:

1. Soumitra Kumar Mandal, “Microprocessor and Microcontroller: Architecture, Programming and Interfacing using 8085, 8086 and 8051”, Tata McGraw-Hill.
2. Douglas V Hall, “Microprocessor and Interfacing, Programming and Hardware”, Tata McGraw Hill, Second edition.
3. Peter Abel, “IBM PC Assembly Language and Programming”, Pearson, Fifth edition.
4. Barry B Bray, “The Intel Microprocessors-Architecture, Programming and Interfacing”, Pearson LPE/PHI, Seventh edition.

Object Oriented Technology Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Object Oriented Technology	**OOT**	

Course Description:

This laboratory provides students with a comprehensive study of the C++ programming language. Classroom lectures stress the strengths of C++, which provide students with the means of writing efficient, maintainable, and portable code.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**02**	**15**	**30**	**01**

Total Semester Credits: 1

Prerequisite Course(s): Fundamental knowledge of Computers and C programming

LAB COURSE CONTENT

Outline of Content:

(Note: Minimum SIX Experiments from group A and FOUR from group B.)

Group A

1. **Write a program for a simple class and object.**
   Performing simple arithmetic operations using C++ class and object like,
   a. Addition,
   b. Subtraction,
   c. Multiplication,
   d. Division.
2. **Write a program for parameterized constructor.**

Demonstrate the use parameterized constructor by passing different types of parameters to the constructor.

3. **Write a program for overloading constructors.**
   Demonstrate the concept of overloading constructor functions using class and object.

4. **Write a program to find the area of rectangle, triangle and sphere using function overloading.**
   To calculate the area of rectangle, triangle and sphere using function overloading and class and object.
5. **Write a program to overload unary operator using member function.**
   Demonstrate the overloading of unary operators using the concept of member functions.
6. **Write a program to overload binary operator using member function.**
   Demonstrate the overloading of binary operators using the concept of member functions.
7. **Write a program for arrays of pointers to objects.**
   Declaring an array of pointers to objects using suitable example.
8. **Write a program using single inheritance, multiple inheritance and hierarchical inheritance.**
   Demonstrate the use of single inheritance, multiple inheritance and hierarchical inheritance by taking suitable example.
9. **Write a program using multilevel inheritance and hybrid inheritance.**
   Demonstrate the use of multilevel inheritance and hybrid inheritance by taking suitable example.
10. **Write a program for virtual base classes.**
    To calculate the total mark of a student using the concept of virtual base class.
11. **Write a program to read and write class objects from files.**
    Writing/reading class object to/from file.
12. **Write a program to format output using ios class functions and flags.**
    To format the output using different ios class functions and flags.
13. **Write a program to format output using manipulators.**
    To format the output using different manipulators.
14. **Write a program using class template.**
    To swap the numbers using the concept of function template.
15. **Write a program for overloading of template functions.**
    Overload templates functions with the number of parameters.

Group B

1. **Write a program for the copy constructor.**
   To calculate factorial of a given number using copy constructor.
2. **Write a program to overload unary operator using friend function.**
   Demonstrate the overloading of unary operators using the concept of friend function.

3. **Write a program to overload binary + operator using member function for concatenation of two strings.**
   Demonstrate the overloading of binary + operator using the concept of member function for concatenation of two strings.
4. **Write a program for matrix multiplication using new and delete dynamic memory allocation operators.**
   Perform the matrix multiplication using new and delete dynamic memory allocation operators.
5. **Write a program to convert class type data to basic type data.**
   Perform the class type data conversion to any basic type data.
6. **Write a program for run time polymorphism using virtual functions.**
   Perform the run time polymorphism using virtual functions.
7. **Write a program for bubble sort using template functions.**
   Perform the bubble sort using the concept of template functions.

Reference Books:

1. E. Balagurusamy, "Object Oriented Programming with C++", Fifth Edition, Tata McGraw Hill, 2011.
2. Robert Lafore, "Object Oriented Programming in C++", Fourth Edition, Pearson Education, 2002.
3. Ashok N. Kamthane, "Object-Oriented Programming with ANSI and Turbo C++", Pearson Education, 2006.
4. Rajesh K. Shukla, "Object-Oriented Programming in C++", Wiley India, 2008.
5. Bjarne Stroustrup, "C++ Programming Language", Third Edition, Addison Wesley, 2002.
6. Yashavant P. Kanetkar, "Let Us C++", Second Edition, BPB Publications, 2003.
7. Venugopal K.R., "Mastering C++", First Edition, TMH, 1999.
8. Mahesh Bhave, Sunil Patekar, "Object Oriented Programming with C++", Second Edition, 2012.
9. Herbert Schildt, "The Complete Reference C++", Fourth Edition, TMH, 2003.

Guide lines for ESE:-

- ESE will be based on the practical assignments submitted by the students in the form of journal.
- In the ESE, the students may be asked to perform the practical assignment with minor modification.
- Evaluation will be based on the paper work of algorithm, understanding of the logic and the syntax, quality of the program, execution of the program, type of input and output for the program.

NORTH MAHARASHTRA UNIVERSITY,

JALGAON (M.S.)

Second Year Engineering

(Computer)

Faculty of Engineering and Technology

COURSE OUTLINE

Semester – IV

W.E.F 2013 – 2014

Data Communication

COURSE OUTLINE

Course Title	Short Title	Course Code
Data Communication	**DC**	

Course Description:

This course is aimed at introducing the fundamentals of data communications to undergraduate students. The goals of the course are to understand the basics and knowledge about the Data Communications using components and protocols of data communications.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	**15**	**45**	**03**

Prerequisite Course(s): Fundamentals of Data Communication.

COURSE CONTENT

Data Communication **Semester- IV**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week **End Semester Examination (ESE) : 80 Marks**
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1 Introduction to Data Communication and Signals

(08 Hours, 16 marks)

a Basics of Data Communication: Characteristics and Components
b Data Representation and Data Flow
c Networks, Introduction to ISO-OSI Reference model
d Introduction to Signals and Transmission Impairments: Analog and Digital
e Periodic Analog Signals, Digital Signals
f Transmission impairment, data rate limits, Performance

2 Digital transmission and Analog transmission

No of Lect – 8, Marks:16

a Digital to Digital Conversion
b Analog to Digital Conversion
c Transmission Modes
d Digital-to-analog Conversion

3 Multiplexing and Transmission Media (08 Hours, 16 marks)

a Multiplexing
b Guided Media
c Unguided Media

4 Switching and Multiple Access (08 Hours, 16 marks)

a Circuit-switched Networks
b Datagram networks
c Virtual-circuit networks
d Multiple Access

5 Error Control and Data Link Control (08 Hours, 16 marks)

a Types of errors
b Block coding
c Linear block codes
d Cyclic codes
e Checksum
f Flow and error control

Text Books:

1. Behrouz A Forouzan, "Data Communications and Networking", Fourth edition: Tata McGraw Hill.
2. P. C. Gupta, "Data Communications", PHI Publications.

Reference Books:

1. William Stallings, "Data & Computer Communications", Seventh edition: PHI Publication.
2. Leon - Garcia, Indra Widijaja, "Communication Networks Fundamental Concepts and Key Architectures", Second edition: McGraw Hill Education.
3. Achyut Godbole, "Data Communication Networks", Tata McGraw Hill.
4. Bruce Hartpence, "Packet Guide to Routing and Switching", O'Reilly.
5. Bruce Hartpence, "Packet Guide to Core Network Protocol" , O'Reilly.
6. James Irvine & David Harle, "Data Communication and Networks: An Engineering Approach", Wiley Edition.

Microprocessor & Microcontroller Interfacing

COURSE OUTLINE

Course Title	Short Title	Course Code
Microprocessor & Microcontroller Interfacing	**MPMCI**	

Course Description:

The objective of this course is to introduce the students to the fundamentals of microprocessor & microcontroller interfacing with assembly programming language and enable them to apply these concepts for real world applications.

Lecture	Hours / Week	No. of Weeks	Total Hours	Semester Credits
	03	15	45	04
Tutorial	01	15	15	

Prerequisite Course(s): Fundamental knowledge of Microprocessors & Microcontrollers.

COURSE CONTENT

Microprocessor & Microcontroller Interfacing **Semester- IV**

Teaching Scheme	Examination Scheme	
Lecture: 3 hours / week	**End Semester Examination (ESE)**	**: 80 Marks**
Tutorial: 1 hour / week	**Paper Duration (ESE)**	**: 03 Hours**
	Internal Sessional Exam (ISE)	**: 20 Marks**

1. Basic I/O Interface

(08 Hours, 16 marks)

a. MSDOS FAT
b. MS DOS Device Drivers Types, Structure of device drivers.
c. 8255 PPI : Internal block diagram, control word and status word, modes of operation, numericals on control word design.

2.

(08 Hours, 16 marks)

a. 8254(PIT) : Internal block diagram, control word format, operating modes, numericals on control word design.

b. 8251(USART) : Architecture and signal description, operating modes, interfacing with 8086 and numericals.
c. TSR programs : concept and implementation.

3. Overall Motherboard Component Logic (08 Hours, 16 marks)

a. Functional block diagram of PC.
b. Motherboard (8086/8088 based) : Motherboard components.
c. Motherboard logic : Reset logic, Interrupt logic, RAM parity logic, NMI logic, Wait state logic, Bus Arbitration logic, RAM & ROM logic, CPU logic, DMA logic, keyboard interface block diagram.
d. Microcomputer Display : Raster scan basics, Overview of character display control system.
e. PC display adapters : CGA,EGA,VGA.
f. Introduction to LCD and Plasma display.

4. 8086 Microprocessor interface (08 Hours, 16 marks)

a. Parallel Printer Interface
b. 7 segment display interface.
c. Disk reading methods: FM , MFM.
d. Internal structure of Floppy disk and hard disk.
e. Floppy Disk Controller : Overview, FDC system interface, Overall operation of floppy disk subsystem, 8272 FDC : internal block diagram and commands.
f. Hard disk controller : HDC commands and device control block.

5. Microcontrollers and Interfacing (08 Hours, 16 marks)

a. Interfacing LEDs and of 7-segment displays.
b. Interfacing keys and keyboard interfacing .
c. Interfacing 0808/0809 ADC.
d. Interfacing DAC 0808.
e. Interfacing stepper motor.

Reference Books:

1. Douglas V. Hall, " Microprocessors and Interfacing : Programming and Hardware", Second edition , Tata McGraw Hill.
2. A. K. Ray & K. M. Bhurchandi, "Advanced Microprocessor and Peripherals – Architecture, Programming and Interfacing", Third edition, Tata Mc Graw Hill.
3. Ray Duncan, "Advanced MS-DOS Programming", Second edition, Microsoft Press.
4. Peter Abel, " IBM PC Assembly language and programming" , Fifth edition, Pearson education/ Prentice Hall of India Pvt. Ltd.
5. B. Govindarajalu, "IBM PC and Clones", Second edition, Tata McGraw Hill.

Data Structures

COURSE OUTLINE

Course Title	Short Title	Course Code
Data Structures	**DS**	

Course Description:

The objective of this course is to introduce the students to the fundamentals of Data Structure with concepts of the C programming language and enable them to apply these concepts for solving real world problems.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Lecture	**03**	**15**	**45**	**04**
Tutorial	**01**	**15**	**15**	

Prerequisite Course(s): Fundamental knowledge of C

COURSE CONTENT

Data Structures **Semester - IV**

Teaching Scheme	**Examination Scheme**	
Lecture: 3 hours / week	**End Semester Examination (ESE)**	**: 80 Marks**
Tutorial: 1 hour / week	**Paper Duration (ESE)**	**: 03 Hours**
	Internal Sessional Exam (ISE)	**: 20 Marks**

1. Introduction to Data Structures (08 Hours, 16 marks)

a Introduction of data and data object.
b Data structure and Abstract Data Type(ADT).
c Implementation of different data structures.
d Basic terminologies with data structures, types of data structures.
e Data structure operations.
f Concept of arrays,pointer and structures.

2. Stack and Queue (08 Hours, 16 marks)

a Detailed knowledge of data structure like stack, queue & circular queue.
b Polish notations & interconversions by using stack.

c Use of stack in function call,recursion,tower of Hanoi.

3. Linked Lists (08 Hours, 16 marks)

a Understand the concept of linked list data structure.

b Pros & Cons of array compared with linked list.

c Creation,traversing,searching,insertion,deletion opertions w.r.t. single linked list.

d Pros & cons of single linked list, double linked list

e Polynomial addition using single linked list as well as storing multivariable polynomials using generalised list.

4. Trees (08 Hours, 16 marks)

a Creation,traversing,searching,insertion,deletion opertions w.r.t. binary search tree.

b Concept of threaded binary tree,tree traversals(recursive & non-necursive).

c Concept of Huffman Algorithm.

e Height Balanced Tree(AVL Search Tree).

5. Searching and Sorting (08 Hours, 16 marks)

a Basics of searching techniques.

b Basics of sorting techniques.

c Different sorting algorithms including Bubble, Insertion, Selection,Quick,Merge,Heap,Radix.

d Time and Space complexity of an algorithm with big 'O', '' , 'Ω' notations.

e Best, Worst, and Avgerage case time complexity of each of these algorithms.

Text Books:

1. Seymour Lipschutz, "Data Structures", Schaums Outlines Tata McGraw Hill, 2006.
2. Ellis Horowitz and Sartaj Sahani, "Fundamentals of Data Structures", Galgotia Publication.

Reference Books:

1. G.S.Baluja, "Data Structures through C", Dhanpatrai Publications.
2. Ashok N. Kamthane, "Introduction to Data structures in C", Person Publications, 2007.
3. Aarom Tanenbaum, Yedidyah Langsam, Moshe Augenstein, "Data structures using c", Pearson Publication.
4. Alfred Aho, John Hopcroft, Jeffrey Ullman, "Data Structures and Algorithms",Pearson Publications.
5. E.Balagurusamy,"Data Structures using C",Tata MacGraw Hill Publications.
6. P.S.Deshpande,O.G.Kakde,"C and Data Structures",dreamtech press Publications.
7. Rajesh K.Shukla, "Data Structures using C and C++" ,Willy India Publication.
8. Larry Nyhoff, "ADTs' Data Structures and prolems with C++",Pearson Publications.

Computer Organization

COURSE OUTLINE

Course Title	Short Title	Course Code
Computer Organization	**CO**	

Course Description:

This course introduces the students about the computer. It includes the terms, concepts, architectures, formats and addressing. This course also describes the Memory organization etc.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	**15**	**45**	**03**

Prerequisite Course(s): Introduction to Computer.

COURSE CONTENT

Computer Organization **Semester- IV**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Introduction to system concepts (08 Hours, 16 marks)

a. To introduce students to System Concept.
b. To learn about Instruction format.
c. To learn General addressing Modes.
d. To learn about Expanding op-codes.
e. To learn about Bus Structures.

2. Arithmetic (08 Hours, 16 marks)

a To know how Numbers are represented.
b To learn Multiplication using Booths and Bit-pairing Algorithms.
c To learn Division using Restoring and Non-Restoring Methods.
d To learn addition and Subtraction of signed numbers.
e To learn Floating point System.

3. Processing Unit (08 Hours, 16 marks)

a To design control unit.

b Designing Control unit using hardwired and Micro programmed methods.

c Learning Wilkes Design method.

d To learn Bus organization.

e To learn execution of complete instruction.

4. Memory (08 Hours, 16 marks)

a Memory organization techniques.

b To know cache memory organization.

c To know Virtual memory.

d To learn basic concepts of memory.

e Introduction to SDRAM, RDRAM, DDRSDRAM, Flash memory.

5. System Organization (08 Hours, 16 marks)

a To know concepts system buses.

b To know Daisy chaining, polling.

c Concepts of PCI bus, SCSI bus, Universal Serial Bus.

d RISC and CISC .

Text Book:

1. Hamacher, Vransic, Zaky, "Computer Organization", Fifth edition, McGraw Hill international.

Reference Books:

1. J.P. Hayes, "Computer Architecture and Organization", Third edition, McGraw Hill international.
2. Sajjan Shiva, "Computer Organization Design & Architecture", CRC Press Publication.
3. Tanenbaum, "Structured Computer Organization", Pearson.
4. William Stallings, "Computer Organization and Architecture", Sixth edition, Pearson.
5. Swati Saxena,"Computer Organization" Dhanpat Rai.
6. Murdocca, Heuring, "Computer Architecture & Organization", Second edition, Wiley.
7. Nicholas Carter, "Computer Architecture", Schaum's Outline.

Computer Graphics

COURSE OUTLINE

Course Title	Short Title	Course Code
Computer Graphics	**CG**	

Course Description:

This course introduces the students about the concepts of user interface with graphics system. It includes the graphics standards, transformations, filling & clipping objects, 2D&3D. This course also describes about graphics applications corresponds with scientific work as well as animation, simulation, etc.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	**15**	**45**	**03**

Prerequisite Course(s): Engineering Graphics.

COURSE CONTENT

Computer Graphics **Semester- IV**

Teaching Scheme	**Examination Scheme**	
Lecture: 3 hours / week	**End Semester Examination (ESE)**	**: 80 Marks**
Tutorial: 1 hour / week	**Paper Duration (ESE)**	**: 03 Hours**
	Internal Sessional Exam (ISE)	**: 20 Marks**

1. Basic Concepts (08 Hours, 16 marks)

a. Introduction to computer graphics
b. Graphics Standards
c. Interactive Computer Graphics
d. Linear and Circle Generation

2. Polygons (08 Hours, 16 marks)

a. Polygons
b. Types of Polygons
c. Polygon filling
d. Scan conversion algorithm
e. Segments

3. 2D & 3D Geometry (08 Hours, 16 marks)

a. 2D transformation primitives and concepts

b. 3 D transformations
c. 3D viewing transformation
d. Concept of parallel perspective projections
e. Viewing parameters

4. Windowing & Clipping (08 Hours, 16 marks)

a. 2 D clipping and 3D clipping
b. Generalized clipping
c. Polygon Clipping
d. Hidden Surfaces and Lines

5. Light, Color & shading (08 Hours, 16 marks)

a. Shading algorithm
b. Color Models – RGB, HVS, CYM
c. Graphical User Interface
d. Graphics Standard
e. Graphics Applications

Text Books:

1. "Computer graphics", ISRD group, THM publications, eleventh reprint 2012.

Reference Books:

1. David F. Rogers, "Procedural Elements for Computer Graphics, Tata McGraw Hill, Second edition.
2. Shirley, Marshner, "Fundamentals of Computer Graphics", Third edition, CRC Publication/ A.K. Peters.
3. Steven Harringtom, "Computer graphics A Programming Approach", MGH.
4. Maurya, "Computer Graphics: with virtual reality system", Wiley India.
5. Foley, Vandam, Feiner, Hughes, "Computer Graphics Principals & Practice", Pearson,
6. Second edition.
7. Donald Hearn and Pauline Baker," Computer Graphics", Pearson LPE, Second edition.
8. Rao and Prasad," Graphics user interface with X windows and MOTIF", New Age.
9. Mukherjee, "Fundamentals of Computer Graphics and Multimedia", PHI.

Application Development Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Application Development Lab	**ADL**	

Course Description:

The objective of this course is to introduce the students to the fundamentals of web development. It includes the technologies like HTML, XML, CSS and Scripting Languages.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	01	**15**	**15**	**02**

Prerequisite Course(s): Fundamental knowledge of Computers.

LAB COURSE CONTENT

This course will use advanced techniques in creating documents for the World Wide Web. Emphasis will be placed on HTML, JavaScript, XML and Java.

1 Introduction to HTML (03 Hours)

a. Tags and Elements
b. Separating Heads from Bodies
c. Attributes
d. Basic Text Formatting
e. Presentational and Phrase Elements
f. List
g. Links and Navigation

2 CSS Style Sheet and Scripting Languages (03 Hours)

a. URLs
b. Images, Audio, and Video
c. Tables, Forms and Frames
d. Cascading Style Sheets
e. Page Layout
f. Scripting Language (Java, VB)

3 Introduction to XML (03 Hours)

a. XML Basics

b. XML Elements
c. Working with DTD

4 DTD and Style Sheet (03 Hours)

a. Adding Style, Using Schemas

5 Introduction to Java (03 Hours)

a. Basic Input/output
b. Applet Class
c. Event handling
d. Introduction to AWT: working with windows, Graphics and Text

Reference Books:

1. Jon Duckett, "Beginning HTML, XHTML, CSS, and JavaScript", John Wiley & Sons publication, 2010.
2. Heather Williamson, "XML: The Complete Reference", First edition, Tata McGraw-Hill Education, 2001.
3. Herbert Schildt, "Java: The Complete Reference", Seventh edition, Tata McGraw-Hill Education, 2006.
4. Thomas A. Powell, "HTML & CSS: The Complete reference", Fifth edition, TMH 2010.
5. Elliotte Rusty Harold, "XML 1.1 Bible", Third edition, Willey Publication, 2004.
6. Steven Holzner, "XML: A Beginner's Guide", First edition, TMH, 2009.
7. Herbert Schildt, "Java: A Beginners Guide", Fifth edition, TMH, 2011.
8. Yashavant Kanetkar, "Let Us Java", BPB Publication, 2011.

Data Communication Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Data Communication Lab	**DC**	

Course Description:

This laboratory provides students with a comprehensive study of the Data Communication concepts and practical implementation of Data Communication concepts.

Laboratory	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	02	15	30	01

Total Semester Credits: 1

Prerequisite Course(s): Fundamental knowledge of Data Communication.

LAB COURSE CONTENT

Outline of Content:

Group A

1. Comparative analysis of different types of network cables with Specifications
   - Study of different types of Network cables – CAT-5, CAT – 6.
   - Study of different cable specifications comparisons.
2. Implementation of Network performance calculator.
   - Simple Program for Calculating Network Performance.
3. Network related commands such as ARP, IPCONFIG, PING, TRACERT, NSLOOKUP, GETMAC, NETSTAT etc.
   - Practical use of Network commands ARP
   - Study of IPCONFIG for IP configurations
   - Study of PING command for finding destination reachable or not.
   - Study of TRACERT command
   - Study of NSLOOKUP command
   - Study of GETMAC to get MAC address.

- Study of NETSTAT to get the network status.

4. I.T Infrastructure planning using Network Connecting Devices.
   - Consider our own college as a case & prepare a planning for I.T. infrastructure.
5. Network Connecting Devices Specifications and configurations.
   - Practical study of Network Connecting device – Repeater.
   - Practical study of Network Connecting device – Switch /HUB.
   - Practical study of Network Connecting device – Router

Group B

1. Implementation of Stop and Wait Protocol
   - Study the working of stop and wait protocol
   - Implementation of simple client and server should be simple
   - Modular approach should be followed.
2. Implementation of Internet checksum
   - Consider a simple example
   - Study it theoretically.
   - Implementation of same .
3. Crimping of cross-wire and straight-through UTP cable to inter-connect two computers.
   - Study of crimping tool.
   - Study of color coding of Network cables.
   - Crimping the cable using Crimping Tool
   - Test the crimping by interconnecting two computers
4. Interconnections of computers in Local Area Network to share resources.
   - Study of concept of LAN & Shared resources.
   - Interconnect computers in LAN
   - Share and make the use of shared resources.
5. Implementation of cyclic redundancy check
   - Study the concept of CRC.
   - Consider Suitable example.
   - Implement same using modular approach.

Note:

- Concerned faculty should suitably frame 08 practical assignments (FOUR from PART – A and FOUR from PART – B) from above list.
- Every student is required to submit the assignments in the form of journal.

Reference Books:

1. Behrouz A Forouzan, “Data Communications and Networking”, Fourth edition: Tata McGraw Hill.
2. P. C. Gupta, “Data Communications”, PHI Publications.
3. William Stallings, “Data & Computer Communications”, Seventh edition: PHI Publication.
4. Leon - Garcia, Indra Widijaja, “Communication Networks Fundamental Concepts and Key Architectures” Second edition: McGraw Hill Education.
5. Achyut Godbole, “Data Communication Networks”, Tata McGraw Hill.
6. Bruce Hartpence, “Packet Guide to Routing and Switching”, O’Reilly.
7. Bruce Hartpence, “Packet Guide to Core Network Protocol” , O’Reilly.
8. James Irvine & David Harle, “Data Communication and Networks: An Engineering Approach”, Wiley Edition.

Microprocessor & Microcontroller Interfacing Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Microprocessor & Microcontroller Interfacing Lab	**MPMCI**	

Course Description:

This laboratory provides students with a comprehensive study of the 8086 and 8051 assembly programming language.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**2**	**15**	**30**	**1**

Total Semester Credits: 1

Prerequisite Course(s): Fundamental knowledge of microprocessors & microcontroller along with instruction set and addressing modes.

LAB COURSE CONTENT

Outline of Content:

(**Note:** Any 6 experiments from Group A and any 4 experiments from Group B. Total 10 experiments should be conducted.)

Group A

Assembly language programming for 8086.

1. Program for mouse interfacing.
2. Program for graphics editor.
3. Program for PC to PC communication using serial port.
4. Program for parallel printer interfacing.
5. Program for ADC interfacing with 8086.
6. Program for DAC interfacing with 8086.
7. Program for stepper motor interfacing.
8. Program for printer device driver.

Group B

Assembly language programming for 8051.

1. Program for interfacing LEDs.
2. Program for interfacing 7-segment displays.
3. Program for keyboard interfacing.
4. Program for ADC interfacing.
5. Program for DAC interfacing.

6. Program for stepper motor interfacing.

Guide lines for ESE:-

- ESE will be based on the practical assignments submitted by the students in the form of journal.
- In the ESE, the students may be asked to perform the practical assignment with minor modification.
- Evaluation will be based on the paper work of algorithm, understanding of the logic and the syntax, quality of program, execution of the program, type of input and output for the program.

Reference Books:

1. Douglas V. Hall, " Microprocessors and Interfacing : Programming and Hardware", Second edition , Tata McGraw Hill.
2. A. K. Ray & K. M. Bhurchandi, "Advanced Microprocessor and Peripherals – Architecture, Programming and Interfacing", Third edition, Tata Mc Graw Hill.
3. Ray Duncan, "Advanced MS-DOS Programming", Second edition, Microsoft Press.
4. Peter Abel, " IBM PC Assembly language and programming" , Fifth edition, Pearson education/ Prentice Hall of India Pvt. Ltd.
5. B. Govindarajalu, "IBM PC and Clones", Second edition, Tata McGraw Hill.

Data Structures Lab

LAB COURSE OUTLINE

Course Title	Short Title Course Code
Data Structures Lab	**DS**

Course Description:

This laboratory provides students with a comprehensive study of the C programming language in data structures. Classroom lectures stress the strengths of C which provide students with the means of writing efficient codes for different data types and data structures.

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Laboratory	**2**	**15**	**30**	**1**

Total Semester Credits: 1

Prerequisite Course(s): Fundamental knowledge of C.

LAB COURSE CONTENT

Outline of Content:

(Note: Minimum FIVE experiments from the Group A and FIVE experiments from the Group B .)

(Group A)

1. **Implementation of stack using array or linked list.**
   Performing simple operations like push, pop and display with respect to stack.

2. **Implementation of queue using array or linked list.**
   Performing simple operations like insertion and deletion of an element into the queue.

3. **Implementation of circular queue using array or linked list.**
   Performing simple operations like insertion and deletion of an element into the circular queue.

4. **Conversion of infix expression to postfix expression.**
   Performing simple conversions of given infix expression into postfix expression.

5. **Conversion of postfix expression to infix expression**.

Performing simple conversions of given postfix expression into infix expression.

6. **Program for addition of two single variable polynomials using Linked List.**

Performing the addition of two polynomials using Linked List.

(Group B)

1. **Implementation of double linked list & perform insertion, deletion and searching.**

Performing the operations on double linked list like insertion, deletion and searching.

2. **Creation of binary tree & perform all non-recursive traversals**.

Create the binary tree and perform the Inorder,Preorder and Postorder traversal.

3. **Creation of binary search tree & perform insertion, deletion and printing in tree shape.**

Create the Binary Search tree performing the operations on BST like insertion, deletion and printing in tree shape.

4. **Create a hash table and handle the collision using linear probing with or without replacement**

Creation of hash Table and handle the collision using linear probing with or without replacement.

5. **Implementation of Quick Sort.**

Sort the given set of numbers using Quick sort.

6. **Implementation of Radix Sort.**

Sort the given set of numbers using Radix sort.

7. **Implementation of Merge Sort.**

Sort the given set of numbers using Merge sort.

8. **Conversion of Infix Expression to Prefix Expression.**

Performing Simple conversions of given Infix Expression into prefix Expression.

Text Books:

1. Seymour Lipschutz, "Data Structures", Schaums Outlines Tata McGraw Hill, 2006.
2. Ellis Horowitz and Sartaj Sahani, "Fundamentals of Data Structures", Galgotia Publication.

Reference Books:

1. G.S.Baluja, "Data Structures through C", Dhanpatrai Publications.

2. Ashok N. Kamthane, “Introduction to Data structures in C”,Person Publications,2007.
3. Aarom Tanenbaum,Yedidyah Langsam,Moshe Augenstein, “ Data structures using C”,Pearson Publications.
4. Alfred Aho,John Hopcroft,Jeffrey Ullman, “Data Structures and Algorithms”,Pearson Publications.
5. E.Balagurusamy, “Data structures using C”,Tata McGraw Hill publications.
6. P.S.Deshpande,O.G.Kakde,”C and Data Structures”,dreamtech press publications.
7. Rajesh K.Shukla, “Data Structures using C and C++” ,Willy India Publication.
8. Larry Nyhoff, “ADTs’ Data Structures and prolems with C++”, Pearson Publications.

Guide lines for ESE:-

- ESE will be based on the practical assignments submitted by the students in the form of journal.
- In the ESE, the students may be asked to perform the practical assignment with minor modification.
- Evaluation will be based on the paper work of concept understanding of topic and algorithm, understanding of the logic and the syntax, quality of program, execution of the program, type of input and output for the program.

Computer Graphics Lab

Lab COURSE OUTLINE

Course Title	Short Title	Course Code
Computer Graphics	**CG**	

Course Description:

This laboratory provides students with a comprehensive study of graphics commands. The practical's make students able for draw different line styles, polygon, circle as well as clipping of polygons & filling of polygons. It also implements 2D & 3D transformations. Because of it students with the means of writing efficient, maintainable, and portable code.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**2**	**15**	**30**	**1**

Total Semester Credits: 1

Prerequisite Course(s): Fundamental knowledge of C, C++ & Graphics.

LAB COURSE CONTENT

(Note: Minimum FIVE experiments from group A and FIVE from group B.)

(Group A)

1. **Line generation using DDA**

   Draw straight line using DDA algorithm.

2. **Different Line Style using Bresenhams Algorithm**

   Draw different styles of line like – Dotted Line , Dashed Line,etc.

3. **Circle Generation using Bresenhams Algorithm**

   Draw 8 way symmetry circle by using Bresenhams algorithm.

4. **Program for Polygon Filling**

   Draw polygon & then filled it by using any filling method like seed fill, flood fill or scan line algorithm.

5. **Program for 2D Transformations (Translation, Rotation and Scaling)**

   Perform 2D transformation on any polygon like- Translation, Rotation & Scaling.

6. **Program for Segmentation**

   Crete segment, Close segment, Delete segment & Open segment.

7. **Program for line clipping**

   Clip line by using any one at least- Sutherland Cohen line clipping algorithm, Mid-point subdivision algorithm, Generalized clipping with Cyrus-Beck Algorithm.

8. **Program for Polygon clipping**

   Clip line by using - Sutherland-Hodgeman algorithm

(Group B)

1. **Program for 3D rotation**

   Perform 3D transformation on any polygon like- Translation, Rotation & Scaling.

2. **Program for Parallel Projections**

   To draw polygon & show Parallel projection on it.

3. **Program for Perspective Projection**

   To draw polygon & show Perspective projection on it.

4. **Program for Animation**

   Show movement of any objects.

5. **Program for Bezier Curve**

   Consider four control points, by finding & joining mid points draw curve.

6. **Mini Project: Developing some Graphics application**

   Create any graphics application.

7. **Study assignment on any latest GUI application or mini-project.**

   Make study of any latest GUI application or develop any mini-project on it.

Guide lines for ESE:

- ESE will be based on the practical assignments submitted by the students in the form of journal.
- In the ESE, the students may be asked to perform the practical assignment with minor modification.
- Evaluation will be based on the paper work of algorithm, understanding of the logic and the syntax, quality of program, execution of the program, type of input and output for the program.

Reference Books:

1. David F. Rogers, "Procedural Elements for Computer Graphics, Tata McGraw Hill, Second edition.
2. Shirley, Marshner, "Fundamentals of Computer Graphics", Third edition, CRC Publication/ A.K. Peters.
3. Steven Harringtom, "Computer graphics A Programming Approach", MGH.
4. Maurya, "Computer Graphics: with virtual reality system", Wiley India.
5. Foley, Vandam, Feiner, Hughes, "Computer Graphics Principals & Practice", Pearson, Second edition.
6. Donald Hearn and Pauline Baker," Computer Graphics", Pearson LPE, Second edition.
7. Rao and Prasad," Graphics user interface with X windows and MOTIF", New Age.
8. Mukherjee, "Fundamentals of Computer Graphics and Multimedia", PHI.

NORTH MAHARASHTRA UNIVERSITY,

JALGAON (M.S.)

Syllabus for

Second Year Electrical Engineering

Faculty of Engineering and Technology

COURSE OUTLINE

SEMESTER – III and IV

W.E.F 2013 – 2014

North Maharashtra University, Jalgaon
Syllabus Structure for Second year Electrical Engineering w.e.f. 2013 – 2014
SEM III

Course Code	Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
							Theory		Practical		Total	
			Theory Hrs /wk	Tutorial Hrs/wk	Practical Hrs/wk	Total	ISE	ESE	ICA	ESE		
	Engineering Mathematics – III(TH)	A	3	1	--	4	20	80	--	--	100	4
	Power Plant Engineering (TH)	B	3	--	--	3	20	80	--	--	100	3
	Electrical Measurement – I (TH)	D	3	1	_	4	20	80	--	--	100	4
	Power System – I (TH)	D	3	--	--	3	20	80	--	--	100	3
	Electrical Engg. Materials (TH)	D	3	_	_	3	20	80	--	--	100	3
	Soft Skill – III (LAB)	C	1	--	2	3	--	--	50	--	50	2
	Power Plant Engineering (LAB)	B	--	--	2	2	--	--	50	--	50	1
	Electrical Workshop (LAB)	D	--	--	2	2	--	--	25	25 (OR)	50	1
	Electrical Measurement – I (LAB)	D	--	--	2	2	--	--	25	25 (PR)	50	1
	Electrical Engg. Materials (LAB)	D	--	--	2	2	--	--	25	25 (PR)	50	1
Total			**16**	**2**	**10**	**28**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination **ESE: End Semester Examination** **ICA : Internal Continuous Assessment**

North Maharashtra University, Jalgaon
Syllabus Structure for Second year Electrical Engineering w.e.f. 2013 – 2014
SEM IV

Course Code	Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
							Theory		Practical		Total	
			Theory Hrs /week	Tutorial Hrs/wk	Practical Hrs/wk	Total	ISE	ESE	ICA	ESE		
	Analog & Digital Electronics (TH)	D	3		_	3	20	80	--	--	100	3
	Network Analysis (TH)	D	3	1	_	4	20	80	--	--	100	4
	Electrical Machine – I (TH)	D	3	1	_	4	20	80	--	--	100	4
	Electrical Installation Estimation &Distribution (TH)	D	3	--	--	3	20	80	--	--	100	3
	Numerical Techniques (TH)	D	3	--	--	3	20	80	--	--	100	3
	C – Programming / MATLAB(LAB)	B	1	--	2	3	--	--	50	--	50	2
	Analog & Digital Electronics(LAB)	D	--	--	2	2	--	--	50	--	50	1
	Network Analysis(LAB)	D	--	--	2	2	--	--	25	25 (PR)	50	1
	Electrical Machines – I (LAB)	D	--	--	2	2	--	--	25	25 (PR)	50	1
	Electrical Installation Estimation & Distribution (LAB)	D	--	--	2	2	--	--	25	25 (OR)	50	1
Total			**16**	**2**	**10**	**28**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination **ESE: End Semester Examination** **ICA : Internal Continuous Assessment**

Course Title	Short Title	Course Code
Engineering Mathematics-III	**EM-III**	

Course Description:

This course is an advanced level Engineering Mathematics which will further strengthen the knowledge of the students who have completed Engineering Mathematics I and II in their first year which were elementary in nature. The course coverage explores Liner Differential Equation**,** function of a complex variable, Integral transforms like Laplace, Fourier, and Z-transform and vector integration. The goal of this course is to understand various differential equations and their solutions with various Integral Transform techniques, together with vector integration and their applications in engineering field.

Lectures	**Hours/Week**	**No. of Weeks**	**Total Hours**	**Credits**
	03	**14**	**42**	**04**
Tutorial	**01**	**14**	**14**	

Prerequisite Course(s): knowledge of HSC , Engineering Mathematics –I & Engineering Mathematics –II subject of first year of engineering.

Objectives of the subject:

1. Students will understand second and higher order differential equations and their solutions by general method as well as some short cut methods. Also application of differential equations to electrical engineering problems are discussed which will allow them to apply to engineering problems.
2. Students will understand function of a complex variable, definition of analytic function and its use in solving real or complex integration. Cauchy Integral theorem and Cauchy residue theorem are very important tools in solving many problems. They will learn these techniques.
3. Students will understand integral transforms such as Laplace transform (L.T.) of a function in t-domain. They will learn L.T. and their inverses of various standard functions as well as special functions such as Heaviside function, Dirac delta function, error function etc. Also they will learn the techniques to solve Initial Value Problems through Laplace transform techniques.
4. Students will understand Fourier transforms, Fourier Sine Transforms, Fourier Cosine transforms and their Inverses which are again very useful in solving Initial Value Problems.
5. Students will also learn Z-Transform and their inverses.
6. Students will understand vector integration such as line integral, surface integral etc which is very much essential in various problems.

7. Students will also learn the important theorems of vector integration like Green's, Gauss' and Stokes' theorems.
8. Students will learn Maxwell's equations which are very important for them.

Course Outcomes:

Upon successful completion this course a students will be

1. Able to apply methods of solving differential equations to the engineering problems they face in industry.
2. Able to understand analytic function of a complex variable. Able to apply Cauchy Integral theorem and Cauchy residue theorem to solve contour integrations
3. Able to apply Laplace Transform and Inverse Laplace Transform which are very useful in solving Initial Value Problems.
4. Able to apply Laplace Transform in solving problems related to their engineering field and other future courses.
5. Able to use Fourier transforms, Fourier Sine Transforms, Fourier Cosine transforms, Z transforms and their Inverses to solve various integration problems.
6. Able to use mathematics in higher studies for analysis and optimal design of system.

Engineering Mathematics – III

(Course Contents)

Semester-III **Examination Scheme:**

Teaching Scheme: **(ESE) End Semester Examination: 80 Marks**

Lectures : 3 Hrs/Week **(ISE) Internal Sessional Examination: 20 Marks**

Tutorials : 1 Hr/Week **(ESE) End Semester Exam duration: 03 Hours**

UNIT-I: Linear Differential Equations: 09 Hours, 16 Marks

a. Solution of LDE of order n with constant coefficients.
b. Method of variation of parameters (Only Second Order).
c. Cauchy's linear equation.
d. Legendre's linear equation.
e. Applications of Linear differential equations to electrical circuits.

UNIT-II: Function of Complex Variable 09 Hours, 16 Marks

a. Analytic Functions, Cauchy-Riemann equations.
b. Cauchy's Residue theorem (Without proof)
c. Cauchy's Integral theorem and Cauchy's Integral Formula (without proof).
d. Conformal mapping, Bilinear transformations.

UNIT-III: Laplace Transform 08 Hours, 16 Marks

a. Definition and Existence of Laplace transforms.
b. Laplace Transform of elementary/standard functions.
c. LT of some special Functions viz., error, Periodic, Unit step, unit Impulse.
d. Theorems & Properties of Laplace Transform (without proof).
e. Inverse Laplace Transform.
f. Applications of LT for Network Analysis.
g. Applications of LT to solution of linear differential equation.

UNIT –IV: Fourier Transform and Z-Transform 08 Hours, 16 Marks

F) Fourier Transform:

a. Introduction to Fourier Integral theorem.
b. Fourier Transforms, Fourier Cosine Transforms, Fourier Sine Transform and their inverse.

G) Z-Transform:

a. Definition and standard properties (without proof)
b. Region of Convergence.
c. Z-Transform of standard /elementary sequences.
d. Inverse Z-transform.

UNIT-V: Vector Calculus and its applications **08 Hours, 16 Marks**

a. Introduction to Gradient, Divergence, Curl, Solenoid and Irrotational vector fields.
b. Vector integration: Line Integral, Surface and Volume integrals.
c. Gauss's Stokes and Green's Theorems (without proof).
d. Applications to Maxwell's equation.

Reference Books:

1. H.K. Dass , "Advanced Engineering Mathematics", S. Chand Publication, New Delhi.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley Eastern Ltd.
3. B.S. Grewal , "Higher Engineering Mathematics", Khanna Publication, Delhi
4. Wylie C.R. & Barrett , "Advanced Engineering Mathematics", Mc Graw Hill
5. B.V. Raman, "Engineering Mathematics", Tata Mc- Graw – Hill.
6. N. P. Bali, "A Text Book of Engineering Mathematics", Laxmi Publication
7. http://nptel.iitm.ac.in

Course Title	Short Title	Course Code
Power Plant Engineering	**PPE**	

Course Description:
This course provides knowledge of basic fundamentals and components required in power plant engineering, working principals and performance evaluation. The course also provides the latest technology involved in power plant engineering.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	**3**	**14**	**42**	**3**

Prerequisite Course(s): Knowledge of HSC and basic fundamentals of Engineering Thermodynamics from first year Engineering.

General Objectives:
The objective of the course is to impart the fundamental knowledge about the power plants. Students develop their ability to apply the specific procedures to analyze the performance and their suitability of power plant components. The students will able to understand basic components of power plant their working principles and will be familiar with the use of different equipments. Safety precautions on work place. This makes bridge on theoretical knowledge and practical practices.

Course Outcomes:
Upon successful completion of this course the students will be able to:

1. Apply basic knowledge of science, mathematics and engineering for understanding thermal studies.
2. Understand advantages, disadvantages of different types of power plant on the basis of economy and environmental aspects.
3. Understand basic working, selection of different boilers, their mountings and accessories.
4. Understand selection of water turbine for hydro electric power plant and working of diesel engine power plant.
5. Understand basic working of Nuclear power plant, social, safety and environmental considerations.
6. Do professional duties in technical field of power plants for economical development.

Power Plant Engineering

(Course contents)

Semester-III **Examination Scheme:**

Teaching Scheme: **(ESE) End Semester Examination: 80 Marks**

Lectures : 3 Hrs/Week **(ISE) Internal Sessional Examination: 20 Marks**

(ESE) End Semester Exam duration: 03 Hours

Unit 1:- Thermodynamics of Power Plant **09 Hours,16 Marks**

a. Introduction to different types of fuels , classification of fuels.
b. Combustion , excess air.(No numerical treatment on combustion of fuels)
c. Thermodynamic Cycles of steam flow.
d. Rankine Cycle, Reheat cycle.
e. Regenerative cycle(numerical based on above Cycles) gas power cycles.
f. Pulverized coal firing systems, fluidized bed combustion.

Unit 2:- Thermal power plants **09 Hours,16 Marks**

a. Types of boilers and boilers mountings and accessories.
b. Heat balance sheet for boiler plant (numerical) layout of thermal power plant,
c. Site selection of thermal power plant.
d. Requirement of electric power station design.
e. Selection of turbine generator set.
f. Coal handling , Storage , preparation and feeding ,out plant handling, storage of coal at plant.

Unit 3:- Hydro electric power plant **08 Hours,16 Marks**

a. Introduction , classification of hydro electric plant.
b. Selection of site for hydroelectric plant.
c. Estimation of power available.
d. Hydraulic turbine, Pelton wheel, Francis and Kaplan turbine.
e. Performance of water turbines (numerical) cavitation in water turbines.
f. Draft tubes ,selection of hydraulic turbines.
g. Governing of turbines, safety measures in hydrostation.

Unit 4:- Nuclear power plant **08 Hours,16 Marks**

a. Introduction , plant siting , basic principles of nuclear Energy
b. Energy mass relationship, structure of the atom , radio active decay, mass defect and binding energy
c. Nuclear Chain reaction, main parts of Nuclear reactor and control , classification
d. Basic reactor system, Radioactive waste disposal ,safety features
e. Diesel power plant:- Introduction, site selection ,main components and its working , Diesel plant Efficiency, choice and characteristic of Diesel power plant.

Unit 5:- power plant Economics and Instrumentation Control. 08 Hours,16 Marks

a. Introduction ,cost analysis, Estimation and predication of load
b. Some commonly used terms, factors affecting economics of generation
c. Distribution of power ,tariffs, load shearing
d. Instrumentation and control of system electric power station
e. Measurement of chemical composition
f. Impurity measuring instruments, steam generator control

Reference Books:

1. Arora, Domkumdawar, "Power Plant Engineering" Dhanpatrai and Sons,
2. G. D. Rai , "An Introduction to Power Plant Technology", , Khanna Publication.
3. R. K. Rajput , Power Plant Engineering, S .Chand
4. J. B. Gupta, "Power Plant Engineering".
5. P. k Nag, "Power Plant Engineering", Tata Mccgraw Hills
6. S . P. Sukhatma ;- "Solar Energy"
7. Chakraborti, Soni, Gupta " A Power Plant System Engg", Dhanpatrai Publication
8. http://nptel.iitm.ac.in

Course Title	Short Title	Course Code
Electrical Measurement-I	**EM-I**	

Course Description:

This course provides a brief introduction to International system of units, dimension of Electrical quantities, methods of magnetic measurements, measurement of resistances. Construction, principle of working, torque equation ,Characteristics, error and adjustment of different types measuring instruments like PMMC, Moving iron and Electro-static instruments, ammeters, voltmeters, wattmeters and energy meters. This course also includes a brief introduction to instrument transformers.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	**3**	**14**	**42**	**4**
Tutorial	**1**	**14**	**14**	

Prerequisite Course(s) : Knowledge of H.S.C. and first year subject Elements of Electrical & Electronics Engineering .

General Objectives:

The objective of the course is to provide the knowledge of system of units, absolute and secondary measurement of electrical & magnetic quantities with different methods. In this course students will also learn available methods of measurement of electrical quantities and equipments for measurement. Students will also get the knowledge about construction, principle of operation, torque equations and different torques acting on measuring instruments. They will also learn errors & their adjustment during their use.

Course Outcomes:

Upon successful completion of this course the students will be able to:

1. Understand the basic concepts in measurement and measuring instruments.
2. Understand the need and process of standardization, calibration of instruments, their significance in process and manufacturing industries for international acceptance.
3. Understand the working principles of measuring instruments and their applications with extension of ranges.
4. Select instruments on basis of accuracy, sensitivity and response time in generation transmission, manufacturing, power system ,testing and energy auditing purposes.
5. Perform technical and professional duties in any type of industries.
6. Do higher studies and use of modern instruments for techno-economical developments.

Electrical Measurement-I

(Course Contents)

Semester-III **Examination Scheme:**

Teaching Scheme: **(ESE) End Semester Examination: 80 Marks**

Lectures : 3 Hrs/Week **(ISE) Internal Sessional Examination: 20 Marks**

Tutorial : 1 Hrs/Week **(ESE) End Semester Exam duration: 03 Hours**

UNIT-I: **09 Hours, 16 Marks**

a. International system of units.
b. Dimension of Electrical quantities.
c. Absolute measurements of current and resistance.
d. Magnetic measurements: Flux meter, permeameters.
e. B-H curve of a ring specimen.
f. Hysteresis loop.
g. Iron loss test at power frequency.
h. Effect of voltage, frequency , form factor on iron loss.
i. Separation of iron losses.

UNIT-II: **09 Hours, 16 Marks**

a. Measurement of Active, Reactive and Apparent power in 3 phase circuit.
c. Effect of power factor on wattmeter reading.
d. Measurements of resistance : Classification,
e. D.C. potentiometer,
f. Kelvin's double bridge,
g. Measurements of high resistance & insulation resistance.
h. Measurement of earth resistance, factor effecting on earth resistivity

Unit-III: **08 Hours, 16 Marks**

a. Measuring instruments (General theory)
b. Definitions and description of Static and Dynamic Characteristic of an instrument, accuracy, linearity, sensitivity, resolution, speed of response.
c. Galvanometer: Construction.
d. Deflection, controlling, damping & balancing systems of D'Arsonval, galvanometers.
e. Ballistic galvanometers.
f. Vibration galvanometers.

UNIT-IV: **08 Hours, 16 Marks**

a. Ammeters and Voltmeters : Construction
b. Principle of operations,
c. Torque equations and errors of PMMC,
d. Moving iron and Electro-static instruments. Extension of ranges using short and multipliers.
e. Instrument transformers : Theory,

f. Expression for ratio and phase angle errors.
g. Design consideration and testing.
h. Precautions in using the instruments transformers.
i. Introduction to capacitive voltage transformer CVT.

Unit-V: **08 Hours, 16 Marks**

a. Wattmeter and Energy-meter : Construction and principle of operation of electrodynamics and induction type wattmeter.
b. Construction and working of low P. F. wattmeters,
c. Errors and their compensation.
d. Construction and principle of operation
e. Torque equation for the induction type of energy-meter.
f. Error and adjustments.

Reference Books:

1. E. W. Golding. , "Electrical Measurements and Measuring instruments", Reem Publication.
2. C. T. Baldwin. , "Fundamentals of Electrical Measurements", Kalyani Publication
3. Cooper and Derfllick, "Electronic Instrumentation and Measurements Techniques", 3rd edition, Prentice-Hall of India.
4. A. K. Sawney. "Electrical & Electronic Measurement and Instrumentation" Danpant Rai & Co.
5. J.B. Gupta, "Electrical & Electronic Measurement and Instrumentation", S K Kataria & Son.
6. http://nptel.iitm.ac.in

Course Title	Short Title	Course Code
Power System-I	**PS-I**	

Course Description:

This course provides an introduction to generation transmission & distribution of power system. This course also provides introduction of different components of transmission system, concept and calculation of transmission line components .Course also provides knowledge of non convectional power plant, different parts and auxiliaries in power plants.

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	**3**	**14**	**42**	**3**

Prerequisite Course(s) : knowledge of H.S.C. and first year subject Elements of Electrical & Electronics Engineering .

General Objectives:

The objective of the course is to provide students with a firm grasp of the basic principles of generation of electrical power, power plant auxiliaries, transmission and distribution. This course will also help students to understand the concepts and terminologies which are used in generation and transmission systems. It is in-depth electrical course related to power generation systems.

Course Outcomes:

Upon successful completion of this course the students will be able to:

1. Apply basic knowledge of science and mathematics and understand various power generating plants.
2. Understand the factors to be consider in site selection for different power plants in view of social, environmental and safety.
3. Understand need and concept of different auxiliaries in power plants.
4. Understand hydrology, load factor, load duration curves in view of economical considerations.
5. To familiarize with different transmission systems and their components.
6. Do higher studies in generation planning, generation scheduling and load dispatch.

Power System –I

(Course contents)

Semester-III **Examination Scheme:**

Teaching Scheme: **(ESE) End Semester Examination: 80 Marks**

Lectures : 3 Hrs/Week **(ISE) Internal Sessional Examination: 20 Marks**

(ESE) End Semester Exam duration: 03 Hours

UNIT-I: G**eneration** **09 Hours, 16 Marks**

a. **Generation:** types of generating plants, basic requirements, site selection principle of working of Hydro Electric power plant, main components and auxiliary components of Hydro Electric power plant.
b. Schematic block diagram and role played by each block for Hydro Electric power plant
c. Basic requirements, site selection and principle of working of Thermal Electric power plant.
d. Main components and auxiliary components of Thermal Electric power plant.
e. Schematic block diagram and role played by each block for Thermal Electric power plant
f. Basic requirements, site selection and principle of working of Nuclear Electric power plant.
g. Main components and auxiliary components of Nuclear Electric power plant.
h. Schematic block diagram and role played by each block for Nuclear Electric power plant

Unit-II: **Non-conventional sources of energy** **09 Hours, 16 Marks**

a. Principle of working, main components and auxiliary components and of solar power plant
b. Schematic block diagram and role played by each block of solar power plant
c. Principle of working, main components and auxiliary components, schematic block diagram and role played by each block of tidal power plant
d. Principle of working, main components and auxiliary components and of MHD power plant
e. Schematic block diagram and role played by each block of MHD power plant
f. Principle of working, main components and auxiliary components of fuel cells
g. Schematic block diagram and role played by each block of fuel cells
h. Principle of working, main components and auxiliary components, schematic block diagram and role played by each block of geothermal energy

UNIT-III: **Power Plant Terminology** **08 Hours, 16 Marks**

a. Classification of power plants as Base load Peak load & Intermediate load plants.
b. Hydrograph
c. Flow duration curve

d. Category of load and load curves
e. Load duration curve.
f. Load factors.
g. Demand factor, Diversity factor.
h. Plant capacity factor, Plant use factor.

UNIT-IV: **Major Electrical Equipments In Power Plants** **08 Hours, 16 Marks**

a. Descriptive treatment of ratings of alternators.
b. Special features and field of use of alternators.
c. Descriptive treatment of ratings, special features and field of use of transformers.
d. Descriptive treatment of ratings, special features and field of use of bus bars.
e. Descriptive treatment of ratings, special features and field of use of exciters, and excitation systems.
f. Descriptive treatment of ratings, special features and field of use of CT and PT
g. Descriptive treatment of ratings, special features and field of use of metering equipments in generating stations.

UNIT-V: **Transmission System** **08 Hours, 16 Marks**

a. Importance of 3 phase overhead transmission lines in power systems & factors to be considered while planning their layout.
b. Resistance, skin effect.
c. Inductance and its estimation for two-wire-single-phase system.
d. Inductance and its estimation for 3 wire 3phase system.
e. Single and double circuit lines, with and without transposition.
f. Equal/unequal and horizontal spacing.
g. Circuit representation of lines: Classification of lines based on length as short, medium & long transmission lines.
h. Representation of transmission line as tee & pie circuit using R-L-C parameter, voltage and current relation of short & medium transmission line.

Reference Books: -

1. B.R.Gupta, “Generation of Electrical Energy”, S Chand Publication
2. William Stevenson ,”Elements of Power System Analysis” M-H international addition
3. OllE Elgerd, “Electrical Energy System Theory”, second edition, TMH.
4. J.B.Gupta, “A Course in Electrical Power System”, Dhanpat Rai and Sons’ Publication
5. http://nptel.iitm.ac.in

Course Title	Short Title	Course Code
Electrical Engineering Materials	**EEM**	

Course Description: The objective of this course is to introduce the students to the fundamental knowledge of various materials used in electrical engineering. The course provides the essential knowledge for the selection of different conducting and insulating materials. This course includes the classification and application of electrical engineering materials. Applications of modern electrical engineering materials for nanotechnology and solar photovoltaic systems.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	**3**	**14**	**42**	**3**

Prerequisite Course(s) : knowledge of H.S.C. and first year subject Elements of Electrical & Electronics Engineering .

General Objectives: The objective of the course is to provide the knowledge of different electrical engineering materials and their applications in designing electrical equipments. The course also provides the study of thermal properties for the efficient design and long life cycle of electrical equipments.

Course Outcomes:

Upon successful completion of this course the students will be able to:

1. Classify different electrical engineering materials and testing of various electrical engineering materials.
2. Understand the electrical and thermal characteristics of conducting, semiconducting, insulating and magnetic materials for the manufacturing of electrical machines and electronic components.
3. Understand and plot the B-H curve of different magnetic materials, their suitability in manufacturing of energy efficient electrical machines.
4. Understand dielectric properties of insulating materials in static and alternating fields.
5. Recognize the materials used for solar photovoltaic systems and nanotechnology.
6. Do higher studies in solar photovoltaic material for green and clean power generation in view of sustainable development through environmental and safety aspects.

Electrical Engineering Materials

(Course Contents)

Semester-III **Examination Scheme:**

Teaching Scheme: **(ESE) End Semester Examination: 80 Marks**

Lectures : 3 Hrs/Week **(ISE) Internal Sessional Examination: 20 Marks**

(ESE) End Semester Exam duration: 03 Hours

UNIT I: Conductors **09 Hours, 16 Marks**

a. Classification: High conductivity, high resistivity materials
b. Fundamental requirements of high conductivity materials and high resistivity materials
c. Mobility of electron in metals
d. Factors affecting conductivity and resistivity of electrical material.
e. Thermoelectric Effect: See back effect, Peltier effect.
f. Commonly used high conducting materials, copper, aluminum, bronze brass, properties, characteristics
g. Constantan, platinum, nichrome, properties, characteristics and applications
h. Materials used for AC and DC machines.

UNIT II: Semi-Conductors and Superconductors **09 Hours, 16 Marks**

a. General concepts, energy bands,
b. Types of semiconductors: intrinsic Semi-conductors, extrinsic Semi-conductors.
c. Compound semiconductor, amorphous semiconductor.
d. Hall effect, drift, mobility, diffusion in Semiconductors.
e. Semi-conductors and their applications.
f. Superconductors: Superconductivity, Properties of Superconductors, Critical field
g. Meissner effect, Type-I and type-II Superconductors.

UNIT III: Dielectrics and Insulators **08 Hours, 16 Marks**

a. Properties of gaseous, liquid and solid dielectric, dielectric as a field medium
b. Electric conduction in gaseous, liquid and solid dielectric
c. Breakdown in dielectric materials, mechanical and electrical properties of dielectric materials,
d. Effect of temperature on dielectric materials, polarization, loss angle and dielectric loss
e. Petroleum based insulating oils, transformer oil, capacitor oils, and properties.
f. Classification of insulation (Solid) and application in AC and DC machines.
g. Solid electrical insulating materials, fibrous, paper boards, yarns, cloth tapes, sleeving wood, impregnation, plastics, filling and bounding materials, fibrous, film, mica, rubber, mica based materials, ceramic materials.

UNIT IV: Magnetic Materials **08 Hours, 16 Marks**

a. Basic terms, Classification of magnetic material, diamagnetic, paramagnetic, ferromagnetic, anti- ferromagnetic and amorphous material.
b. Hysteresis loop, magnetic susceptibility, coercive force, curie temperature.
c. Magneto-striction, factors affecting permeability and hysteresis loss.
d. Common magnetic materials
e. Soft and hard magnetic materials.
f. Electric steel, sheet steel, cold rolled grain oriented silicon steel, hot rolled grain oriented silicon steel, hot rolled silicon steel sheet

UNIT V: Modern Engineering Materials **08 Hours, 16 Marks**

Materials for Electronic Components

a. Resistors, Capacitors
b. Inductors, Relays
c. Bipolar transistors, Field effect transistor (FET)
d. Integrated circuits
e. Power devices

Nano-materials

f. Introduction, Nanotechnology
g. Nano-devices.

Solar/Photovoltaic Cell

i. Introduction, Photo generation of charge carriers, p-n junction
ii. Light absorbing materials: Silicon thin films, concentrating photovoltaic.

Reference Books:

1. A.J.Dekker, "Electrical Engineering Materials".
2. S.P.Seth and P.V.Gupta, "A course in Electrical Engineering Materials", Dhanpat Rai .
3. C.S.Indulkar and S.Thiruvengadam, "Electrical Engineering Materials", S Chand Pub
4. S.P.Chhaiotra and B.K.Bhat, "Electrical Engineering Materials".
5. Electrical Engineering Materials: T.T.T.I Chennai, TMH.
6. R.K.Rajput, "Electrical Engineering Materials", Laxmi Publication.
7. http://nptel.iitm.ac.in

Course Title	Short Title	Course Code
Soft Skills – III	**SK-III**	

Course Description: Through this course we have tried to prepare the students for the industry. Most companies test mathematical and logical ability through an aptitude test. This subject aims at working on these skills of a student through strategies formulae and practice exercises.

Lecture	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
	1	14	14	2
Practical	2	14	28	

Prerequisite Course(s): Fundamental knowledge of High School Mathematics.

Soft Skills – III
(Course Contents)

Semester-III **Examination Scheme:**
Teaching Scheme: **(ICA) Internal Continuous Assessment: 50 Marks**
Lectures : 1 Hrs/Week
Practical : 2 Hrs/Week

Unit-I: Arithmetic-1 **04 Hours, 10Marks**

1. **Basic Formulae**
   i. Divisibility Rules
   ii. Speed Maths
   iii. Remainder Theorem
   iv. Different Types of Numbers
   v. Applications

b. HCF, LCM and Linear Equations

i. HCF – Successive Division and Prime Factorization Methods
ii. LCM – Successive Division and Prime Factorization Methods
iii. Applications
iv. Linear Equations – Elimination Method
v. Substitution Method
vi. Applications

c. Averages and Mixtures

i. Concept of Average
ii. Faster Ways of Finding It

iii. The Allegation Method
iv. Applications

Unit-II: Arithmetic–II **04 Hours, 10Marks**

2. Percentages

i. Concept of Percentage
ii. Working with Percentages
iii. Applications

b. Profit and Loss

i. Difference between Cost and Selling Price
ii. Concept of Profit Percentage and Loss Percentage
iii. Applications

c. Time and Work

i. Basic Time and Work Formula
ii. Relation between Time and Work
iii. Applications

Unit-III: Arithmetic–III **03 Hours, 10Marks**

3. Permutations and Combinations

i. Sum Rule of Disjoint Counting
ii. Product Rule of Counting
iii. Concept of Factorial
iv. Permutations
v. Linear Permutations
vi. Combinations
vii. Circular Permutations
viii. Applications

b. Probability

i. Definition and Laws of Probability
ii. Mutually Exclusive Events
iii. Independent Events
iv. Equally Likely Events
v. Exhaustive Events
vi. Cards
vii. Dice
viii. Applications

c. Time and Distance

i. Speed
ii. Conversion Factors for Speed
iii. Average Speed
iv. Moving Bodies – Passing, Crossing and Overtaking
v. Relative Speed

vi. Boats and Streams
vii. Applications

Unit-IV: Non-Verbal Reasoning **03 Hours, 10Marks**

4. Analogies

i. Examples
ii. Applications

b. Classification

i. Examples
ii. Applications

c. Sequences

i. Examples
ii. Applications

Unit-V: Analytical Reasoning **03 Hours, 10Marks**

5. Analytical Puzzles

i. Classification Puzzles
ii. Ordering Puzzles
iii. Assignment Puzzles
iv. Applications

b. Letter and Number Series

i. Different Types of Letter Series
ii. Different Types of Number Series
iii. Mixed Series

c. Coding and Decoding

i. Letter Coding
ii. Number Coding
iii. Mixed Coding
iv. Odd Man Out
v. Applications

Guide lines for ICA:

ICA will be based on credit tests and assignments submitted by the student in the form of journal.

Reference Books:

1. R. S. Aggarwal, "Quantitative Aptitude", S. Chand Publication, New Delhi, 2012.
2. R. S. Aggarwal, "A Modern Approach to Verbal Reasoning", S. Chand Publication, New Delhi, 2012.
3. R. S. Aggarwal, "A Modern Approach to Non-Verbal Reasoning", S. Chand Publication, New Delhi, 2012.

Course Title	Short Title	Course Code
Power Plant Engineering Lab	**PPE Lab**	

Course Description:
In this laboratory, course emphasis on imparting the practical knowledge about power plant engineering, their working , safety precaution at work place.

Practical	**Hours per Week**	**No. of Weeks**	**Total Hours**	**Semester Credits**
	2	**14**	**28**	**1**

Prerequisite Course(s): Knowledge of HSC and basic fundamentals of Engg. Thermodynamics from First year Engineering.

General Objectives:
The objective of the laboratory is to impart the fundamental knowledge about the power plant. Students develop their ability to apply the specific procedures to analyze the experimental results. The students will able to understand basic components of power plant their working principles and will be familiar with the use of different equipments. This makes bridge on theoretical knowledge and practical practices.

Course Outcomes:
After successful completion of this lab students will be able to:

1. Analyze the practical data for determination of performance of power plant components.
2. Understand basic of thermal, hydroelectric, nuclear power plant.
3. Understand selection of boiler as per load requirement.
4. Understand basic working of different boilers and their mountings and accessories.
5. Understand selection of water turbine for hydro electric power plant.
6. Understand working, safety, environmental considerations of diesel power plant and nuclear power plant.

Power Plant Engineering Lab

(Lab Course Contents)

Semester: III **Examination Scheme:**

Practical: 2Hr/Week **(ICA) Internal Continuous Assessment : 50 Marks**

Teacher should facilitate learning following lab experiments:

1. Study of modern thermal power plant .
2. Study of boiler mountings and accessories
3. Demonstration and trail on diesel engine
4. Study of modern hydro electric power plant
5. Demonstration and trail on any water turbine i.e. Pelton wheel/Francis/Kaplan
6. Study of modern nuclear power plant.
7. Assignment on boiler heat balance sheet and cycles.
8. Assignment on economics of power plant
9. Assignment on instrumentation and control of power plant

Note: Lab file should consist of minimum **Eight** experiments.

Guide lines for ICA :

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Reference Books:

1. Arora, Domkumdawar, “Power Plant Engineering” Dhanpatrai and Sons,
2. G. D. Rai , “An Introduction to Power Plant Technology”, Khanna Publication.
3. R. K. Rajput , Power Plant Engineering, S .Chand
4. J. B. Gupta, “Power Plant Engineering”.
5. P. K Nag, “Power Plant Engineering”, Tata Mccgraw Hills
6. S . P. Sukhatma, “Solar Energy”
7. Chakraborti, Soni, Gupta “ A Power Plant System Engg”, Dhanpatrai Publication

Course Title	Short Title	Course Code
Electrical Workshop	**EW Lab**	

Course Description:

This course provides the basic practical knowledge about the electrical engineering. The course includes the study of different electrical symbols, electrical shocks and safety precautions, equipments used for the measurement and testing of electrical devices, different types of cables and wires, wiring accessories, lamp circuits. The course includes visit to the electrical industries or power plant for the enhancement of practical knowledge.

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Practical	**2**	**14**	**28**	**1**

Prerequisite Course(s) : knowledge of H.S.C. and first year subject Elements of Electrical & Electronics Engineering .

General Objective:

The objective of the course is to provide knowledge about practical practices used in electrical engineering. This course will help students to use various tools for measurement and testing of electrical apparatus. The subject provides scope for practical applications of electrical engineering. The course will also help students to use and implement efficient and techno commercial aspect of maintenance and installation.

Course Outcomes:

Upon successful completion of this course the students will be able to:

1. Understand various electrical symbols and their use in electrical drawing.
2. Familiar with the safety precautions and practices while working in industrial and domestic premises.
3. Understand various maintenance schemes such as preventive, breakdown maintenance.
4. Select correct size and type of cables and wires for different applications.
5. Use different types of measuring and testing equipments.
6. Select correct rating of fuse and MCB for protection scheme and safety.
7. Discharge the professional duties in technical field of maintenance and installation.

Electrical Workshop

(Lab Course contents)

Semester: III **Examination Scheme:**

Teaching Scheme: **(ICA) Internal Continuous Assessment: 25Marks**

Practical: 2 Hrs/Week **(ESE) End Semester Examination Practical (OR) : 25Marks**

1. **Study of different electrical symbols.**
2. **Electrical Shocks and safety precautions.**
3. **Study of different Cables:**
   a. Classification of cable, Types of three Phase cable
   b. Cable standards and specifications
   c. Insulating materials for cables, Cable joining
   d. Coaxial cable, twisted pair cable, Flat ribbon cable.
4. **Study of different wires**
   a. Size selection of wires
   b. Standard wires TRC and CTS wires
   c. Weather proof wires, Flexible wires.
5. **Study of wiring accessories:**
   a. Types of switches
   b. Types of lamp holders, ceiling rose, mounting blocks, socket outlets plugs, wooden boards
   c. main switches (ICDP/ICTP/MCB), Junction boxes, Distribution boxes, fuse boards.
6. **Selection of fuse & MCB.**
7. **Study and use of:**
   a. DC/AC voltmeter and ammeter.
   b. Analog multi-meter and Digital multi-meter for the measurement of electrical quantities.
   c. Megger, Clip-on meter.
   d. Power factor meter.
8. **Domestic wiring and Lamp circuits:**
   a. Simple circuit, series and parallel circuit,
   b. Fluorescent lamp circuits, domestic switch board wiring.
9. **Industrial Visit:** Electrical power station, electrical substation, electrical workshop, electrical process industries (minimum two visits) and its reports.

Note: The term work should include a minimum **eight** experiments. Workshop practical practices should be based on above mentioned topics. Practical should explain with model and samples on each topic.

Guide lines for ICA :

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guide lines for ESE:-

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked questions on practical. Evaluation will be based answers given by students in oral examination.

Reference Books:

1. William A. Thue, “Electrical power cable engineering”
2. S L Uppal, “Electrical Wiring, Estimation and Costing”
3. Surjit Singh, “Electrical wiring, Estimation and Costing”
4. S K Bhattacharya, “Electrical wiring, Estimation and Costing”
5. B R Gupta, “Electrical Wiring, Estimation and Costing”

Course Title	Short Title	Course Code
Electrical Measurement– I Lab	**EM- I Lab**	

Course Description:
In this laboratory, course emphasis on imparting the practical knowledge and understanding of basic principles, characteristic, performance of different measuring instruments and measurement of different electrical quantities. It also gives the platform to understand need and importance of calibration and standardization.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Practical	**2**	**14**	**28**	**1**

Prerequisite Course(s): Knowledge of HSC and Element of Electrical & Electronic Engg at First year Engineering.

General Objectives:
The objective of the laboratory is to impart the fundamental knowledge of measuring instruments. Students develop their ability to select the specific instrument in reference of ranges and resolution of instruments for proper and correct analysis. The students will able to understand the characteristic of measuring instruments. In this lab course, students will be familiar with the use of different equipments, safety precautions on work place. This makes bridge on theoretical knowledge and practical practices.

Course Outcomes:
Upon successful completion of this lab students will be able to:

1. Conduct practical and able to analyze the practical data for various purposes.
2. Measure various electrical quantities and circuit parameters
3. Able to select the measuring instrument with proper range and type for practical uses.
4. Understand methods of measurement of power and energy.
5. Calibrate various types of instruments as per IS .
6. Do professional duties in technical field and able to use advance measuring instruments.

Electrical Measurement-I LAB

(Lab Course Contents)

Semester: III **Examination Scheme:**

Teaching Scheme: **(ICA) Internal Continuous Assessment: 25Marks**

Practical: 2 Hrs/Week **(ESE) End Semester Examination Practical (PR) : 25Marks**

Teacher should facilitate learning following lab experiments:

1. Measurement of active power in three phase circuit by two wattmeter method.
2. Measurement of reactive power by two wattmeter and single wattmeter.
3. Calibration of single phase energy meter at different P.F.'s
4. Calibration of three phase two elements energy meter at different P.F.'s
5. D.C. potentiometer for calibration of ammeter and voltmeter.
6. Kelvin's double bridge: Measurement of low resistance.
7. Measurements of phase angle error and ration error of current Transformer
8. Measurements of phase angle error and ration error of Potential Transformer.
9. Epstein square.
10. Measurement of earth resistance.
11. Measurement of insulation resistance by Megger

Note: The term work should include a minimum **eight** experiments from the above list

Guide lines for ICA :

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guide lines for ESE:-

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical . Evaluation will be based on paper work and performance in the practical.

Reference Books:

1. E. W. Golding. , "Electrical Measurements and Measuring instruments", Reem Publication.
2. C. T. Baldwin. , "Fundamentals of Electrical Measurements", Kalyani Publication
3. Cooper and Derfllick, "Electronic Instrumentation and Measurements Techniques", 3rd edition, Prentice-Hall of India.
4. A. K. Sawney. "Electrical & Electronic Measurement and Instrumentation" Danpant Rai & Co.
5. J.B. Gupta, "Electrical & Electronic Measurement and Instrumentation", S K Kataria & Son.

Course Title	Short Title	Course Code
Electrical Engineering Materials	**EEM Lab**	

Course Description:
The objective of this course is to introduce the students to the fundamental knowledge of various materials used in electrical engineering. Testing of electrical engineering material and application. Testing of insulation oil as per IS.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Practical	**3**	**14**	**28**	**1**

Prerequisite Course(s) : knowledge of H.S.C. and first year subject Elements of Electrical & Electronics Engineering .

General Objectives: The objective of the course is to provide students with the essential knowledge of different electrical engineering materials and their applications in designing electrical equipments. The students will able to carry different test on electrical engineering materials to find characteristic and applications. The students will able to select the material for different applications. This course also provide a platform for further studies in solar electric power generation.

Course Outcomes:
Upon successful completion of this course the students will be able to:

1. Apply basic knowledge of science and understand the characteristic of conducting material and their applications.
2. Analyze the practical data for determination of properties of materials.
3. Understand break down mechanisms for insulating materials.
4. Do testing of transformer oil as per IS.
5. Recognize the materials used for solar photovoltaic systems and nanotechnology.
6. Do higher studies in solar photovoltaic material for green, clean power generation in view of development through environmental aspects.

Electrical Engineering Material LAB

(Lab Course Contents)

Semester: III **Examination Scheme:**

Teaching Scheme: **(ICA) Internal Continuous Assessment: 25Marks**

Practical: 2 Hrs/Week **(ESE) End Semester Examination Practical (PR) : 25Marks**

1. Testing of insulating oil as per I.S.
2. Testing of solid insulating materials as per IS
3. Testing of power capacitors as per IS
4. Measurements of resistivity of conducting materials.
5. Measurements of resistivity of resistive material.
6. Study and use of Gauss meter.
7. Use of spark gap for high voltage testings.
8. To study See back and Peltier effects.
9. Study of hysteresis loop of ferromagnetic materials.
10. Study of various insulating materials.

Note: Lab file should consist of minimum **Eight** experiments.

Guide lines for ICA :

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guide lines for ESE:-

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical. Evaluation will be based on paper work and performance in the practical.

Reference Books:

1. A.J.Dekker, “Electrical Engineering Materials”.
2. S.P.Seth and P.V.Gupta, “A course in Electrical Engineering Materials”, Dhanpat Rai .
3. C.S.Indulkar and S.Thiruvengadam, “Electrical Engineering Materials”, S Chand Pub
4. S.P.Chhaiotra and B.K.Bhat, “Electrical Engineering Materials”.
5. Electrical Engineering Materials: T.T.T.I Chennai, TMH.
6. R.K.Rajput, “Electrical Engineering Materials”, Laxmi Publication.

NORTH MAHARASHTRA UNIVERSITY,

JALGAON (M.S.)

Syllabus for

Second Year Electrical Engineering

Faculty of Engineering and Technology

COURSE OUTLINE

SEMESTER –IV

W.E.F 2013 – 2014

Course Title	Short Title	Course Code
Analog & Digital Electronics	**ADE**	

Course Description:
This course provides knowledge about electronic devices, their characteristic and ability to control high power electrical equipments. This course also provides the knowledge of digital electronics.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	**3**	**14**	**42**	**3**

Prerequisite Course(s): Knowledge of mathematics and sciences at HSC & Element of Electrical and Electronic Engg at first year Engg.

General Objectives: Evolution of analog integrated circuits and digital circuits the space requirement is also reduced. The advancements in digital system design manufacturing, computer technology and information systems have caused the rapid increase in the use of digital circuits. Hence this subject is intended to learn facts, concepts, principles and applications of analog integrated circuits digital electronic. Thus, students can sharpen their skills of developing the logic using digital techniques.

Course Outcomes:
Upon successful completion of this course the students will be able to:

6. Apply basic knowledge of science and engineering to understand electronic devices and circuits.
7. Understand the construction and working principles of different electronic devices.
8. Analyze the circuit for determination of circuit parameters and response of electronic devices.
9. Understand the use of different electronic devices such as BJT,FET,OPP,IC 555, PLL,etc
10. Understand and implement simple digital electronic circuits, able to use updated software and tools for continuous updating of knowledge.
11. Do higher studies in Power Electronics, Modern Drives and Flexible AC Transmission System (FACTS).

Analog & Digital Electronics

(Course Contents)

Semester-IV **Examination Scheme:**

Teaching Scheme: **(ESE) End Semester Examination: 80 Marks**

Lectures : 3 Hrs/Week **(ISE) Internal Sessional Examination: 20 Marks**

(ESE) End Semester Exam duration: 03 Hours

Unit –I **09 Hours, 16 Marks**

a. Review of rectifiers using diodes.
b. Introduction, BJT as a amplifier .
c. Analysis of CE and CC configuration using BJT,
d. Introduction to FET and FET as amplifier ,
e. Multistage amplifier,
f. Basic configuration of differential amplifier.

Unit- II **09 Hours, 16 Marks**

a. Operational amplifier, Op-amp parameters such as CMRR, slew rate , frequency response and gain limitations. (concept only).
b. Inverting ,non inverting amplifier.
c. Summer and substractor .
d. Op-amp applications: Integrator , differentiator .
e. Op-amp as Comparator , Schmitt trigger,
f. Instrumentation amplifier , precision rectifiers(Half wave and full wave rectifiers)
g. Waveform generation using Op-amp – sine, square , and triangular.

Unit-III **08 Hours, 16 Marks**

a. Types of voltage regulators only concepts
b. Series and shunt voltage regulators (Transistor series regulator),
c. Protection circuits for voltage regulators,
d. Fixed and variable voltage regulators using ICs Viz 78xx,79xx,LM723, LM317,
e. Study of VCO and PLL,
f. IC 555 and modes of operation-Astable, Monostable,

Unit-IV **08 Hours, 16 Marks**

a. Introduction to K Map- two, three and four variables, K Map with examples
b. Concept of Latch, SR Flip flop, D type Flip flop
c. Type of triggering- age and level
d. JK flip flop, Race around condition JK Flip flop, D and T type flip flop.
e. JK Master slave flip flop, Applications
f. Opto coupler , opto isolator, opto decoder, opto encoder

UNIT-V **08 Hours, 16 Marks**

a. Shift register, various types and concept
b. Bidirectional shift register,
c. Ripple counter(asynchronous)counter,
d. Synchronous counter only two and three bit operation
e. Twisted ring counter,
f. Up – down counter,

Reference Books:

1. Gaikwad R, "Operational Amplifier", PHI New Delhi
2. K.R.Botkar, "Integrated Circuit" , Khanna Publication,New Delhi
3. Milman Halkias , "Principles of Electronics", TMH
4. R P Jain, "Digital Electronics", TMH
5. Salivahen, "Electronic Devices and Circuit" , TMH
6. http://nptel.iitm.ac.in

Course Title	Short Title	Course Code
Network Analysis	**NA**	

Course Description:

This course provides a brief introduction to students to analyze, design and synthesize network with passive and active elements. This course also includes network topologies, circuit theorems, initial conditions of network, Laplace Transform of signals, two port network parameters & Fourier Series of signals. This course provides brief description about sinusoidal steady –state analysis of R-L-C circuits

	Hours/Week	No. of Weeks	Total Hours	Credits
Lectures	**03**	**14**	**42**	**04**
Tutorial	**01**	**14**	**14**	

Prerequisite Course(s) : knowledge of H.S.C. and first year subject Elements of Electrical & Electronics Engineering .

General Objectives:

The objective of the course is to help the students in basic concepts and modern engineering methods of circuit analysis with passive and active elements. Students will be able to learn the application of Kirchoff's laws including node voltage and mesh current methods in circuit analysis, sinusoidal steady state analysis, network theorems in DC and AC cases, analysis of signal waveforms, Laplace Transformation and its applications in electric circuits, mutually coupled circuits, two port networks, Graph theory and Fourier analysis.

Course Outcomes: Upon successful completion of this course the students will be able to:

1. Identify the network, principal elements of electric circuits: nodes, loops, mesh, branches, voltage and current sources and topological description of a network.
2. Solve problems related to initial and final condition of a network.
3. Write the differential equation of first-order and second –order circuits in standard form and determine the complete solution of first-order and second order circuits excited by switched DC sources.
4. Analyze waveform using Laplace & Fourier transform.
5. Compute different theorems for networks containing linear resistors and independent and dependent sources.
6. Understand the meaning of steady state and transients by inductor and capacitor in circuits and write differential equations for such circuits.
7. Do higher studies in power system analysis under transient condition with help of modern tools.

Network Analysis

(Course Contents)

Semester-IV **Examination Scheme:**

Teaching Scheme: **(ESE) End Semester Examination: 80 Marks**

Lectures: 3 Hrs/Week **(ISE) Internal Sessional Examination: 20 Marks**

Tutorials : 1 Hr/Week **(ESE) End Semester Exam duration: 03 Hours**

Unit-I: **09 Hours, 16 Marks**

Introduction: Continuous and Discrete, Fixed and Time varying systems

a. Linear and Nonlinear, Lumped and Distributed systems
b. Passive and Active networks and systems
c. Independent and Dependent sources, Impulse, Step, Ramp signals
d. Sinusoidal, Square, Saw tooth signals

Coupled circuits:

e. Magnetic coupling, Concept of Self and Mutual inductance
f. Coefficient of coupling, Inductive coupling in series and parallel
g. Dot convention in Coupled coils, Modeling of coupled circuits

Unit-II: **08 Hours, 16 Marks**

a. Source transformation.
b. Mesh and super-mesh analysis, Loop analysis.
c. Node and super-node analysis.
d. Network theorems (Application in AC circuits with independent and dependent sources**):** Superposition theorem.
e. Thevenin's and Norton's theorem.
f. Maximum power transfer theorem.
g. Millman's theorem and its application in three phase unbalanced circuit analysis.

Unit-III: **08 Hours, 16 Marks**

Laplace transforms:

a. Impulse, Step & Sinusoidal response of RL, RC, and RLC circuits.
b. Transient analysis of different electrical circuits with initial conditions.
c. Transient analysis of different electrical circuits without initial conditions.
d. Concept of Convolution theorem and its applications.
e. Solution of Problems with DC & AC sources.

Fourier method of waveform analysis: Fourier series and Fourier Transform (in continuous domain only)

f. Application in circuit analysis.

Unit-IV: **08 Hours, 16 Marks**

Graph theory and Networks equations:

a. Concept of Network graph, Terminology used in network graph: oriented or directed graph, branch, tree, co-tree,.
b. Incidence matrix.
c. Tie-set matrix, Cut set matrix.
d. Network Equilibrium equations in matrix form: Mesh or Loop or KVL Equilibrium equations Node or KCL Equilibrium equations.
e. Duality: Construction of dual networks by mathematical and graphical method.

Unit-V: **08 Hours, 16 Marks**

Two port networks analysis:

a. Open circuit Impedance parameters, Short circuit Admittance parameters, Transmission parameters, Hybrid parameters
b. Inter conversion of parameters
c. Interconnection of Two port parameters: cascade connection, series connection, parallel connection
d. System and Network functions: Driving point impedance and Admittance functions, transfer impedance and admittance, voltage and current transfer ratio
e. Solution of Problems

Filter circuits: Analysis and synthesis of Low pass filters,

f. High pass, Band pass, Band reject filters.
g. All pass filters (first and second order only) using operational amplifier.

Reference Books:

1. W.H. Hyat, J.E. Kemmerly & S.M. Durbin, "Engineering Circuit Analysis", Tata Mc Graw Hill .
2. D. Roy Chowdhury, "Networks and Systems", New Age International Publishers
3. C.L. Wadhwa , "Network Analysis and Synthesis", New Age International Publishers
4. A. Sudhakar & S.S. Palli, Circuit and Networks: Analysis and synthesis, 4th edition. TMH.l
5. M.E. Valkenburg, "Network Analysis", Pearson Education .
6. D. Chattopadhay & P.C. Rakshit , "Fundamental of Electric Circuit Theory", S. Chand.
7. M. Nahvi & J.A. Edminister, Schum's outline series ,Electric Circuit, Tata Graw Hill.
8. Charles K. Alexander, Mathew. N.O. Sadiu , "Fundamental of Electric Circuits", Tata Mc Graw Hill
9. Syed A. Nasar, "Schaum's Solved Problem Series, Electric Circuits", Tata Mc Graw Hill
10. http://nptel.iitm.ac.in

Course Title	Short Title	Course Code
Electrical Machines – I	**EM/C – I**	

Course Description:
This course provides knowledge about D. C. machines and transformers to familiarize students with construction, their working, operation, performance and applications.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	**3**	**14**	**42**	**04**
Tutorial	**1**	**14**	**14**	

Prerequisite Course(s) : Knowledge of HSC and first year subject Element of Electrical and Electronics.

General Objective:
The course aimed at acquiring an understanding on basic principles, operation, performance and control of dc machine and transformer. The subject is helpful in the studies of technological aspects such as utilization of electrical energy, switch gear & protection, manufacturing processes & testing & maintenance of electrical machines. The subject provides scope for higher study and able to use updated software.

Course Outcomes:
Upon successful completion of this course the students will be able to:

1. Apply basic knowledge of science and engineering for understanding electrical machines.
2. Understand construction, concepts, principles of operation & testing of dc machines and transformers.
3. Analyze data for qualitative and quantitative parameters to determine characteristics of machines.
4. Apply knowledge of electrical machines for technological subjects such as utilization of electrical energy, switch gear & protection, manufacturing processes and safety precautions.
5. Discharging duties in technical field for economical, societal and sustainable developments.
6. Do higher studies and able to use updated software for continuous updating of knowledge.

Electrical Machine-I

(Course Contents)

Semester-IV **Examination Scheme:**

Teaching Scheme: **(ESE) End Semester Examination: 80 Marks**

Lectures : 3 Hrs/Week **(ISE) Internal Sessional Examination: 20 Marks**

Tutorial : 1 Hrs/Week **(ESE) End Semester Exam duration: 03 Hours**

Unit – I: **D.C .Machines** **09 Hours, 16 Marks**

a. Introduction of D C machine and its construction .
b. Construction of field and armature winding, Type of armature windings.
c. **D.C. generator:** Basic principles of working, e.m.f. generation, Classification of DC generator.
d. Process of commutation, types of commutation, Causes of bad commutation and remedies.
e. Characteristics and applications of different types of d.c. generator.
f. Losses and power stages in dc generator.
g. Armature reaction, effect and estimation of amp-turns.

Unit – II: **D.C. Motors** **09 Hours, 16 Marks**

a. Working principle of DC motor & significance of back e.m.f.
b. Need of starter and reversing direction of rotation.
c. Classification of DC motors and torque equitation.
d. Speed control by armature voltage and field control.
e. Characteristics and applications of different types of d.c. Motors.
f. Power stages in DC motor & Condition of maximum efficiency .

Unit – III: **Testing of DC Motors** **08 Hours, 16 Marks**

a. Testing of d.c. Machines: Type of tests like routine, type test and supplementary test.
b. Brake test.
c. Swinburne's test.
d. Regenerative or Hopkinson's test .
e. Field's test for series motor.

Unit – IV: **Single Phase Transformers** **08 Hours, 16 Marks**

a. Constructional working details, arrangements of core and coils in shell type and core type transformer.
b. EMF equation, voltage and current ratios, concept of leakage flux and its effect.
c. Leakage reactance and leakage impedances of transformer windings, voltage regulation.
d. General phasor diagrams on no load and load.
e. Open and short circuit test on transformer.
f. Exact and approximate equivalent circuit referred to either side.

g. Efficiency, maximum efficiency, all day efficiency transformer rating, Autotransformers.

Unit – V: **Three – Phase Transformers** **08 Hours, 16 Marks**

a. Poly-phase Transformers-connecting a bank of three identical single phase transformer for three phase transformation,
b. Comparison between a bank of three identical single phase transformers and a single three phase transformer.
c. Standard connections for three phase transformers, their voltage phaser diagrams, phaser groups, suitability of particular connection for supplying unbalanced loads.
d. Factor affecting the choice of connection.
e. Parallel operation of three phase transformers, tap changer on transformer.
f. Open delta or V-V connection, application and vector diagram.
g. Scott connection for three phase to two phase transformation and vice-versa ,applications.
h. Labeling and polarity test of three phase transformer.

Reference Books:

1. E.W.Clayton. "Design and Performance of D.C. Machines"
2. M.G.Say. "Design and Performance of A.C. Machines" CBS Publication
3. Langsdorf, " A.C.Machines," TMH.
4. P.C.Sen. "D.C. Machines", TMH.
5. Nagrath and Kothari "Electric Machine" –TMH
6. B. L. Theraja, "Electrical Technology", Vol – II, S. Chand Publucation
7. P. S Bimbhra, "Electrical Machinery" 2/E, Khanna Publishers
8. Ashfaq Husain, "Electrical Machines", Dhanpat Rai & Co.
9. http://nptel.iitm.ac.in

Course Title | Short Title | Course Code

Electrical Installation Estimation and Distribution | **EIED**

Course Description:

This course provides the knowledge about the various aspects of transmission & distribution system. The course includes the study of different components of transmission & distribution system, types of tariffs, earthing systems, different types of modern advanced tools such as PLC, SCADA to control system efficiently & economically, & basics of illumination engineering.

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	**3**	**14**	**42**	**03**

Prerequisite Course(s) : knowledge of H.S.C. and first year subject Elements of Electrical & Electronics Engineering .

General Objectives:

The objective of the course is to provide students with a firm grasp of the essential principles of a.c. and dc transmission and distribution systems. This course will help student to understand the concepts and terminology that are used in illumination engineering, designing & installation of electrical power system. The subject provides scope for practical applications of electrical power system engineering. The course provide bridge for higher studies in efficient and techno commercial aspect of power system.

Course Outcomes:

Upon successful completion of this course the students will be able to:

1. Understand various methods of power distribution system.
2. Analyze parameter and design of different transmission components.
3. Draw substation layout as per the requirements, design of conductor size and components of systems as per IS.
4. Prepare the detailed wiring, earthing estimates of residential, commercial building and industrial sectors.
5. To familiarize with different scheme of illumination systems.
6. Discharge the professional duties in the field of electrical installations.

Electrical Installation Estimation and Distribution

(Course Contents)

Semester-IV **Examination Scheme:**

Teaching Scheme: **(ESE) End Semester Examination: 80 Marks**

Lectures: 3 Hrs/Week **(ISE) Internal Sessional Examination: 20 Marks**

(ESE) End Semester Exam duration: 03 Hours

UNIT-I: **Supply Systems** **09 Hours, 16 Marks**

a. Supply Systems: Typical A.C. Supply Scheme
b. A.C. transmission, D.C. transmission and comparison between them based on technical, stability and cost effectiveness.
c. Types of transmission: overhead transmission, underground transmission and comparison between them.
d. Various systems of transmission: Dc systems : Two wire dc, two wire dc with midpoint earthed, dc three wire system.
e. Single phase ac systems : Single phase two wire, single phase two wire with midpoint earthed, single phase three wire system .
f. Two phase ac systems: Two phase three wire system, two phase four wire system .
g. Three phase ac system : Three phase three wire system, three- phase four wire system.

UNIT-II: **Overhead Transmission Line Components** **09 Hours, 16 Marks**

a. The support –poles, towers, and their types, cross arm and clamps, guys and stays.
b. Conductors-characteristics of conductor material, types of conductor- solid conductor, bundle conductor, concentrically standard conductor (ACA, ACSR conductor).
c. Insulators – types (pin, strain, shackle and suspension insulator), failure of insulators, potential distribution over suspension insulator string.
d. String efficiency, method of improving of string efficiency.
e. Underground cables **;** classification , construction of cable, requirements of insulating materials , insulation resistance.
f. capacitance dielectric stress in single-core/multi-core/ sheathed /armored cables.
g. Grading of cables – capacitance grading and inter sheath grading.

UNIT-III: **Earthing and Design of Distribution System** **08 Hours, 16 Marks**

a. Earthing : System earthing, Equipment earthing, method and material for earthing.
b. Design of distribution system **:** General design consideration for distribution system.
c. Connection scheme of distribution system.
d. Requirements of distribution system.
e. Service mains, feeders,distributors.
f. A.C. distribution and D.C Distribution
g. Feeder design based on Kelvin's law .

UNIT-IV: **Design and Estimation** **08 Hours, 16 Marks**

a. IE rules related to estimation and installation.
b. Design and estimation of installation of residential buildings, commercial, industrial heads as per IE rules .
c. Different types of tariffs.
d. Introduction to SCADA and PLC panels.

UNIT-V: **Illumination** **08 Hours, 16 Marks**

a. Illumination : nature of light , definitions –plane angle , luminous flux luminous intensity , illuminance and their units, luminous efficiency.
b. Laws of illumination – inverse square law and Lambert's cosine law , polar curves.
c. Requirements of good lighting scheme: Polar curves, direct, indirect , semi direct , semi-indirect lighting
d. Design of lighting scheme : factors to be considered , working plane space to height ratio, absorption factor, maintenance factor , depreciation factor , coefficient of utilization
e. Design of illumination schemes for industrial workshops assembly halls, street lighting.
f. Design of flood lighting schemes**:** factors like reflection factor , waste light factor and beam factor and design of such schemes for typical installation.

Reference Books:

1. J.B.Gupta, "Transmission and Distribution" S.K.Kataria and Sons, New Delhi.
2. S.L.Uppal , "Electrical Wiring , Estimation and Costing" ,Khanna Publishers, New Delhi.
3. V.K.Mehta, "Principle of Power System" ,S.Chand, New Delhi
4. S.L.Uppal, "Electric Power", Khanna Publishers, New Delhi.
5. H.Pratap , "Art and Science of Electrical Utilization" ,Dhanpat Rai and Sons, New Delhi.
6. B.D.Arora, "Electric Wiring, Estimating and Costing", New Heights, New Delhi
7. S.K.Bhattacharya, "Electrical Estimation and Costing"
8. I.E.Rules.
9. http://nptel.iitm.ac.in

Course Title	Short Title	Course Code
Numerical Techniques	**NT**	

Course Description:
This course provides knowledge of numerical methods and optimization technique.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	3	**14**	**42**	**3**

Prerequisite Course(s) : Knowledge of mathematics and science at HSC & First Year Engineering.

General Objectives:
To familiarize with number system in computations, polynomial equations, concept of roots of an equation & methods to find the same. To study various differentiation & integration methods. To understand the tradeoff between programming ease, computation time, data storage, truncation and round off errors.

Course Outcomes:
Upon successful completion of this course the students will be able to:

1. Solve polynomial and transcendental equations,
2. Solve linear algebraic equations, simultaneous equations.
3. Solve Interpolate by Lagrange's & Newton methods.
4. Solve ordinary differential equations by using Euler's method, Runge Kutta method, Taylor's Method and predictor - corrector method.
5. Develop computer program for above methods.
6. Do higher studies in power system such as load flow study and power system optimization.

Numerical Techniques

(Course Contents)

Semester-IV **Examination Scheme:**

Teaching Scheme: **(ESE) End Semester Examination: 80 Marks**

Lectures : 3 Hrs/Week **(ISE) Internal Sessional Examination: 20 Marks**

(ESE) End Semester Exam duration: 03 Hours

Unit I **09 Hours, 16 Marks**

a. Number systems & errors in digital computations,
b. Transcendental & polynomial equations,
c. Concept of roots of an equation & methods to find the same.
d. Secant method,
e. Newton- Raphson method,
f. Regula-Falsi method.
g. Method of matrix Inversion (Shipley inversion method)

Unit II **09 Hours, 16 Marks**

Linear algebraic simultaneous equations:

a. Gauss method, ,
b. Gauss Elimination,
c. Gauss Jordan,
d. Jacobi Iteration,
e. Triangular Factorization (L-U Factorization),
f. Gauss Seidal method.

Unit III **08 Hours, 16 Marks**

Interpolation:

a. Newtons's forward and backward interpolation formula
b. Gauss's forward and backward interpolation formula
c. Lagrange & Newton interpolations,
d. Central difference operators, interpolating polynomials using finite differences,
e. Least squares approximation.

Unit IV **08 Hours, 16 Marks**

Differentiation & Integration:

a. Numerical differentiation methods based on interpolation,
b. Finite differences, undetermined coefficients.
c. Integration using Simpson's 1/3 rule
d. Trapezoidal rule.

Unit V **08 Hours, 16 Marks**

Ordinary differential equations and their solutions:

a. Euler's method,
b. Taylor series method,
c. Runge-Kutta methods,
d. predictor-corrector methods.

Reference Books:

1. Jain & Iyengar, "Numerical Methods for Scientific & Engineering Computation", 3rd edition, New Age international.
2. S.K.Gupta, "Numerical Methods for Engineers", New Age international.
3. Anita, "Numerical Methods for Scientists & Engineers", Tata McGraw Hill.
4. S.S. Shashtry, "Introductory Methods of Numerical", Tata McGraw Hill.
5. Rajaraman, "Numerical Methods & Computations", Tata McGraw Hill.
6. Kanti Swarup , P. K. Gupta, Man Mohan, "Operation Research", Sultan Chand & Son.
7. Yashwant Kanitkar., "Let us C".

Course Title	Short Title	Course Code
C – Programming / MATLAB	**CP/MATLAB**	

Course Description:
The objective of this course is to introduce the students to the fundamental concepts of the C and C++ programming language, MATLAB and enable them to apply these concepts for solving real world problems. This course includes the basic structure and statements required for simple mathematical problems in MATLAB. This course provides the basic concepts of plot and other useful tools required to solve the problems.

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	**1**	**14**	**14**	**2**
Practical	**2**	**14**	**28**	

Prerequisite Course(s): Knowledge of mathematics and subject computer programming at first year engineering.

General Objectives: The objective of the course is to provide students with the essential knowledge of C language and MATLAB programming. This course will help students to use various modern tools for solving the problems of electrical engineering. The subject provides scope for practical applications of electrical engineering. The course will help students to analyze the electrical systems using the software. The course provides the effective approach for the higher studies in the efficient system design.

Course Outcomes:
Upon successful completion of this course the students will be able to:

1. Know use of the appropriate statements available in the C and C++ language and MATLAB.
2. Implement small and medium programs of varying complexity using the most commonly used features of the language.
3. Employ good programming style, standards and practices during program development.
4. Solve the different numerical techniques and perform Matrix operations.
5. Understand and use of MATLAB for solving simple mathematical problems.
6. Plot simple, 2-D and 3-D plots using MATLAB.
7. Use modern engineering tools in MATLAB which are useful for analyzing and designing of electrical power system.

C – Programming / MATLAB

(Course Contents)

Semester-IV **Examination Scheme:**

Teaching Scheme: **(ICA) Internal Continuous Assessment: 50 Marks**

Lectures : 1 Hrs/Week

Practical : 2 Hrs/Week

Unit-I C Language Review: **03 Hours**

a. Algorithms, flowcharts
b. Data types in C
c. The C character set: Constants, Variables and keywords.
d. The decision control structure

Unit-II Program Development Concepts: **03 Hours**

a. The loop control structure
b. Functions and pointers
c. Arrays

Unit-III Numerical computational techniques 1 **03 Hours**

a. Solution of transcendental & polynomial equation.
b. Solution of bisection method.
c. Solution of Newton Raphson method.

Unit-IV Numerical computational techniques 2 **02 Hours**

a. Solution of secant method.
b. Solution of linear equations using Gauss elimination method and Gauss-Jordan methods.
c. Numerical integration and differentiation: trapezoidal rule Simpson's 1/3 and 3/8 rule.

Unit-V MATLAB **03 Hours**

a. Introduction, Basics of MATLAB
b. Working with arrays of numbers
c. Creating and printing simple plots
d. Creating and executing a Script file, function file.
e. Interactive computations: Matrices and vectors, Matrix and array operation.
f. Graphics: Basic 2-D plots, 3-D plots.

C – Programming / MATLAB
(Lab Course Contents)

Teacher should facilitate learning following lab experiments:

1. Bisection Method program.
2. Secant Method program.
3. Newton Raphson Method program.
4. Gauss Elimination Method Program.
5. Gauss seidal Method Program.
6. Simpson`s 1/3 rd and 3/8 th rule program.
7. Arithmetic operations on matrix using MATLAB.
8. Plot the simple, 2-D and 3-D plots using MATLAB.
9. Find the roots of polynomial equations using MATLAB.
10. Find eigenvalues and eigenvectors, LU factorization.

Note: Lab file should consist of minimum **Eight** experiments.

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and assignment submitted by the student in the form of journal.

Reference Books:

1. Yashavant Kanetkar, "Let Us C", BPB Publications, 10/E, 2010.
2. Stephen G Kochan "Programming in C", Pearson Education, 3/E, 2004.
3. Vikas Gupta, "Computer Concepts and C Programming", Dreamtech Press, 2009.
4. Jain & Iyengar, "Numerical Methods for Scientific & Engineering Computation", 3rd edition, New Age international.
5. S.K. Gupta, "Numerical methods for Engineers", New Age international.
6. Anita, "Numerical methods for scientists & Engineers", Tata McGraw Hill.
7. Using MATLAB, Version 6, The Math Works, Inc., 2000.
8. MATLAB function reference, The Math Works, Inc., 2000.
9. Using MATLAB Graphics, Version 6, The Math Works, Inc., 2000.
10. MATLAB Release Notes for Release 12, The Math Works, Inc., 2000.

Course Title	Short Title	Course Code
Analog & Digital Electronics Lab	**ADE Lab**	

Course Description:
This lab course provides knowledge about electronic devices, their characteristic and ability to control high power electrical equipments. This course also provides the knowledge of digital electronics

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	**3**	**14**	**28**	**1**

Prerequisite Course(s): Knowledge of mathematics and sciences at HSC & FE level and basic electronics

General Objectives: Evolution of analog integrated circuits and digital circuits the space requirement is also reduced. The advancements in digital system design manufacturing, computer technology and information systems have caused the rapid increase in the use of digital circuits. Hence this subject is intended to learn facts, concepts, principles and applications of analog integrated circuits digital techniques. Thus, students can sharpen their skills of developing the logic using digital techniques.

Course Outcomes:
Upon successful completion of this course the students will be able to:

1. Apply basic knowledge of science and engineering to understand electronic circuits.
2. Conduct practical and able to analyze the data for determination of circuit parameters and response of electronic devices.
3. Understand the use of different electronic devices such as BJT,FET,OPP,IC 555, PLL, etc
4. Understand and implement simple digital electronic circuits, able to use updated software and tools for continuous updating of knowledge.
5. Do higher studies in Power Electronics, Modern Drives and Flexible AC Transmission System (FACTS).

Analog & Digital Electronics Lab
(Lab Course Contents)

Semester-IV **Examination Scheme:**
Teaching Scheme: **(ICA) Internal Continuous Assessment: 50 Marks**
Practical : 2 Hrs/Week

Teacher should facilitate learning following lab experiments:

1. Op-amp as square & sine wave generator using IC 741.
2. Op-amp as comparator & Schmitt trigger IC 741.
3. Instrumentation amplifier using 3 Op-amps .
4. IC 555 application – Astable, Monostable, Square wave generator, Square counter.
5. IC 565 application ,calculation of lock range and capture range.
6. Study of JK flip flop IC 7476.
7. Study of binary counter using IC 7493.
8. Study of up down counter using IC 74492.
9. Study of IC 723 as low / high voltage regulator.
10. IC 7805 used as fixed voltage regulator, elevated voltage and current, constant current source.

Note: Lab file should consist of minimum **Eight** experiments.

Guide lines for ICA:
ICA shall be based on continuous evaluation of student performance throughout semester and assignment submitted by the student in the form of journal.

Reference Books:-

1.Gaikwad R, “Operational Amplifier”, PHI New Delhi
2.K.R.Botkar, “Integrated Circuit” , Khanna Publication,New Delhi
3.Milman Halkias , “Principles of Electronics”, TMH
4.R P Jain, “Digital Electronics”, TMH.

Course Title	Short Title	Course Code
Network Analysis Lab	**NA Lab**	

Course Description:
This laboratory provides introduction to Electrical engineering students with a focus on circuit components and analysis. This laboratory provides comprehensive study of fundamental concepts of ac and dc networks, network theorems, measurement of circuit parameters and transient response of simple RLC circuits.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**2**	**14**	**28**	**1**

Prerequisite Course(s): Knowledge of HSC & subject Element of Electrical & Electronic Engg. at first year Engineering.

General Objectives:
The objective of the lab course is to provide students with the essential principles of ac and dc electric circuit and basic circuit parameters. This course will help student to understand concept of network theorems, transient response of series and parallel RLC circuits and coupled circuits and two port networks. This course will help the student to apply the network concepts to solve the real life electrical engineering problems. The scope of this course is very wide and it is very important for the further studies and research work.

Course Outcomes:
Upon successful completion of this lab course the students will be able to

1. Introduce the concept of circuit elements, lumped circuits, circuit laws and reduction.
2. Analyze the electric network concepts, topology and equations.
3. Know the solution of differential equations & Laplace transform.
4. Use the knowledge of different theorems, pole zeros & different types of network.
5. Relate the knowledge of Z, Y, H parameters, Fourier series to understand the behaviors of network.

Network Analysis Lab

(Lab contents)

Semester-IV **Examination Scheme:**

Teaching Scheme: **(ICA) Internal Continuous Assessment: 25 Marks**

Practical : 2 Hrs/Week **(ESE) End Semester Examination(PR): 25 Marks**

Teacher should facilitate learning following lab experiments:

1. Verifications of Thevenin's Theorem for two port network.
2. Verification of Norton's Theorem for two port network.
3. Verification of Superposition Theorem for two port network.
4. Pole and Zero plot of one port network.
5. Measurement of Z parameter of two port network.
6. Measurement of Y parameter of two port network.
7. Measurement of ABCD parameter of two port network.
8. To plot frequency response of series RLC circuit.
9. To plot frequency response of parallel RLC circuit.
10. Study of filters

Note: Lab file should consist of minimum **Eight** experiments.

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guidelines for ESE:

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical out of above practicals. Evaluation will be based on paper work and performance in the practical.

Reference Books:

1. M.E. Van Valkenberg , "Network Analysis" , Third edition, Printice Hall of India.
2. William Hayt, Jack Kemmerly, "Engineering Circuits Analysis", Fifth editions, McGraw Hill International edition.
3. D. Roy Choudhary, "Networks and Systems", New Age International.
4. Franklin Koo, "Network analysis and Synthesis", New Age International
5. Shyam Mohan and sudhakar, "Network Analysis", TMH Publications.

Course Title	Short Title	Course Code
Electrical Machines – I Lab	**EMC – I Lab**	

Course Description:

In this laboratory, course emphasis on imparting the practical knowledge and understanding of basic principles, characteristic , performance and testing of DC Machines, Speed control DC Motor and use of other measuring equipment their class of accuracy. It also give the platform to understand construction, working ,performance , testing and selection of transformer.

Practical	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	2	**14**	**28**	**1**

Prerequisite Course(s): Knowledge of HSC and First year Engineering.

General Objectives:

The objective of the laboratory is to impart the fundamental knowledge of Machines and transformers. Students will able to develop their ability to apply the specific procedures for analyze the experimental results. The students will able to understand the characteristic of DC machines and application in process and manufacturing. Application of transformer in power system. In this lab course, students will be familiar with the use of different equipments, safety precautions on work place. This makes bridge on theoretical knowledge and practical practices.

Course Outcomes:

After successful completion of this lab students will be able to:

1. Understand constructional details of dc electrical machines and transformer.
2. Understand specifications of machines.
3. Conduct practicals for determination of characteristics of different type of generator , motors and transformers.
4. Able to analyze the test data for practical for applications, design and manufacturing processes.
5. Understand methods of speed control and starters for dc motors.
6. Select motor and transformer based on technical specifications, safety precautions and application.
7. Do professional duties in technical field for economical development.

Electrical Machine-I Lab

(Lab Course Contents)

Semester-IV **Examination Scheme:**

Teaching Scheme: **(ICA) Internal Continuous Assessment: 25 Marks**

Practical : 2 Hrs/Week **(ESE) End Semester Examination(PR): 25 Marks**

Teacher should facilitate learning following lab experiments:

1. Determination of magnetization, external , internal characteristics and critical field resistance of d. c. shunt generator
2. Determination of external characteristics of d.c. compound generator as i) differential compound, ii) cumulative compound generator.
3. Speed control of D.C shunt motor by armature and field control.
4. i) Study of 3 and 4 point starters. ii) Reversal of motor rotation of D. C. motor.
5. Determination of performance characteristic of DC series motor by direct load.
6. Swinburne's test on DC shunt Motor: Determination of losses & efficiency.
7. Polarity and Ratio test on single phase transformer/three phase transformer.
8. Determination of performance of single phase transformer by direct load test.
9. Determination of performance of single phase transformer by conducting Open circuit and short circuit test.
10. Parallel operation of two single phase transformer.
11. Study of phaser and vector group of three phase transformer.
12. Scott connection of two single phase transformer on no load and at balanced load.

Note: Lab file should consist of minimum **Eight** experiments.

Guide lines for ICA :

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guide lines for ESE:-

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical. Evaluation will be based on paper work and performance in the practical.

Reference Books:

1. E.W.Clayton. "Design and Performance of D.C. Machines"
2. M.G.Say. "Design and Performance of A.C. Machines" CBS Publication
3. Langsdorf, " A.C.Machines," TMH.
4. P.C.Sen. "D.C. Machines", TMH.
5. Nagrath and Kothari "Electric Machine" –TMH

6. B. L. Theraja, “Electrical Technology”, Vol – II, S. Chand Publucation
7. P. S Bimbhra, “Electrical Machinery” 2/E, Khanna Publishers
8. Ashfaq Husain, “Electrical Machines”, Dhanpat Rai & Co.

Course Title Short Title Course Code

Electrical Installation, Estimation and Distribution Lab EIED Lab

Course Description:

This course provides an introduction to generation transmission & distribution of power system also in this course study of different components of transmission system, types of earthing systems & Different types of latest control system such as PLC, SCADA, Design of transmission line components and different parts

Practical	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	2	14	28	1

General Objectives:

The objective of the course is to provide students with a firm grasp on the essential principles of transmission and distribution. This course will help student to understand the concepts and terminology which are used in transmission and distribution systems. It is not an in-depth electrical course but, rather a course aimed at acquiring an understanding of basic principles that are used in electrical engineering.

Course Outcomes:

Upon successful completion of this course the students will be able to:

1. Analyze and design of different transmission components.
2. Design of conductor size and components of systems
3. Describe concept and conditions of different interconnected systems in transmission systems
4. Understand construction and working different earthing systems
5. Familiarize with different illumination systems.
6. Understand safety precautions in electrical installations.

Electrical Installation, Estimation and Distribution Lab

(Lab Course Contents)

Semester-IV **Examination Scheme:**

Teaching Scheme: **(ICA) Internal Continuous Assessment: 25 Marks**

Practical : 2 Hrs/Week **(ESE) End Semester Examination(OR): 25 Marks**

Teacher should facilitate learning and drawing sheets:

1. Transmission line components : Five insulators –one piece pin, three piece pin type , suspension insulator (one disc) string insulator (one disc), shackle insulator; towers for single circuit and double circuit lines; lightening arrestor, stays, clamps, pin; typical pole including service mains, HT, LT lines supporting pole , 'H' type pole.
2. Distribution substation; Two views (front view and side view) of distribution substation layout ; single line diagram, pipe earthing , plate earthing.
3. Wiring diagrams and symbols**:** minimum 25 symbols as per IS standards. Any one circuit diagram out of the following: 1) Rotor resistance starter, 2) Automatic star /delta starter, 3)Maximum demand indicator.
4. Project on illumination design of laboratory / workshop or small scale industrial establishment along with estimation.
5. Project on electrification of given area showing distributors, feeders and substations.

The drawing sheet along with report on each topics.

Guide lines for ICA :

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of drawing sheet and journal.

Guide lines for ESE:-

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked questions on practical. Evaluation will be based answers given by students in oral examination.

Reference Books:

1. J.B.Gupta, "Transmission and Distribution" S.K.Kataria and Sons, New Delhi.
2. S.L.Uppal , "Electrical Wiring , Estimation and Costing" ,Khanna Publishers, New Delhi.
3. V.K.Mehta, "Principle of Power System" ,S.chand, New Delhi
4. S.L.Uppal, "Electric Power", Khanna publishers, New Delhi.
5. H.Pratap , "Art and Science of Electrical Utilization" ,Dhanpat Rai and Sons, New Delhi.
6. B.D.Arora, "Electric Wiring, Estimating and Costing", New Heights, New Delhi
7. S.K.Bhattacharya, "Electrical Estimation and Costing"
8. I.E.Rules.

NORTH MAHARASHTRA UNIVERSITY, JALGAON (M.S.)

Second Year Engineering (E&TC/E&C/Elex/IE)

Faculty of Engineering and Technology

COURSE OUTLINE

Semester – III

W.E.F 2013 – 2014

SE Semester - III

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory			Practical	Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
Solid State Devices & Circuits-I (TH)	D	3	1	---	4	20	80	---	---	100	4
Electrical Circuits and Machines (TH)	B	3	---	---	3	20	80	---	---	100	3
Digital Techniques & Applications (TH)	D	3	1	---	4	20	80	---	---	100	4
Component Devices & Instrumentation Technology (TH)	D	3	---	---	3	20	80	---	---	100	3
Communication Systems-I (TH)	D	3	---	---	3	20	80	---	---	100	3
Soft Skills – III	C	1	---	2	3	---	---	50	---	50	2
Electrical Circuits and Machines (LAB)	B	---	---	2	2	---	---	50	---	50	1
Solid State Devices & Circuits-I (LAB)	D	---	---	2	2	---	---	25	25(PR)	50	1
Communication Systems-I (LAB)	D	---	---	2	2	---	---	25	25(PR)	50	1
Digital Techniques & Applications (LAB)	D	---	---	2	2	---	---	25	25(PR)	50	1
Total		**16**	**2**	**10**	**28**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination **ESE:** End Semester Examination **ICA:** Internal Continuous Assessment

SE Semester - IV

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory		Practical		Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
Engineering Mathematics-III (TH)	A	3	1	---	4	20	80	---	---	100	4
Solid State Devices & Circuits-II (TH)	D	3	1	---	4	20	80	---	---	100	4
Microprocessors (TH)	D	3	---	---	3	20	80	---	---	100	3
Linear Integrated Circuits (TH)	D	3	---	---	3	20	80	---	---	100	3
Network Analysis & Synthesis (TH)	D	3	---	---	3	20	80	---	---	100	3
Computer Programming-II (LAB)	B	1	---	2	3	---	---	50	---	50	2
Linear Integrated Circuits (LAB)	D	---	---	2	2	---	---	50	---	50	1
Solid State Devices & Circuits-II (LAB)	D	---	---	2	2	---	---	25	25(PR)	50	1
Network Analysis & Synthesis (LAB)	D	---	---	2	2	---	---	25	25(PR)	50	1
Microprocessors (LAB)	D	---	---	2	2	---	---	25	25(PR)	50	1
Total		**16**	**2**	**10**	**28**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination **ESE:** End Semester Examination **ICA:** Internal Continuous Assessment

Solid State Devices & Circuits- I

COURSE OUTLINE

Course Title	Short Title	Course Code
Solid State Devices & Circuits- I	**SSDC-I**	

Course Description:

This course includes semiconductor-based devices such as diodes, bipolar transistors, FETs, and related components. This course is designed to introduce to the students to the basic principles and applications of semiconductor devices. It includes semiconductor physics and semiconductor diodes, fundamentals, BJT, FET, MOSFET (operation & characteristics), frequency response of BJT and FET. This course provides instruction in the theory and application of solid state devices in the electronics industry. Emphasis is placed on the physical characteristics and uses of solid state devices.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Lecture	03	14	42	04
Tutorial	01	14	14	

Prerequisite Course(s): Knowledge of Elements of Electronics Engineering

COURSE CONTENT

Solid state Devices and Circuits-I **Semester-I**

Teaching Scheme	**Examination Scheme**
Lecture: 3 hours / week	**End Semester Examination (ESE) : 80 Marks**
Tutorial: 1 hour / week	**Paper Duration (ESE) : 03 Hours**
	Internal Sessional Exam (ISE) : 20 Marks

Unit-I: Introduction to Semiconductor **No of Lect. – 9, Marks: 16**

a) Intrinsic and Extrinsic Semiconductor - Concept of Doping, N type Semiconductor, P type semiconductor.
b) Conduction Mechanism - Drift and Diffusion Current, Carrier Concentration after doping (N and P type material).
c) Law of mass action.
d) Introduction to Diode application – Voltage Multiplier circuit, Analysis of half wave rectifier & full wave rectifier. Analysis of Full wave rectifier with capacitor filter.

Unit-II: Introduction to BJT Biasing **No of Lect. – 9, Marks: 16**

a) Concept of DC and AC Load line.
b) Introduction to biasing, Need of biasing, Different biasing circuit (Fixed bias, collector- base bias, Voltage divider bias), Stability factor.

c) Bias Compensation technique - Bias Compensation technique using Diode and Thermistor.
d) Small Signal model of BJT- Hybrid parameter model of BJT for Low frequency analysis, Derivation for Av, Ai, Ri, & Ro using Exact and Approximate analysis in terms of H parameter for CE amplifier.
e) Exact and Approximate analysis for all Configurations, Conversion formulae for CE, CC.
f) Millers Theorem and its Dual.

Unit-III: Introduction to FET **No of Lect. – 8, Marks: 16**

a) Symbol, Construction Principle of operation, V-I and Transfer Characteristics for N & P channel FET.
b) FET Parameter.
c) Biasing of FET, Different biasing methods.
d) Analysis of Voltage divider biasing method (Analytical and Graphical method).
e) Small Signal model of FET, CS, CG& CD amplifier.
f) FET as an amplifier CS (Bypass and Un bypassed excluding rd).

Unit-IV: Introduction to MOSFET **No of Lect. – 8, Marks: 16**

a) MOSFET - Symbol, Types of MOSFET - Depletion and Enhancement type MOSFET (N channel & P channel).
b) Construction, Operation, & V-I characteristics of MOSFET.
c) MOSFET biasing - Types of Depletion & enhancement MOSFET biasing.
d) MOSFET as amplifier.

Unit-V: Cascade Amplifier and Frequency response of BJT **No of Lect. – 8, Marks: 16**

a) Multistage amplifier - Need of multistage amplifier, multistage amplifier with combination of different configuration (CE-CE, CE-CB).
b) Concept of frequency response of BJT, B.W. of Single stage and cascaded amplifier.
c) Square wave Testing **-** Derivation for F_L & F_H of Square wave testing of an amplifier.
d) Concept of Capacitor in Frequency response - Effect of coupling, bypass capacitor and junction capacitor on frequency response of BJT.

Reference Books:

1. R. Boylestad, L. Nashelsky "Electronics Devices and Circuit Theory", 10th Edition, Pearson, 2009.
2. S. Salivahanan, N. Sureshkumar and A. Vallavaraj, "Electronics Devices and Circuits", Tata McGraw Hill, 3rd Edition, 2009.
3. S. C. Sarkar, "Electronics Devices and Circuits-I" Everest Publishing House, The Millennium 12th enlarged and revised Edition, 2001.
4. T. Floyd, "Electronics Devices" conventional current version, 7th Edition, Pearson, 2008.
5. D. Cheruku, B. Krishna, "Electronics Devices and Circuits", 2nd Edition, Pearson, 2012.
6. J. Miillman, C. Halkias, "Integrated Electronics", Tata McGraw Hill, 1st Edition, 1991.

Electrical Circuits and Machines

COURSE OUTLINE

Course Title	Short Title	Course Code
Electrical Circuits and Machines	**ECM**	

Course Description:

The course considers the basic principles of electrical machines. In this course we will introduce some of the basic concepts and terminology that are used in modern electrical engineering. The students can use this knowledge to analyze electrical networks, D.C. machines, A.C. machines & transformer etc.

Lecture	Hours / Week	No. Of Weeks	Total Hours	Semester Credits
	03	14	42	03

Prerequisite Course(s): knowledge of Elements of Electrical and Electronics Engineering.

COURSE CONTENT

Electrical Circuits and Machines **Semester-III**

Teaching Scheme

Lecture: 3 hours / week

Examination Scheme

End Semester Examination (ESE): 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Unit-I: Three phase circuits & A.C. circuits **No of Lect. – 9, Marks: 16**

a) Thevenin's, Norton's theorem's application for A.C. network.
b) Three phase circuit power measurement (Star and Delta load).
c) Single watt meter, two Watt meter method.
d) Active, reactive, apparent power and power factor.

Unit-II: DC Machines **No of Lect. – 9, Marks: 16**

a) DC machine construction.
b) EMF equation of Generator, working principle (series & shunt).
c) Motor working principle; back EMF (series & shunt).
d) Torque equation and speed equation of motor.
e) Characteristics, losses and power stages of generator & motor.
f) Necessity of starter (3-point starter).

Unit-III: Single phase & three phase transformers **No of Lect. – 8, Marks: 16**

a) Transformers construction, EMF equation, working Principle: 1ϕ and 3ϕ.
b) Transformer phasor diagram no load & on load.
c) C.T, P.T. & Auto-transformer.
d) Open circuit and short circuit tests, Efficiency and regulation.

Unit-IV: Synchronous Machines **No of Lect. – 8, Marks: 16**

a) Alternator construction, principle of operation and EMF equation.
b) Principle of operation of synchronous motor.
c) Synchronous Motors on load with different excitation.
d) Explain hunting in synchronous motor.

Unit-V: Induction Motors **No of Lect. – 8, Marks: 16**

a) Three phase I.M. construction.
b) Principle of working of three-phase I.M.
c) Slip, torque equation (T_{st} & T_{max}) & torque - slip characteristics.
d) Types of starters (DOL, star-delta, auto-transformer).
e) Single phase Induction motors
f) Special machines (stepper motor, servo motor, universal motors) working, data analysis and application.

Reference Books:

1. B. Theraja, A. Theraja, "A Text book of Electrical Technology- Vol-I",S. Chand, 1st Edition, 2010.
2. B. Theraja, A. Theraja, "A Text book of Electrical Technology- Vol-II", S. Chand, 1st Edition, 2010.
3. V N Mittle/ Arvind Mittal, "Basic Electrical Engineering", McGraw Hill Companies, 2nd Edition.
4. H. Cotton, "Electrical Technology", CBS Publication, 7th Edition.

Digital Techniques and Applications

COURSE OUTLINE

Course Title	Short Title	Course Code
Digital Techniques and Applications	**DTA**	

Course Description:

This course provides an introduction to digital electronics & its applications covering different types of codes, Boolean laws, SOP and POS form, k-map technique, arithmetic circuits such as adder, substractor, Multiplexer, Demultiplexer and their applications, different types of flip-flops and their applications, sequential circuits such as ripple counter, synchronous counter, Mod-n counter, shift resister and its applications. Logic families TTL, MOS and its interfacing. This course is designed to give a broad understanding of the principles of Digital Techniques and its applications.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Lecture	03	14	42	04
Tutorial	01	14	14	

Prerequisite Course(s): Knowledge of Basic gates and semiconductor devices.

COURSE CONTENT

Digital Techniques and Applications **Semester-I**

Teaching Scheme	**Examination Scheme**	
Lecture: 3 hours / week	**End Semester Examination (ESE)**	**: 80 Marks**
Tutorial: 1 hour / week	**Paper Duration (ESE)**	**: 03 Hours**
	Internal Sessional Exam (ISE)	**: 20 Marks**

Unit-I: Codes and Boolean algebra **No of Lect. – 9, Marks: 16**

a) Introduction to Number Systems.
b) Representation of signed numbers.
c) Classification of Binary codes. BCD codes, Excess -3 codes, Gray codes, ASCII codes, Hamming code and pulsed operation of logic gates.
d) Boolean algebra, reducing Boolean expressions, SOP form, POS form, Minterm, Maxterm.
e) Simplification of Boolean function using K-map method and don't –care condition.

Unit-II: **Combinational Logic Circuits** **No of Lect. – 9, Marks: 16**

a) Half and Full adder/ Substractor Circuits**.**
b) IC 7483 parallel adder, BCD adder, 1bit / 2 bit's digital comparator.
c) Code converters: - binary to gray, BCD to Excess-3, BCD to 7 Segment
d) Multiplexer, De-multiplexer, decoder and their Applications.

Unit-III: **Sequential Circuits and Shift Register.** **No of Lect. –9, Marks: 16**

a) Classification of Sequential Circuits.
b) Latches and Edge triggered Flip-Flops:- SR, JK, T, D, Master Slave JK flip-flop and their application.
c) Excitation table, conversion of Flip- Flops.
d) Shift Register: - Definition, different types and their operation.
e) 4-bit bidirectional Shift register, 4-bit universal shift Register.
f) Application of shift Register: - ring counter, twisted ring counter.

Unit-IV: **Counters and Clocked sequential circuits.** **No of Lect. – 9, Marks: 16**

a) Design Ripple and MOD-N counters using Flip- Flops.
b) Design 4 bit UP/DOWN Ripple counter.
c) Design synchronous and MOD- N counters using Flip- Flops.
d) Synchronous sequential Machine.
e) Design Synchronous sequential circuits.

Unit- V: **Logic Families** **No of Lect. – 9, Marks: 16**

a) Characteristics of digital ICs.
b) Operation of TTL NAND gate, totem – pole, open collector output, wired AND, unconnected inputs.
c) CMOS inverter, NAND, NOR gate, unconnected inputs, wired logic, open drain output.
d) Interfacing of CMOS to TTL and TTL to CMOS.
e) Tri-State logic.
f) Comparison of different logic families.

Reference Books:

1. A. Kumar, "Fundamentals of Digital Circuits", PHI, 2nd Edition, 2011.
2. R. Jain, "Modern Digital Electronics", Tata McGraw Hill, 4th Edition, 2010.
3. Leach, Malvino, "Digital Principles and Applications", Tata McGraw Hill, 5th Edition, 2002.
4. J. Wakerly, "Digital Design Principles and Practices", Pearson 2nd Edition, 2009.
5. R. Tocci, "Digital Systems Principles and Applications", Pearson 2nd Edition, 2002.

Component Devices & Instrumentation Technology

COURSE OUTLINE

Course Title	Short Title	Course Code
Component Devices & Instrumentation Technology	**CDIT**	

Course Description:

This course provides an introduction to different devices used in instrumentation & electronics engineering covering types of errors in measurement, different analog and digital instruments such as voltmeter, current meter, ohm meter, recorders, instrumentation amplifier and function generator, AC and DC bridges, study of different transducers like temperature, humidity, flow, pyrometer, piezoelectric and phototransistor and basic of printed circuit board designing.

Lecture	Hours / Week	No. of Weeks	Total Hours	Semester Credits
	03	14	42	03

Prerequisite Course(s): Knowledge of Physics and Elements of Electrical & Electronics Engineering.

COURSE CONTENT

Component Devices & Instrumentation Technology **Semester-III**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Unit-I: Measurement, Error and Display device **No of Lect. – 8, Marks: 16**

a) Definition of different term: Accuracy, precision, sensitivity, resolution, Significant figures.
b) Errors: gross error, systematic error, random error, limiting errors.
c) Statistical Analysis.
d) Permanent magnet moving coil mechanism (PMMC).
e) DC ammeter and DC volt meter.
f) Series and shunt type of ohmmeter.

Unit-II: Electronic instruments **No of Lect. – 8, Marks: 16**

a) Digital multi-meter.
b) Types of DVM: Linear Ramp type, Integration, Dual slope integration and successive approximation.
c) Recorders: Galvanometric, potentiometer, magnetic recorder.

d) Designing of Instrumentation amplifier.
e) Basic Standard Sine Wave Generator, Function generator block diagram.

Unit-III: Bridges and their applications **No of Lect. – 9, Marks: 16**

a) Wheatstone bridge.
b) Kelvin Bridge and Kelvin's double bridge.
c) General form of AC Bridge.
d) Maxwell Bridge, Hay Bridge.
e) Schering Bridge.
f) Wien Bridge & Wagner ground connection.

Unit-IV: Transducers and application **No of Lect. – 8, Marks: 16**

a) Thermometer and Thermocouple.
b) Integrated Circuit Temperature Transducers.
c) Measurement of Humidity by Hygrometer.
d) Flow transducer: - Turbine and Electromagnetic flow meter.
e) Pyrometer.
f) Piezoelectric Transducer, Phototransistor.

Unit-V: Printed Circuit Boards **No of Lect. – 9, Marks: 16**

a) Classification of PCBs, Manufacturing of basic printed circuit boards.
b) Artwork generation: Basic approach, general design guideline, Artwork generation guideline, film master preparations.
c) Copper clad laminates: properties and types.
d) Etching techniques, mass-soldering techniques.
e) Multilayered Boards.
f) Overview of Passive Components.

Reference Books:

1. H. Kalsi, "Electronic Instrumentation", TMH, 2nd Edition, 2007.
2. A. Helfric and W. Cooper, "Modern Electronics Instrumentation and Measurement Technique", Pearson LPE, 2005.
3. A. Sawhney, "Electrical and Electronics measurement and Instrumentation", Dhanpat Rai and company, 18th Edition, 2007.
4. K. Kishore, "Electronic Measurement and Instrumentation", Pearson 4th, Edition, 2012.
5. R. Khandpur, "Printed Circuit Boards Design Fabrication, Assembly and Testing", TMH, 1st Edition 2005.
6. A. Kalavar, "Electronic Materials Components and Devices Technology", Everest Publishing House, 10th Edition, 2004.

Communication Systems-I

COURSE OUTLINE

Course Title	Short Title	Course Code
Communication Systems-I	**CS-I**	

Course Description:

The course considers analog communication systems. In this course we will introduce some of the basic mathematical concepts that will allow us to think in the two "domains" of communications, the time domain and the frequency domain. We will cover the basic types of analog modulation (AM, FM, and phase modulation) from both a mathematical description and from a block-diagram system approach.

	Hours / Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	03	14	42	03

Prerequisite Course(s): Analog signal and fundamentals.

COURSE CONTENT

Communication Systems-I **Semester-III**

Teaching Scheme	**Examination Scheme**
Lecture: 3 hours / week	**End Semester Examination (ESE): 80 Marks** **Paper Duration (ESE) : 03 Hours** **Internal Sessional Exam (ISE) : 20 Marks**

Unit-I: Introduction to Communications System & Noise No of Lect. – 8, Marks: 16

a) Communications Systems and need of modulation.
b) Introduction, External noise, internal noise.
c) Noise Calculations.
d) Noise Figure and noise Temperature.

Unit-II: Amplitude modulation & SSB Techniques No of Lect. – 8, Marks: 16

a) Amplitude Modulation Theory.
b) Generation of Amplitude Modulation.
c) Evolution and Description of Single Side Band Techniques (SSB).
d) Suppression of Carrier and Unwanted Side Band.
e) Extensions of SSB.

Unit-III: Frequency and Phase modulation concept **No of Lect. –8, Marks: 16**

a) Theory of Frequency and Phase Modulation.
b) Noise and Frequency Modulation.
c) Generation of Frequency Modulation.

Unit-IV: AM / FM receiver **No of Lect. – 8, Marks: 16**

a) Receiver Types.
b) A.M. Receivers.
c) F.M. Receivers.
d) Single and Independent Sideband Receivers.

Unit-V: Pulse Modulation

No of Lect. – 8, Marks: 16

a) Fourier Transform and properties.
b) Statement of Sampling theorem and types of Sampling.
c) Pulse amplitude Modulation and concept of TDM, FDM.
d) Pulse Width Modulation and Pulse Position Modulation.
e) PWM and PPM generation block diagram and wave form description.

Reference Books:

1. G. Kennedy, B. Davis, "Electronic Communication Systems", Tata McGraw Hill Edition, 4th Edition, 1999.
2. H. Taub, D. L. Schilling and G. Saha, "Principles of Communication Systems", Tata McGraw-Hill Edition, 3 rd Edition, 2012.
3. S. Kundu, "Analog and Digital Communication", Pearson, ISBN 978-81-317-3187-1.
4. D. Roddy, J. Coolen, "Electronic Communications", Pearson, 4th Edition, 2011.

Soft Skills – III

COURSE OUTLINE

Course Title	Short Title	Course Code
Soft Skills – III	**SK-III**	

Course Description: Through this course we have tried to prepare the students for the industry. Most companies test mathematical and logical ability through an aptitude test. This subject aims at working on these skills of a student through strategies formulae and practice exercises.

Lecture	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
	1	14	14	2

Prerequisite Course(s): Fundamental knowledge of High School Mathematics.

COURSE CONTENT

Soft Skills – III **Semester-III**

Teaching Scheme **Examination Scheme**

Lecture: 1 hour / week **Internal Continuous Assessment (ICA): 50 Marks**

Unit-I: Arithmetic-1 **No. of Lect. – 3, Marks: 10**

a. Basic Formulae

i. Divisibility Rules.
ii. Speed Maths.
iii. Remainder Theorem.
iv. Different Types of Numbers.
v. Applications.

b. HCF, LCM and Linear Equations

i. HCF – Successive Division and Prime Factorization Methods.
ii. LCM – Successive Division and Prime Factorization Methods.
iii. Applications.
iv. Linear Equations – Elimination Method.
v. Substitution Method.
vi. Applications.

c. Averages and Mixtures

i. Concept of Average.

ii. Faster Ways of Finding It.
iii. The Allegation Method.
iv. Applications.

Unit-II: Arithmetic–II **No of Lect. – 3, Marks: 10**

a. Percentages

i. Concept of Percentage.
ii. Working with Percentages.
iii. Applications.

b. Profit and Loss

i. Difference between Cost and Selling Price.
ii. Concept of Profit Percentage and Loss Percentage.
iii. Applications.

c. Time and Work

i. Basic Time and Work Formula.
ii. Relation between Time and Work.
iii. Applications.

Unit-III: Arithmetic–III **No of Lect. –3, Marks: 10**

a. Permutations and Combinations

i. Sum Rule of Disjoint Counting.
ii. Product Rule of Counting.
iii. Concept of Factorial.
iv. Permutations.
v. Linear Permutations.
vi. Combinations.
vii. Circular Permutations.
viii. Applications.

b. Probability

i. Definition and Laws of Probability.
ii. Mutually Exclusive Events.
iii. Independent Events.
iv. Equally Likely Events.
v. Exhaustive Events.
vi. Cards.
vii. Dice.
viii. Applications.

c. Time and Distance

i. Speed.
ii. Conversion Factors for Speed.
iii. Average Speed.
iv. Moving Bodies – Passing, Crossing and Overtaking.
v. Relative Speed.
vi. Boats and Streams.
vii. Applications.

Unit-IV: Non-Verbal Reasoning **No of Lect. 2, Marks: 10**

a. Analogies

i. Examples.
ii. Applications.

b. Classification

i. Examples.
ii. Applications.

c. Sequences

i. Examples.
ii. Applications.

Unit-V: Analytical Reasoning **No of Lect. – 3, Marks: 10**

a. Analytical Puzzles

i. Classification Puzzles.
ii. Ordering Puzzles.
iii. Assignment Puzzles.
iv. Applications.

b. Letter and Number Series

i. Different Types of Letter Series.
ii. Different Types of Number Series.
iii. Mixed Series.

c. Coding and Decoding

i. Letter Coding.
ii. Number Coding.
iii. Mixed Coding.
iv. Odd Man Out.
v. Applications.

Guide lines for ICA:
ICA will be based on credit tests and assignments submitted by the student in the form of journal.

Reference Books:

1. R. S. Aggarwal, "Quantitative Aptitude", S. Chand Publication, New Delhi, 2012.
2. R. S. Aggarwal, "A Modern Approach to Verbal Reasoning", S. Chand Publication, New Delhi, 2012.
3. R. S. Aggarwal, "A Modern Approach to Non-Verbal Reasoning", S. Chand Publication, New Delhi, 2012.

Electrical Circuits and Machines

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Electrical Circuits and Machines	**ECM**	

Course Description:

In this laboratory course emphasis is on the understanding need of electrical engineering and their application.

	Hours/Week	No. Of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Total Semester Credits: 1

Prerequisite Course(s): Elements of Electrical & Electronics Engineering

LAB COURSE CONTENT

(Note: Minimum FOUR Experiments from each group.)

Group A

1. **Two Wattmeter method of power measurement in three phase balanced load.**

    a. Measure the line Voltage for star / delta inductive load.
    b. Measure the line current for star / delta inductive load.
    c. Measure the power of watt-meters.
    d. Draw the phasor diagram for the star / delta inductive load.
    e. Calculate total power.

2. **Speed control of D.C. shunt motor by armature voltage and flux control method**.

    a. Measure armature voltages of D.C. shunt motor.
    b. Measure the field current of D.C. shunt motor.
    c. Plot graph for measure values voltages and field current.
    d. Verification of characteristics of motor.

3. **Load test on three phase induction motor.**

    a. Measure input Voltage and current of motor.
    b. Measure output speed of motor.
    c. Measure output torque of motor.
    d. Calculate the input power of motor.

e. Calculate the output power of motor.
f. Calculate the efficiency of motor.
g. Verification of performance characteristics of motor.

4. O.C. and S.C. test of single phase transformer to determine regulation and efficiency.

a. Measure the reading of ammeter.
b. Measure the reading of voltmeter.
c. Measure the reading of wattmeter.
d. Calculate no load resistance & reactance.
e. Calculate equivalent resistance, reactance and impedance.

5. Load test on D.C. series motor

a. Measure load current I_L.
b. Measure armature current I_a.
c. Verification of performance characteristics of motor.

Group B

1. Study of specification & application single phase motors.

a. Describe working and construction.
b. Selection criteria for application.
c. Use of datasheet for same.
d. Assembly & dissembling.

2. Study of specification & application of stepper motor.

a. Describe working and construction.
b. Selection criteria for application.
c. Use of datasheet for same.
d. Assembly & dissembling.

3. Study of specification & application of servo motor.

a. Describe working and construction.
b. Selection criteria for application.
c. Use of datasheet for same.
d. Assembly & dissembling.

4. Study of specification & application of universal motors.

a. Describe working and construction.
b. Selection criteria for application.
c. Use of datasheet for same.
d. Assembly & dissembling.

5. **Study of starter of three-point starter.**

    a. Identify and explain different parts of starter.
    b. Assembly & dissembling of starter.
    c. Connection of starter according to wiring diagram.

6. **Study of starter of star-delta starter.**

    a. Identify and explain different parts of starter.
    b. Assembly & dissembling of starter.
    c. Connection of starter according to wiring diagram.

7. **Study of starter of DOL starter.**

    a. Identify and explain different parts of starter.
    b. Assembly & dissembling of starter.
    c. Connection of starter according to wiring diagram.

Reference Books:

1. B. Theraja, A. Theraja, "A Text book of Electrical Technology- Vol-I",S. Chand, 1st Edition, 2010.
2. B. Theraja, A. Theraja, "A Text book of Electrical Technology- Vol-II", S. Chand, 1st Edition, 2010.
3. V N Mittle/ Arvind Mittal, "Basic Electrical Engineering", McGraw Hill Companies, 2nd Edition.
4. H. Cotton, "Electrical Technology", CBS Publication, 7th Edition.

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Solid State Devices & Circuits-I

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Solid State Devices & Circuits-I	**SSDC-I**	

Course Description:

In this laboratory course emphasis is on the understanding of semiconductor diodes, Transistor, Field effect transistor and other devices.

	Hours/Week	No. Of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Total Semester Credits: 1

Prerequisite Course(s): Basics of Elements of Electronics engineering.

LAB COURSE CONTENT

Outline of Content:

(Note: Minimum FOUR Experiments from each group.)

Group A

1. **To find load regulation of full wave Bridge wave rectifier circuit with capacitor filter.**

   a.Calculate load regulation of full wave bridge rectifier circuit.

2. **Plot I/P and O/P characteristics of BJT.**

   a. Determine input & output resistance from the characteristics.

3. **To Plot DC Load Line for BJT (Voltage Divider biasing circuit).**

   a. D.C. analysis of Circuit (Theoretical Calculation of ICq , VCEq i.e. Q point)
   b. Calculation of ICq, VCEq i.e Q Point Practically.

4. **To plot regulation characteristics of Voltage doubler circuit**

   a. Calculation of Load regulation.
   b. Plot characteristics of Doubler circuit.

5. Plot frequency response of CE-CE Cascade amplifier.

h. Find voltage gain and bandwidth.
i. Plot frequency response.
j. Calculate Ri, Ro.

6. Study the effect of bypass capacitor on frequency response of single stage CE amplifier

a. Calculate Voltage gain and Bandwidth without bypass capacitor.
b. Calculate Voltage gain and Bandwidth with bypass capacitor.
c. Compare "a" and "b".

Group B

1. To Plot DC Load Line for FET (Voltage Divider biasing circuit).

a. D.C. analysis of Circuit (Theoretical calculation of Idq , Vdsq i.e. Q point)
b. Calculation of Idq, Vdsq i.e. Q Point Practically.

2. Plot characteristics of CSFET.

a. Determine amplification factor, trans-conductance, and dynamic resistance.

3. Study the frequency response of CSFET.

a. Calculate Voltage gain and Bandwidth. Plot frequency response
b. Calculate of Ri, Ro.

4. Square wave testing of an amplifier.

a. Calculate Lower cutoff frequency and higher cutoff frequency.
b. Calculate bandwidth.

5. Plot frequency response of CE-CC Cascade amplifier.

a. Find voltage gain and bandwidth
b. Plot frequency response.
c. Calculate Ri, Ro

6. **To determine A_V, R_i, R_o of Darlington amplifier.**

a. Calculate A_v.
b. Calculate R_i, R_o.

Reference Books:

1. R. Boylestad, L. Nashelsky "Electronics Devices and Circuit Theory", 10th Edition, Pearson, 2009.
2. S. Salivahanan, N. Sureshkumar and A. Vallavaraj, "Electronics Devices and Circuits", Tata McGraw Hill, 3rd Edition, 2009.
3. S. C. Sarkar, "Electronics Devices and Circuits - I" Everest Publishing House, The Millennium 12th enlarged and revised Edition, 2001.
4. Thomas L. Floyd, "Electronics Devices" conventional current version, 7th Edition, Pearson, 2008.
5. D. Cheruku, B. Krishna, "Electronics Devices and Circuits", 2nd Edition, Pearson, 2012.
6. J. Miillman and C. Halkias, "Integrated Electronics", Tata McGraw Hill Edition, 1st Edition, 1991.

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guide lines for ESE:

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical out of 8. Evaluation will be based on paper work and performance in the practical.

Communication Systems-I

LAB COURSE OUTLINE

Course Title	Short Title & Course Code
Communication Systems-I	**CS-I**

Course Description:

In this laboratory course emphasis is on the understanding of need of modulation and demodulation and their uses.

	Hours/Week	No. Of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Total Semester Credits: 1

Prerequisite Course(s): Analog signal and its fundamentals.

LAB COURSE CONTENT

(Note: Minimum FOUR Experiments from each group.)

Group A

1. **Study of AM transmitter and calculate of modulation index of AM wave by envelope method.**

   a. Sketch and recognize the resulting waveforms for a sinusoidal carrier being amplitude modulated by a single frequency audio signal.
   b. Draw and analyze graphs to show the resulting waveform, and frequency spectrum for a sinusoidal carrier amplitude modulated by an audio signal, to a given depth of modulation, m;
   c. Select and use the formula:

$$m = \frac{(V_{max} - V_{min})}{(V_{max} + V_{min})}$$

   To calculate the depth of modulation for given amplitude modulated RF signal.

2. **Analyze and generate A.M. Demodulation signal by diode detector.**

   a. Generate AM modulated wave form.
   b. Apply Modulated AM signal to demodulator.
   c. Observe clipping effect.
   d. Compare original modulating signal with demodulated output.

3. **Study of FM and calculate of modulation index of FM wave.**

   a. Generate FM waveform.
   b. Calculate Modulation Index.
   c. Compare over with A.M. modulation.

4. **F.M. Demodulation (Phase discriminator/Ratio detector method.)**

   a. Generate FM modulated wave form.
   b. Apply Modulated FM signal to demodulator.
   c. Compare original output with demodulated output.
   d. Plot S-curve

5. **To Construct and Verify Pre-emphasis and De-emphasis and Plot the Waveforms.**

   a. Apply the sinusoidal signal as input signal to pre emphasis circuit.
   b. By increasing the input signal frequency observe the output voltage and calculate gain.
   c. Plot the graph between gain Vs frequency.
   d. Repeat same procedure for de-emphasis circuit.

6. **Study of Amplitude limiter circuit.**

   a. Apply sinusoidal signal.
   b. Find out limiting range of applied input signal.
   c. Draw the graph for same and discussed about result.

Group B

1. **Calculate gain for RF / IF stage with AGC and without AGC.**

   a. Explain concept regarding with and without AGC.
   b. Calculate gain of RF/IF stages with AGC.
   c. Calculate gain of RF/IF stages without AGC

2. **DSB-SC signal generation using balanced modulator.**
   a. Observe that the output is double side band suppressed carrier.
3. **Analyze voltage and waveform at various stages/points in A.M. radio receiver (i.e. Super-heterodyne Radio Receiver).**

   a. Identify the different stages and write down the information about the individual stage.
   b. Observation may be any available information such as number, value, type or any other indication.
   c. Observed and draw waveform of various stages.
   d. Analyze signal each points.

4. PAM modulator & demodulator.

a. Generate pulse amplitude modulated waveform.
b. Observed waveform and made calculation.
c. Detection of modulated waveform.
d. Observed demodulated PAM waveform compute information.

5. PWM modulator & demodulator.

a. Generate pulse width modulated waveform.
b. Observed waveform and made calculation.
c. Detection of modulated waveform.
d. Observed demodulated PWM waveform compute information.

6. PPM modulator & demodulator.

a. Generate pulse position modulated waveform.
b. Observed waveform and made calculation.
c. Detection of modulated waveform.
d. Observed demodulated PPM waveform compute information.

Reference Books:

1. G. Kennedy, B. Davis, "Electronic Communication Systems", Tata McGraw Hill Edition, 4th Edition, 1999.
2. H. Taub, D. L. Schilling and G. Saha, "Principles of Communication Systems", Tata McGraw Hill Edition, 3 rd Edition, 2012.
3. S. Kundu, "Analog and Digital Communication", Pearson, ISBN 978-81-317-3187-1.
4. D. Roddy, J. Coolen, "Electronic Communications", Pearson, 4th Edition, 2011.

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guide lines for ESE:

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical out of 8. Evaluation will be based on paper work and performance in the practical.

Digital Techniques and Applications

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Digital Techniques and Applications	**DTA**	

Course Description:
In this laboratory course emphasis is on the understanding of combinational and sequential circuit design.

	Hours/Week	No. Of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Total Semester Credits: 1

Prerequisite Course(s): Knowledge of Basic gates and semiconductor devices.

LAB COURSE CONTENT

(Note: Minimum FOUR Experiments from each group)

Group A

1. **Realization of logic gates OR, AND, NOT, NOR, NAND gates using discrete components and verify their truth tables.**

    a. Apply different combinations of inputs and observe the outputs.
    b. Compare the outputs with the truth tables.

2. **Design of 4 bit Gray to binary Code Converter.**

    a. Prepare the truth table of Gray to binary code.
    b. All the 16 combinations of inputs are given at respective pins
    c. Verify the truth tables of Gray to binary code.

3. **Realization of IC7483 as parallel adder and substractor.**

    a. Apply the inputs toA3 to A0 and B0 to B3.
    b. Check the output sum S3 to S0 and also C4.
    c. For Subtraction, Apply B input through NOT gate, which gives compliment of B.
    d. Verify the truth table of adder/substractor.

4. **Verification of Ex-3 to BCD code conversion using NAND gates.**

    a. Apply the logic inputs to A3 - A0 and B3- B0.
    b. Check the output sum S3 to S0 and also C4.
    c. For Subtraction, Apply B input through NOT gate, which gives compliment of B.
    d. Verify the truth table of adder/substractor.

5. **Verification of 4-Bit Magnitude Comparator using IC7485.**

    a. Feed the 4-bit binary input to A3-A0 and B3-B0.
    b. Observe the output A>B, A=B, and A<B on logic indicators for different combinational input. The outputs must be 1 or 0 respectively.
    c. Verify the truth table of 4-bit comparator.

6. **Design and Implement BCD to 7 Segment display decoder using IC 447/7448.**

    a. Apply BCD Number to Decoder IC.
    b. Observe the output on 7- segment display.

Group B

1. **Verify the truth table of multiplexer and de-multiplexer using ICs.**
    a. Prepare the truth table of multiplexer.
    b. Based on the select line one of the input will be selected at the output.
    c. Observe the output of multiplexer and verify the truth table.

2. **Verify the truth table of J-K, T, and D Flip-flops using ICs.**

    a. Prepare the truth table of flip-flops.
    b. Examine the output of flip-flops and validate the truth table.
    c. Check out the output for J-K flip-flops, when J and k both inputs are at logic “1”.

3. **Design ring and Johnson counter using flip-flops.**

    a. Organize the truth table of ring and Johnson counters.
    b. Apply clock pulses and note the outputs after each clock pulse
    c. Verify the truth table of ring and Johnson counters.

4. **Design decade ripple counter using flip-flops.**

    a. Prepare circuit diagram and make connection as per diagram.
    b. Apply clock pulse.
    c. Monitor the output after each clock pulse and note down the outputs Q_3, Q_2, Q_1, and Q_0.

5. **Realization of Decade counter using IC.**

    a. Apply clock pulse at the clock input
    b. Observe the output at Q_A, Q_B, Q_C, and Q_D.

6. **Design 4-bit UP/DOWN synchronous counter using IC.**

    a. Apply clock pulse at the clock input
    c. Observe the output at Q_A, Q_B, Q_C, and Q_D.

Reference Books:

1. A. Kumar, "Fundamentals of Digital Circuits", PHI, 2nd Edition, 2011.
2. R. Jain, "Modern Digital Electronics", TMH. 4th Edition, 2010.
3. Leach, Malvino, "Digital Principles and Applications", TMH 5th Edition, 2002.
4. J. Wakerly, "Digital Design Principles and Practices", Pearson 2nd Edition, 2009.
5. R. Tocci, "Digital Systems Principles and Applications", Pearson 2nd Edition, 2002.

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guide lines for ESE:

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical out of 8. Evaluation will be based on paper work and performance in the practical.

NORTH MAHARASHTRA UNIVERSITY,

JALGAON (M.S.)

Second Year Engineering

(E&TC/E&C/Elex/IE)

Faculty of Engineering and Technology

Semester – IV

W.E.F 2013 – 2014

Engineering Mathematics-III

COURSE OUTLINE

Course Title	Short Title	Course Code
Engineering Mathematics-III	**EM-III**	

Lecture	Hours / Week	No. of Weeks	Total Hours	Semester Credits
	03	14	42	04
Tutorial	01	14	14	

Course Description:
This course provides the elementary level knowledge of n^{th} order Linear Differential Equations, Transforms, Complex Analysis and Vector Calculus. Course includes solution of n^{th} order linear differential equations, Laplace transform, Fourier Transforms, Z-Transform, and Vector Calculus.

Prerequisite Course(s): Engineering Mathematics-I, Engineering Mathematics-II

COURSE CONTENT

Engineering Mathematics-III **Semester-IV**

Teaching Scheme	Examination Scheme
Lecture: 3 hours / week	**End Semester Examination (ESE): 80 Marks**
Tutorial: 1 hour / week	**Paper Duration (ESE) : 03 Hours**
	Internal Sessional Exam (ISE) : 20 Marks

UNIT-I: Linear Differential Equations: No of Lect. – 8, Marks: 16

a. Solution of LDE of order n with constant coefficients.
b. Method of variation of parameters (Only second order).
c. Cauchy's linear equation.
d. Legendre's linear equation.
e. Applications of Linear differential equations to electrical circuits.

UNIT-II: Function of Complex Variable No of Lect. – 8, Marks: 16

a. Analytic functions, Cauchy-Riemann equations.
b. Cauchy's Residue theorem(Without proof)
c. Cauchy's Integral theorem and Cauchy's Integral formula (without proof).
d. Conformal mapping, bilinear transformations.

UNIT-III: Laplace Transform **No of Lect. – 8, Marks: 16**

a. Definition and Existence of Laplace transforms.
b. Laplace Transform of elementary/standard functions.
c. LT of some special functions viz, error, Periodic, Unit Step, Unit Impulse.
d. Theorems & Properties of Laplace Transform (without proof).
e. Inverse Laplace Transform.
f. Applications of LT for Network Analysis.
g. Applications of LT to solution of linear differential equation.

UNIT-IV: Fourier Transform and Z-Transform **No of Lect. – 8, Marks: 16**

A. Fourier Transform:

a. Introduction to Fourier Integral theorem.
b. Fourier Transforms, Fourier Cosine Transforms, Fourier Sine Transform and their inverse.

B. Z- Transform:

a. Definition and standard properties (without proof)
b. Region of Convergence.
c. Z-Transform of standard / elementary sequences.
d. Inverse Z-transform.

UNIT-V: Vector Differentiation **No of Lect. – 8, Marks: 16**

a. Definition, physical Meaning of vector differentiation.
b. Tangential and normal components of acceleration, Radial and transverse components of velocity and acceleration.
c. Vector differential operator (∇)
d. Gradient of Scalar point function.
e. Directional Derivatives of Scalar point function.
f. Divergence and Curl vector field.
g. Solenoidal and Irrotational vector fields.

Reference Books:

1. H. Dass, "Advanced Engineering Mathematics",S. Chand Publication, New Delhi, 2008.
2. E. Kreyszig, "Advanced Engineering Mathematics",Wiley Eastern Ltd, 10th Edition.
3. B. Grewal, "Higher Engineering Mathematics", Khanna Publication, Delhi, 42nd Edition, 2012.
4. C. Wylie, Barrett, "Advanced Engineering Mathematics", McGraw Hill, 6th revised Edition, 1995.
5. B. Raman, "Engineering Mathematics", Tata McGraw Hill, 2007.
6. N. Bali, "A Text Book of Engineering Mathematics", Laxmi Publication, 2004.

Solid State Devices & circuits- II

COURSE OUTLINE

Course Title	Short Title	Course Code
Solid State Devices & circuits- II	**SSDC-II**	

Course Description:

This is an introductory graduate-level course on the various applications of Electronics Circuit. Basic Electronics is an interdisciplinary branch of Engineering and mathematics that deals with the behavior of Various Devices. The goals of the course are to understand the basic principle of various Devices and its application in different area.

Lecture	**Hours / Week**	**No. of Weeks**	**Total Hours**	**Semester Credits**
	03	14	42	04
Tutorial	01	14	14	

Prerequisite Course(s): Knowledge of Elements of Electronics Engineering and Solid state devices and circuit I.

COURSE CONTENT

Solid state devices and circuits-II **Semester-IV**

Teaching Scheme	**Examination Scheme**	
Lecture: 3 hours / week	**End Semester Examination (ESE)**	**: 80 Marks**
Tutorial: 1 hour / week	**Paper Duration (ESE)**	**: 03 Hours**
	Internal Sessional Exam (ISE)	**: 20 Marks**

Unit-I: **Waveshaping Circuit** **No of Lect. – 9, Marks: 16**

a) Different Types of Waveshaping circuit- Astable multivibrator, Bistable multivibrator and monostable multivibrator.
b) Analysis of different Time Base circuits – Miller integrator, Bootstraps sweep circuit.
c) Introduction of Differential amplifier, Different modes of Differential amplifier.
d) DC Analysis of Differential amplifier with Re, AC analysis of Differential amplifier.
e) Calculation of CMRR for Balanced & Unbalanced operation, Techniques to improve CMRR of Differential amplifier.
f) Schmitt trigger circuit.

Unit-II: **High frequency model of BJT** **No of Lect. – 8, Marks: 16**

a) Introduction High frequency model of BJT.
b) Behaviour of transistor at high frequency, high frequency CE amplifier π model
c) CE short circuit current gain for π model, Definition and derivation of Fα, Fβ & F_T
d) Introduction to Tuned Circuit, Classification of Tuned amplifier.
e) Circuit diagram, Operation & characteristics of Single Tuned amplifier.
f) Circuit diagram, Operation & characteristics of Doubled Tuned amplifier and Stagger Tuned amplifier.

Unit-III: **Large signal amplifier** **No of Lect. – 8, Marks: 16**

a) Introduction of power amplifier.
b) Need of Power amplifier, Concept of Load Line, Performance parameter of Power amplifier.
c) Classification of power amplifier. DC and AC Analysis of Class A power amplifier with Resistive Load and efficiency calculation.
d) DC and AC Analysis of Transformer coupled Class A power amplifier and efficiency calculation.
e) DC and AC Analysis of Class B Push Pull power amplifier and efficiency calculation, calculation of Maximum output power, Maximum Power Dissipation
f) Working of Class B Complementary power amplifier, efficiency calculation
g) Concept of Crossover distortion, Elimination of Crossover distortion.
h) Analysis of Harmonic distortion (Five point method).

Unit-IV: **Feedback amplifier** **No of Lect. –9, Marks: 16**

a) Introduction of Feedback amplifier.
b) Concept of feedback amplifier, Types of feedback (Positive & Negative feedback), Basic amplifier types.
c) Derivation of gain with feedback. Topology used in feedback amplifier, Classification of Feedback amplifier.
d) Analysis of Voltage series and Current series Negative feedback amplifier with derivations of Ri and Ro.
e) Analysis of Voltage shunt and Current shunt Negative feedback amplifier with derivations of Ri and Ro.

Unit-V: **Voltage Regulator and Oscillator** **No of Lect. – 8, Marks: 16**

a) Introduction of voltage regulator.
b) Block diagram of Regulated power supply, concept of Line and Load regulation, Types of Voltage regulator.
c) Emitter Follower series voltage regulator, Transistorized series voltage regulator.
d) Short circuit protection circuit (Using Transistor and Diode), Fold back protection circuit.
e) Concept of Oscillator, classification of oscillator, Construction, working and Derivation of frequency and hfe of Phase shift, Wien Bridge oscillator.

f) Circuit diagram, working and Derivation of frequency and hfe of Hartley, Colpitts oscillator, Clap oscillator.
g) Crystal oscillator.

Reference Books:

1. R. Boylestad, L. Nashelsky, "Electronics Devices and Circuit Theory", Pearson, 10th Edition, 2009.
2. S. Salivahanan, N Sureshkumar, "Electronics Devices and Circuits" Tata McGraw-Hill, 3rd Edition 2008.
3. B. Singh, R. singh, "Electronics Devices and Circuits", Pearson, 2nd Edition.
4. D. Cheruku, B. Krishna, "Electronics Devices and Circuits", 2nd Edition, Pearson, 2012.
5. Jacob Millman, "Electronis devices and circuits", McGraw-Hill, 1967.
6. S. C. Sarkar, "Electronics Devices and Circuits-I" Everest Publishing House, The Millennium 12th enlarged and revised Edition, 2001.

Microprocessors

COURSE OUTLINE

Course Title	Short Title	Course Code
Microprocessors	**MP**	

Course Description:

Introduction to the basic concepts of microprocessor, assembly language programming and peripheral interface. Course includes instruction set, Machine cycles, assembly language programming, interrupts, sub-routine, stack, call and return for 8085 microprocessor and interfacing of memory Programmable Peripheral Interface, and Programmable Timer/Counter. This course is designed to give a broad understanding of the microprocessor, assembly language programming and peripheral interfaces.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Lecture	03	14	42	03

Prerequisite Course(s): Digital Electronics.

COURSE CONTENT

Microprocessors **Semester-IV**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE): 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Unit-I: **8085 microprocessor.** **No of Lect. – 8, Marks: 16**

a) Block diagram and operation of microcomputer system.
b) 8085 Microprocessor architecture & operation.
c) Program Counter and Stack pointer and Pin diagram of 8085 microprocessor.
d) De-multiplexing of lower order address bus and generation of control signals.
e) Memory classification, Basic of memory interfacing and Address decoding techniques.
f) Interfacing of memory with 8085 microprocessor. (With interfacing Numerical).

Unit-II: **Instruction set of 8085 microprocessor.** **No of Lect. – 8, Marks: 16**

a) Instruction structure and classification (One/two/three Byte).
b) Machine cycles & Bus Timing: Opcode Fetch, Memory Read, and Memory Write.
c) Instruction Set: Instruction for Data transfer operations and Arithmetic operations.
d) Instruction for Logic operations and Branch operations.
e) Concept of sub-routine.
f) Unconditional Call and Return instruction.
g) Conditional Call and return instructions.

Unit-III: **Assembly Language Programming.** **No of Lect. – 9, Marks: 16**

a) Addressing modes of 8085 microprocessor.
b) Ideal steps for writing assembly language programs and basic of flowchart symbols.
c) Assembly Language Programming on: Data Transfer operations and, Accessing I/O devices.
d) Assembly language programming on Arithmetic operations, Logical operations and Branch operations.
e) Concept and designing of counters and time delay and their assembly language programming.
f) Assembly language programming on subroutines.

Unit-IV: **Stack, Interrupts and Serial I/O of 8085 microprocessor.** **No of Lect. –8, Marks: 16**

a) Stack and stack related instructions.
b) Assembly language programming on string/array related operations.
c) Introduction to Memory mapped I/O and I/O mapped I/O. (Difference Only).
d) The 8085 Interrupt and 8085 vectored Interrupts.
e) Serial I/O lines SID &SOD. Data transfer through SID and SOD lines.

Unit-V: **General Purpose Peripheral Devices.** **No of Lect. – 8, Marks: 16**

a) Internal architecture of 8255-Programmable Peripheral Interface. I/O and BSR Mode of 8255.
b) Interfacing of I/O device using 8255 - Programmable Peripheral Interface.
c) Programmable Interval Timer/ Counter 8254, block diagram, control word register, Modes of 8254.
d) Programming on counter and mode 0-3 (only) of 8254.

References Books:

1. R. Gaonkar, "Microprocessor, Architecture, Programming and Applications with 8085", Penram International Publication, 5th Edition, 2004.
2. B. Ram, "Fundamentals of Microprocessors and Microcomputers", Dhanpat Rai Publication, 6th Edition, 2011(reprinted).
3. Gilmore, "Microprocessors- Principles and application", Tata McGraw Hill.
4. M. Rafiquzzaman, "Microprocessors- Theory and applications: INTEL and MOTOROLA", Revised Edition.

Linear Integrated Circuits

COURSE OUTLINE

Course Title	Short Title	Course Code
Linear Integrated Circuits	**LIC**	

Course Description:

Introduce the basic concepts of operational amplifier, linear & non-linear application of OP-AMP. Course includes basics and designing of various comparator and signal generators using OP-AMP, various data convertors, active filters, PLL and its use for communication applications. This course is designed to give a broad understanding of the operational amplifier, its application in various fields.

Lecture	Hours / Week	No. of Weeks	Total Hours	Semester Credits
	03	14	42	03

Prerequisite Course(s): EEEE, SSDC-I.

COURSE CONTENT

Linear Integrated Circuits **Semester-II**

Teaching Scheme

Lecture: 3 hours / week

Examination Scheme

End Semester Examination (ESE): 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Unit-I: **Operational amplifier:** **No of Lect. – 9, Marks: 16**

a) Ideal op-amp characteristics; schematic development stages of op-amp.
b) Current sources and active loads.
c) Difference, intermediate and output stages including Miller capacitors for frequency computation.
d) Internal circuit of op-amp IC μA741, operational amplifier parameters, offset null techniques of op-amp features.
e) Data sheet interpretation and data sheet study of op-amp IC 741.
f) Measurement of op-amp parameters, effects of real operational amplifier parameters on circuit performance.
g) Frequency response and stability, frequency and phase compensation techniques.

Unit-II: **OP-AMP Applications** **No of Lect. – 9, Marks: 16**

a) Non-inverting amplifier and voltage follower, inverting amplifier.
b) Peak amplifier, ac amplifier, AF amplifier IC LM380.
c) Analog adder, averaging amplifier, integrator, differentiator.
d) Analog computation, basic building blocks, basic linear differential equation.
e) Differential and instrumentation amplifiers using one, two and three op-amps, instrumentation amplifier IC μA725, bridge amplifier.
f) Voltage-to-current and current-to-voltage converters, Analog multipliers, dividers.
g) Log/antilog amplifiers.

Unit-III: **Active filters and Voltage regulators** **No of Lect. – 8, Marks: 16**

a) Active filters: types and response.
b) Analysis and synthesis of first, second and higher order active filters.
c) Butterworth filters all pass filter.
d) Voltage regulators: Series op-amp regulator, IC voltage regulator.
e) Voltage regulator IC μA723 and its applications as positive/negative and fixed/adjustable voltage regulators.
f) Three terminal voltage regulators: positive/negative and fixed/adjustable voltage regulators.
g) Dual tracking regulators; switching regulator: concept and schematic, IC MC1723and its application.

Unit-IV: **Comparators and waveform generation.** **No of Lect. –8, Marks: 16**

a) Comparators: introduction, parameters; op-amp as comparator, comparator IC 710, peak detectors.
b) Waveform generation: Schmitt's trigger, square-triangle wave oscillators, relaxation oscillators and pulse generators.
c) Timer IC 555 and its use as timer circuit and multi-vibrators.
d) Analysis and design of R-C (phase shift, wien bridge) oscillators.
e) Voltage controlled oscillator IC SE/NE566, function generator IC LM 8038.
f) Clippers and clampers; precision rectifiers.

Unit-V: **A/D interface circuits and PLL** **No of Lect. – 8, Marks: 16**

a) A/D interface circuits: Analog to digital (A/D) and digital to analog (D/A) converters.
b) Sample and hold circuits; analog multiplexers.
c) Phase lock loop (PLL): operating principles, lock and capture range.
d) PLL as amplitude and frequency modulation detection, frequency shift keying (FSK) decoder, frequency synthesiser.
e) PLL IC SE/NE565.

Reference Books:

1. D. Choudhari, S. Jain, "Linear Integrated Circuits", New Age International (P) limited,4th Edition, 2010.
2. R. Gayakwad, "Op-amps and Linear Integrated Circuits", Prentice Hall of India, 4th Edition, 2008.
3. K. Botkar, "Integrated Circuits", Khanna Publishers, 10th Edition, 2010.
4. S. Franco, "Design with operational amplifiers and analog integrated circuits", Tata McGraw Hill, 3rd Edition, 2002.
5. J. Wait, L. Huelsman and G. Korn, "Introduction to Operational Amplifier Theory and Applications", McGraw Hill, 2nd Edition, 1991.
6. J. Fiore, "Op-amp and Linear Integrated Circuits Theory and Applications", Delmar Thompson Learning, 1st Edition, 2001.
7. R. Coughlin, F. Driscoll, "Operational Amplifiers and Linear Integrated Circuits", PHI, 6th Edition, 2001.

Network Analysis and Synthesis

COURSE OUTLINE

Course Title	Short Title	Course Code
Network Analysis and Synthesis	**NAS**	

Course Description:

This course introduces the student to Network Analysis & Synthesis. The student will learn to analyze & Synthesize Electric circuits either one port & two port networks. Student will study the different techniques to analyze, synthesize and design of network, analysis of standard signals and learn new synthesis tools also analysis of two port networks using Z, Y, h, ABCD parameters. Student will also learn types of network function. Theory as well as tools for classical & modern filter design. Emphasis have given to the following topics related to network analysis and synthesis, complex frequency, frequency domain concept, properties of LC, RC, and RLC. Pole-zero concepts, design of different types of filters and attenuators.

Lecture	Hours / Week	No. of Weeks	Total Hours	Semester Credits
	03	14	42	03

Prerequisite Course(s): knowledge of basic Electrical and Electronics engineering and their concept.

COURSE CONTENT

Network Analysis and Synthesis **Semester-IV**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Unit-I: **System and Network Functions.** **No of Lect. – 9, Marks: 16**

a. Definition and types of network function with their Numerical.
b. Concept of complex frequency and characteristics of standard signals.
c. Concept of Laplace transform and Laplace transform of basic R, L, and C Component.
d. Network Analysis using Laplace transform with initial condition, Numericals.
e. Concept of Pole and Zero, time-domain behavior from pole-zero plot, concept of residues.

Unit-II: **Frequency Selective Networks.** **No of Lect. – 8, Marks: 16**

a. Concept of resonance, types of resonance, Q-factor and their significance.
b. Series resonance, resonance frequency with derivation, variation of impedance, current with frequency, bandwidth and selectivity, examples.
c. Parallel resonance, resonance frequency, bandwidth and selectivity, examples.

Unit-III: **Two Port Networks Parameters.** **No of Lect. – 8, Marks: 16**

a. Introduction of two port network and their different parameters such as Z, Y, h, ABCD parameter with equivalent circuit
b. Concept of reciprocity and symmetry condition for two port network parameters.
c. Inter connection of two port networks in series, parallel, cascade connection and series-parallel connection.
d. Inter conversion of the parameters, examples on finding the different two port network parameters.

Unit-IV: **Attenuators and Filters**. **No of Lect. – 8, Marks: 16**

a. Concept of Neper and Decibel (dB).
b. Introduction of attenuator, types of attenuator, design of symmetrical 'T' and '**π**' attenuator, examples.
c. Filters fundamentals & Design of different types of filters such as constant K-type Low pass and high pass filter, examples.
d. Design of m-derived low pass and high pass filter, examples. Concept of band pass, band stop filter, terminating half section and concept of composite filter

Unit-V: **Synthesis of Networks**. **No of Lect. – 9, Marks: 16**

a. Hurwitz polynomial and its properties, check Hurwitz criteria by Routh array or continued fraction expansion method, examples.
b. Positive real function and its properties, procedure for testing of positive real function, examples.
c. Synthesis of one port network such as LC, RC, RL with their properties.
d. Synthesis of L-C, R-C, and R-L networks using Foster and Cauer forms, examples.

Reference Books:

1. D. Choudhary, "Network and system", New Age international Publication, 1st Edition, Reprint 2005.
2. A. Sudhakar, S. Palli, "Circuit & Networks Analysis and Synthesis", Tata MH 3rd Edition, 2009.
3. A. Chakraborti, "Circuit Theory (Analysis and synthesis)", Dhanpat Rai Publication, 6th Edition, .2012.
4. B. R. Gupta, "Network Analysis and synthesis", S. Chand and company Ltd., 2010.
5. G. K. Mithal, "Network Analysis", Khanna Publishers, 2000.

Computer Programming-II

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Computer Programming-II	**CP-II**	

Course Description:

This laboratory course emphasis is on the understanding of C programming and open source operating system.

	Hours/Week	No. Of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	2
Lecture	1	14	14	

Total Semester Credits: 2

Prerequisite Course(s): C Programming and its fundamentals.

LAB COURSE CONTENT

(Note: Group A is **mandatory** and Minimum **EIGHT** practical from B group.)

Group A

1. Installation of Linux (Ubuntu 10.04).with various essential packages
2. Study of basic commands in Linux terminal (Minimum 20 commands)

Group B

Note: Required software is Ubuntu 10.04, gcc

1. Program for sum of digits.
2. Program for reverse number.
3. Program for counting digits in a number.
4. Program for bubble sort.
5. Program for Matrix multiplication.
6. Program for stack operations using switch case.
7. Program for queue using arrays.
8. Program for string operations without using library functions.
9. Program to convert decimal to binary/hexadecimal.
10. Write a Program with Bit wise operations.
11. Write a Program with Right and left Shift Operation.
12. Program to swap two numbers using pointer.
13. Program for implementation of DOS copy/type command using FILE operations and command line arguments.

Reference Books:

1. E. Balagurusamy, "Programming in ANSIC C", Tata McGraw Hill Publications, 4th Edition, 2007.
2. E. Balagurusamy, "Object Oriented Programming with C++", Tata McGraw Hill Publications, 4th Edition, 2008.
3. Y. Kanetkar, "Let Us C", BPB publication, 10th Edition, 2010.

Guide lines for ICA:

The Internal Continuous Assessment shall be based on practical record and knowledge/skill acquired. The performance shall be assessed experiment wise using continuous assessment format A&B.

Linear Integrated Circuits

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Linear Integrated Circuits	**LIC**	

Course Description:

In this laboratory course emphasis is on the understanding of operational amplifier, and its application for various.

	Hours/Week	No. Of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Total Semester Credits: 1

Prerequisite Course(s): EEEE, SSDC-I

LAB COURSE CONTENT

(Note: Minimum EIGHT Experiments from below list.)

1. **Op-amp parameter measurement: input bias current, input offset current, Input offset voltage, slew rate of op-amp 741).**

    a. Calculation of input bias current, input offset current, input offset voltage, slew rate of op-amp Practically.

2. **Design and test active integrator and differentiator circuits for given Frequency.**

    b. Apply different I/P signals & observe the O/P waveform.
    c. Plot the frequency response.

3. **Study the operation of half wave and full wave precision rectifier**

    a. Observe the I/P & O/P waveforms for both the circuits.

4. **Design and test positive and negative clamper.**

    a. Observe the I/P & O/P waveforms for both the circuits.

5. **Design and test Schmitt trigger circuit for given hysteresis.**

    a. Measure the hysteresis voltage.

6. **Design and test of square wave and triangular and saw tooth wave generator using Op-amp for given frequency.**

    a. Observe the O/P waveforms
    b. Measure the O/P frequency of the circuits.

7. **Design and test timer using IC 555 in monostable and astable mode.**

    a. Observe the o/p waveforms.
    b. Measure the o/p frequency of the circuits.

8. **Design and test function generator using IC 8038.**

    a. Observe the o/p waveforms
    b. Measure the o/p frequency of the different waveforms.

9. **Design and test PLL using IC 565 PLL for given lock and capture range.**

    a. Observe the o/p waveforms.
    b. Measure the lock & capture range.

10. **Design and test audio amplifier using IC LM380 with and without positive feedback.**

    a. Measure the gain of amplifier.

11. **Setup DAC circuit Using IC LM 741 and study its performance.**

    a. Apply the different i/p & measure the o/p voltage.

12. **Setup ADC circuit Using IC LM 741 and study its performance.**

    a. Apply different i/p voltages & observe its digital equivalents.

13. **Design and test second order Butterworth LP / HP filter.**

    a. Plot the frequency response.

14. **Design and test BP Butterworth filter.**

    a. Plot the frequency response.

15. Design and test BR Butterworth filter.

a. Plot the frequency response.

Reference Books:

1. D. Choudhari, S. Jain, "Linear Integrated Circuits", New Age International (P) limited, 4th Edition, 2010.
2. R. Gayakwad, "Op-amps and Linear Integrated Circuits", Prentice Hall of India, 4th Edition, 2008.
3. K. Botkar, "Integrated Circuits", Khanna Publishers, 10th Edition, 2010.
4. S. Franco, "Design with operational amplifiers and analog integrated circuits", Tata McGraw Hill, 3rd Edition, 2002.
5. J. Wait, L. Huelsman and G. Korn, "Introduction to Operational Amplifier Theory and Applications", Tata McGraw Hill, 2nd Edition, 1991.
6. J. Fiore, "Op-amp and Linear Integrated Circuits Theory and Applications", Delmar Thompson Learning, 1st Edition, 2001.
7. R. Coughlin, F. Driscoll, "Operational Amplifiers and Linear Integrated Circuits", PHI, 6th Edition, 2001.

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Solid State Devices & circuits -II

LAB-COURSE OUTLINE

Course Title	Short Title & Course Code
Solid State Devices & circuits -II	**SSDC- II**

Course Description:
In this laboratory course emphasis is on the understanding of combinational and sequential circuit design.

	Hours/Week	No. Of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Total Semester Credits: 1

Prerequisite Course(s): Solid State Devices

LAB COURSE CONTENT

(Note: Minimum FOUR Experiments from each group.)

Group A

1. **Calculation of CMRR of Emitter coupled differential amplifier using Emitter resistance and Compare it with Constant current source circuit.**

    a. Calculate Avd in differential mode operation.
    b. Calculate Avc in Common mode operation.
    c. Compare CMRR in above two methods.

2. **Observe the response of Miller integrator for given i/p.**

    a. Draw input and output waveform of miller integrator.

3. **Measure response of Schmitt trigger circuit for sine wave input.**

    a. Calculation of UTP and LTP.
    b. Observe Hysteresis characteristics.
    c. Draw input and output waveform.

4. **Determine the period and frequency of oscillation for Astable/Monostable Multivibrator**.

a. Draw output waveforms at base and collector of Q1 and Q2.

5. Class B Push Pull amplifier efficiency calculation.

a. Calculate A.C. output power Pac.
b. Calculate D.C. i/p Power Pdc.
c. Calculate efficiency.

6. Class B Complementary Symmetry efficiency calculation and elimination of crossover distortion.

a. Calculate A.C. output power Pac.
b. Calculate D.C. I/P Power Pdc.
c. Calculate efficiency.
d. Observe how to eliminate crossover distortion.

Group B

1. Plot regulation characteristics of Series voltage regulator circuit.

a. Calculate Line regulation.
b. Calculate Load regulation.

2 Plot frequency response of Voltage series/ Voltage shunt feedback amplifier.

a. Compare Voltage gain and Bandwidth for with and without feedback.

3. Calculate Voltage gain Av, input impedance Ri, and output impedance Ro for current series/ voltage series negative feedback amplifier

a. Compare Voltage gain Av, input impedance Ri, and output impedance Ro for current series/voltage series amplifier in with and without feedback.

4. Plot frequency response of Single tuned amplifier.

a. Calculate of resonant frequency and bandwidth.

5. Study of Phase shift, Wien Bridge, Hartley, Colpitts.(Any Two)

a. Calculate theoretical frequency of oscillator using formula.
b. Compare theoretical frequency with fundamental frequency.

6. **Determination of frequency and output voltage of Crystal Oscillator.**

    a. Calculate frequency of oscillator and compare with fundamental frequency of Crystal.

Reference Books:

1. R. Boylestad, L. Nashelsky, "Electronics Devices and Circuit Theory", Pearson, 10th Edition, 2009.
2. S Salivahanan, N Sureshkumar, "Electronics Devices and Circuits" Tata McGraw Hill, 3rd Edition 2008.
3. B.Singh, R. Singh, "Electronics Devices and Circuits", Pearson, 2nd Edition.
4. D. Cheruku, B. Krishna, "Electronics Devices and Circuits", 2nd Edition, Pearson, 2012.
5. Jacob Millman, "Electronis devices and circuits", McGraw-Hill, 1967.

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guide lines for ESE:

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical out of 8. Evaluation will be based on paper work and performance in the practical.

Network Analysis and synthesis Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Network Analysis and synthesis Lab	**NAS**	

Course Description:

In this laboratory course emphasis is on the understanding of basic electrical circuits. The students can use this knowledge to analyze and synthesize Electrical networks and Design of different filters and attenuators.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Total Semester Credits: 1

Prerequisite Course(s): Course on Basic Electrical and Electronics Engineering..

LAB COURSE CONTENT

(Note: Minimum EIGHT practical's are to be performed.)

1. **Determine transfer / driving point Impedance function of given two port reactive network.**

    a. Measure electrical quantity such as Voltages and currents at different ports of the two ports the network.
    b. Find the Driving point impedance or transfer impedance of given network.
    c. Compare analytical and the practical values.

2. **Determine Pole-Zero plot of given one port reactive network.**

    a. Measure the output current of the one port reactive network with frequency variation.
    b. Calculate impedance by taking ratio of input voltage and measured currents for each frequency value.
    c. Draw the graph of impedance and frequency and find practical values of poles and zeros
    d. Compare analytical and practical values of poles and zeros.

3. **Study of Series and parallel resonance, find BW and Q- factor.**

    a. Measure the current of Series RLC and Parallel RLC resonance circuit with varying frequency.

b. Draw the graph of frequency and currents and find out resonance frequency, bandwidth, and quality factor.
c. Compare the analytical and measured values of the Resonance frequency and Bandwidth.

4. Determine Z parameter of networks connected in series.

a. Determine the open circuit impedance parameters by connecting 2 two ports network in series combination.
b. Measure the voltage and current in network by taking any one port open circuited and take a ratio of voltage to current of different ports of the networks.
c. Compare the analytical and practical values of Open circuit impedance parameters i.e. Z_{11}, Z_{12}, Z_{21}, Z_{22}.

5. Determine Y parameter of networks connected in parallel.

a. Determine the short circuit admittance parameters by connecting 2 two ports networks in parallel combination.

b. Measure the voltage and current in network by taking any one port short circuited and take a ratio of current to voltage of different ports of the networks.
c. Compare the analytical and practical values of short circuit admittance parameters i.e. Y_{11}, Y_{12}, Y_{21}, Y_{22}.

6. Determine transmission parameter of networks connected in cascaded form.

a. Determine the ABCD / Transmission parameters by connecting 2 two ports networks in Cascade combination.
b. Measure the voltage and current in network by taking output one port open circuited and similarly measure the voltage and current by taking output port short circuited take a ratio of voltage to current and current to voltage of different condition i.e. short circuit and open circuit of the networks.
c. Compare the analytical and practical values of ABCD / transmission parameters i.e. $A= V_1/ V_2$, $B=V_1/ I_2$, $C=I_1/ V_2$, $D=I_1/ I_2$.

7. Frequency response of constant k- low pass filters and find out cut of frequency.

a. Design constant K-Low Pass filter with given cut off frequency and given design impedance.
b. Take different readings of V_0 for varying frequency from function generator.
c. Calculate attenuation (α) in dB for each frequency.

d. Plot the graph of attenuation in dB Vs Frequency and determine the cut-off frequency from graph. Compare this practical cut-off frequency with the design value.

8. Frequency response of constant k- high pass filters and find out cut of frequency.

a. Design constant K-High Pass filter with given cut off frequency and given design impedance.
b. Take different readings of V_0 for varying frequency from function generator.
c. Calculate attenuation (α) in db for each frequency.
d. Plot the graph of attenuation in db Vs Frequency and determine the cut-off frequency from graph. Compare this practical cut-off frequency with the design value.

9. Frequency response of m- derived filters and find out cut of frequency.

a. Design m- derived filter with given cut off frequency and given frequency of maximum attenuation, with given design impedance.
b. Take different readings of V_0 for varying frequency from function generator.
c. Calculate attenuation (α) in dB for each frequency.
d. Plot the graph of attenuation in dB Vs frequency and determine the cut-off frequency from graph. Compare this practical cut-off frequency with the design value.

10. Frequency response of band pass filter.

a. Take different readings of V_0 for varying frequency from function generator.
b. Calculate attenuation α in dB for each frequency.
c. Plot the graph of attenuation in dB Vs frequency and determine the cut-off frequency from graph. Compare this practical cut-off frequency with the design value.

11. Design build and test symmetrical T or Π attenuator (plot attenuation Vs RL).

a. Design a symmetrical 'T' attenuator to given attenuation (In dB) to work into a use of given impedance.
b. Apply variable DC input voltage at input with respect to ground, Measure voltage 'Vs' & Measure voltage 'V_R', and calculate value of $N= V_S/ V_R$.
c. Calculate attenuation in dB for each input voltage.
d. Compare measured values and Theoretical values of attenuation.

Reference Books:

1. D. Choudhary, “Network and system”, New Age international Publication.
2. A. Sudhakar, S. Palli, “Circuit & Networks Analysis and Synthesis”, Tata MH 3rd Edition, 2009.
3. A. Chakraborti, “Circuit Theory (Analysis and synthesis)”,Dhanpat Rai Publication,2012.
4. B. R. Gupta, “Network Analysis and synthesis”, S. Chand and company Ltd., 2010.
5. G. K. Mithal, “Network Analysis”, Khanna Publishers, 2000.

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guide lines for ESE:

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical out of 8. Evaluation will be based on paper work and performance in the practical.

Microprocessors Lab

LAB COURSE OUTLINE

Course Title | Short Title & Course Code

Microprocessors Lab | **MP LAB**

Course Description:

This course is designed to teach students the practical aspects of principles, interfacing and applications of microprocessor architecture, including both hardware and basic assembly language programming using the 8085 Microprocessor.

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Total Semester Credits: 1

Prerequisite Course(s): Digital Electronics.

LAB COURSE CONTENT

(Note: Minimum Eight from List)

1. **Addition of two 8 bit numbers.**
   Performing simple arithmetic operations of addition using 8085 Microprocessor.
2. **Subtraction of two 8 bit numbers.**
   Performing simple arithmetic operations of subtraction using 8085 Microprocessor.
3. **Addition of two 16 bit numbers.**
   Performing simple arithmetic operations of addition using 8085 Microprocessor.
4. **Subtraction of two 16 bit numbers.**
   Performing simple arithmetic operations of subtraction using 8085 Microprocessor.
5. **Multiplication of two 8 bit numbers.**
   Performing simple arithmetic operations of multiplication using 8085 Microprocessor.
6. **Division of two 8 bit numbers.**
   Performing simple arithmetic operations of division using 8085 Microprocessor.
7. **Program for block transfer of data bytes.**
   Perform block transfer of data.
8. **To find square of a number using look-up table.**
9. **To find largest/smallest number in array of data.**
10. **Arrange an array of data in ascending/descending order.**
11. **Program to implement decimal up/down counter.**
12. **BCD to Hex / Hex to BCD Conversion.**

13 **Interfacing of 8253/54 Timer with 8085 Microprocessor and generate the square wave.**

14 **Case study of Microprocessor controlled temperature system / microprocessor controlled manufacturing process/ traffic signal controller. (Study only)**

References Books:

1. R. Gaonkar, "Microprocessor, Architecture, Programming and Applications with 8085", Penram International Publication, 5th Edition, 2004.
2. B. Ram, "Fundamentals of Microprocessors and Microcomputers", Dhanpat Rai Publication, 6th Edition, 2011(reprinted).
3. Gilmore, "Microprocessors- Principles and application", Tata McGraw Hill.
4. M. Rafiquzzaman, "Microprocessors- Theory and applications: INTEL and MOTOROLA", Revised Edition.

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guide lines for ESE:

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical out of 8. Evaluation will be based on paper work and performance in the practical.

NORTH MAHARASHTRA UNIVERSITY, JALGAON (M.S.)

Second Year Engineering (Information Technology)

Faculty of Engineering and Technology

COURSE OUTLINE

Semester – III

W.E.F 2013 – 2014

Annexure - I

SE Semester - III

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory			Practical	Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
Engineering Mathematics-III	D	3	1	---	4	20	80	---	---	100	4
Information Theory	B	3	---	---	3	20	80	---	---	100	3
Discrete Structure & Graph Theory	D	3	1	---	4	20	80	---	---	100	4
Digital System & Microprocessor	D	3	---	---	3	20	80	---	---	100	3
Object Oriented Technology	D	3	---	---	3	20	80	---	---	100	3
Soft Skills – III	C	1	---	2	3	---	---	50	---	50	2
Information Theory Lab	B	---	---	2	2	---	---	50	---	50	1
Discrete Structure & Graph Theory Lab	D	---	---	2	2	---	---	25	25 **(PR)**	50	1
Digital System & Microprocessor Lab	D	---	---	2	2	---	---	25	25 **(PR)**	50	1
Object Oriented Technology Lab	D	---	---	2	2	---	---	25	25 **(PR)**	50	1
Total		**16**	**2**	**10**	**28**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination **ESE: End Semester Examination** **ICA: Internal Continuous Assessment**

SE Semester - IV

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory		Practical		Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
Data Communication	D	3	---	---	3	20	80	---	---	100	3
Microprocessor & Microcontroller Interfacing	D	3	1	---	4	20	80	---	---	100	4
Data Structures	D	3	1	---	4	20	80	---	---	100	4
Computer Organization	D	3	---	---	3	20	80	---	---	100	3
Computer Graphics & Multimedia	D	3	---	---	3	20	80	---	---	100	3
Application Development Lab	B	1	---	2	3	---	---	50	---	50	2
Data Communication Lab	D	---	---	2	2	---	---	50	---	50	1
Microprocessor & Microcontroller Interfacing Lab	D	---	---	2	2	---	---	25	25 **(PR)**	50	1
Data Structures Lab	D	---	---	2	2	---	---	25	25 **(PR)**	50	1
Computer Graphics & Multimedia Lab	D	---	---	2	2	---	---	25	25 **(PR)**	50	1
Total		**16**	**2**	**10**	**28**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination **ESE: End Semester Examination** **ICA: Internal Continuous Assessment**

Engineering Mathematics –III

COURSE OUTLINE

Course Title	Short Title	Course Code
Engineering Mathematics -III	**EM-III**	

Course Description:

This course is aimed at introducing the fundamentals of basic Mathematics to undergraduate students. The background expected includes a prior knowledge of Mathematics from first year engineering or diploma and familiarity with various laws, principles and theories. The goals of the course are to understand the basic principle of Mathematics and its application in different area.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Lecture	**03**	**15**	**40**	**04**
Tutorial	**01**	**15**	**13**	

Prerequisite Course(s): Engineering Mathematics-I, Engineering Mathematics-I / Diploma Mathematics.

COURSE CONTENT

Engineering Mathematics -III **Semester- III**

Teaching Scheme	**Examination Scheme**	
Lecture: 3 hours / week	**End Semester Examination (ESE)**	**: 80 Marks**
Tutorial: 1 hour / week	**Paper Duration (ESE)**	**: 03 Hours**
	Internal Sessional Exam (ISE)	**: 20 Marks**

1. Laplace Transform (08 Hours, 16 marks)

- Definition and Existence of Laplace transforms.
- Laplace Transform of elementary/standard functions.
- Theorems and Properties of Laplace Transform (without proof).
- Inverse Laplace Transform.
- Laplace Transform of Unit step function.
- Solution of differential equations using LT.

2. Fourier Transform and Z-Transform (08 Hours, 16 marks)

A) Fourier Transform:

- Introduction to Fourier Integral theorem.
- Fourier Transforms, Fourier Cosine Transforms, Fourier Sine Transform and their inverse.

B) Z- Transform:

- Definition and standard properties (without proof)
- Region of Convergence.
- Z-Transform of standard / elementary sequences.
- Inverse Z-transform.

3. Statistics and Probability distributions (08 Hours, 16 marks)

- Introduction to Mean, Mode, Median standard deviation, Variance, Coefficient of Variation.
- Moments, Skewness and kurtosis.
- Correlation and Regression.
- Binominal Distribution.
- Poisson distribution.
- Normal distribution.

4. Testing of Hypothesis and Significance (08 Hours, 16 marks)

- Introduction to population parameters and statistics.
- Testing of Hypothesis, Null Hypothesis and Alternative Hypothesis.
- Level of Significance.
- Test of Significance of large sample.
- Chi-Square test.

5. Fuzzy Sets and System (08 Hours, 16 marks)

- Introduction to Fuzzy sets.
- Standard Fuzzy sets operations.
- Crisp sets, Crisp sets verses Fuzzy sets.
- Fuzzy arithmetic.
- Constructing Fuzzy sets and operations on Fuzzy sets and systems
- Applications of Fuzzy sets.

Text Book:

1. Debashis Dutta, "Textbook of Engineering Mathematics", New Age International Publishers.
2. Witold Pedrycz and Fernando Gomide, "An Introduction to Fuzzy Sets: Analysis and Design", Prentice Hall of India, New Delhi.

Reference Books:

1. H.K. Dass, "Advanced Engineering Mathematics", S. Chand Publication, New Delhi.
2. Erwin Kreyszig, " Advanced Engineering Mathematics", Wiley Eastern Ltd.
3. B.S. Grewal, "Higher Engineering Mathematics" , Khanna Publication, Delhi.
4. Wylie C.R. & Barrett , " Advanced Engineering Mathematics", Mc Graw Hill.
5. B.V. Raman, "Engineering Mathematics", Tata Mc Graw Hill.
6. N. P. Bali , "A Text Book of Engineering Mathematics", Laxmi Publication.
7. George J. Klir and Bo Yuan, ''Fuzzy Sets and Fuzzy Logic: Theory and Applications".

Information Theory

COURSE OUTLINE

Course Title	Short Title	Course Code
Information Theory	**IT**	

Course Description:

This subject imparts the fundamentals of both information theory and data compression. The subject details how programmers and electronic communications professionals can use cryptography-the technique of enciphering and deciphering messages-to maintain the privacy of computer data. It describes dozens of cryptography algorithms, gives practical advice on how to implement them into cryptographic software, and shows how they can be used to solve security problems.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	**15**	**45**	**03**

Prerequisite Course(s): Fundamental knowledge of Computer.

COURSE CONTENT

Information Theory **Semester-III**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week **End Semester Examination (ESE) : 80 Marks**
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Introduction **(08 Hours, 16 marks)**

a) Computer security concepts
b) Security attacks
c) Security services and Security mechanism.

Classical Encryption Techniques

a) Symmetric cipher model
b) Substitution techniques
c) Transposition techniques
d) Rotor machines
e) Steganography
f) Cryptographic Protocols

Block Ciphers and DES

a) Block cipher principles
b) Data Encryption Standard
c) Differential and Linear cryptanalysis

2. Block Cipher Operation **(08 Hours, 16 marks)**

a) Multiple encryption and Triple DES
b) Electronic code book
c) Cipher block chaining mode
d) Cipher feedback mode
e) Output feedback mode
f) Counter mode

Introduction to Number Theory

a) Prime numbers
b) Fermat's and Euler's Theorems
c) Testing for primality
d) Chinese remainder theorem

Public-key Cryptosystem and RSA:

a) Principles
b) RSA algorithm

3. Cryptographic Hash Functions **(08 Hours, 16 marks)**

a) Applications of hash functions
b) Simple hash functions
c) Requirements and security
d) Secure Hash Algorithm (SHA)

Digital Signatures

a) Introduction to Digital Signatures
b) ElGamal and Schnorr digital signature scheme
c) Digital signature standard

Key Management and Distribution

a) Symmetric key distribution using symmetric and asymmetric encryption
b) Distribution of public keys
c) X.509 certificates
d) Public key infrastructure

4. Data Compression **(08 Hours, 16 marks)**

a) Introduction
b) Coding and Modeling
c) Shannon-Fano algorithm
d) Huffman algorithm, Adaptive Huffman coding
e) Arithmetic coding
f) Statistical modeling

5. Graphics and Speech Compression **(08 Hours, 16 marks)**

a) Dictionary based compression
b) Sliding window compression
c) LZ78 compression, Speech compression
d) Lossy graphics compression

Text Books:

1. William Stallings, "Cryptography and Network Security", Fifth edition, Pearson, 2011
2. Mark Nelson and Jean-Loup Gailly, "The Data Compression Book", Second edition, BPB Publications

Reference Books:

1. Bruce Schneider, "Applied cryptography: Protocols, Algorithms and sources code in C", Second edition, Willey, 2008.
2. Atul Kahate, "Cryptography and Network Security", Second edition, TMH, 2007.
3. D.C. Hankerson , Greg A. Harris and Peter D. Johnson Jr., "Introduction to Information Theory and Data Compression", Second edition, CRC Press, 2003.
4. Alfred J. Menezes, Paul C. van Oorschot and Scott A. Vanstone, "Handbook of Applied Cryptography", CRC Press, 1996.
5. Forouzan, "Cryptography & Network Security", Second edition, TMH, 2010.

Discrete Structure and Graph Theory

COURSE OUTLINE

Course Title	Short Title	Course Code
Discrete Structure and Graph Theory	**DSGT**	

Course Description:

The objective of this course is to introduce the students to the fundamentals of Discrete Structures and also with Graph Theory with concepts of the C programming language and enable them to apply these concepts for solving real world problems.

Lecture	Hours / Week	No. of Weeks	Total Hours	Semester Credits
	03	15	45	04
Tutorial	01	15	15	

Prerequisite Course(s): Fundamental knowledge of C

COURSE CONTENT

Discrete Structure and Graph Theory **Semester-III**

Teaching Scheme	Examination Scheme	
Lecture: 3 hours / week	**End Semester Examination (ESE)**	**: 80 Marks**
Tutorial: 1 hour / week	**Paper Duration (ESE)**	**: 03 Hours**
	Internal Sessional Exam (ISE)	**: 20 Marks**

1. Propositions, Sets, Probability (08 Hours, 16 marks)

a Propositions, compound proposition, basic logical operations, truth tables, tautology, contradiction.

b Quantifiers: universal and existential quantifiers.

c Theory: Set, Combinations of Sets, Mathematical Induction Principle.

d Cardinality of finite Sets, Rule of sum, Rule of product.

e Permutations, Combinations.

f Discrete Probability.

2. Relations and Functions: (08 Hours, 16 marks)

a Definitions, properties of Binary relations.

b Equivalence Relations and partitions, Partial ordering relations.

c Lattice, chains and antichains.

d Transitive Closure and Warshall's Algorithm.

e Functions Definitions, Composition of Functions, Types of Function.

f Recursive Functions, Pigeonhole principle.

3. Recurrence Relation and Analysis of Algorithms (08 Hours, 16 marks)

a Recurrence Relation, Linear Recurrence Relations with constant Coefficients.

b Homogeneous Solutions, Particular Solutions, total solutions, Solution by the method of generating functions.

c Introduction, Largest number algorithm, sorting algorithms: Bubble sort.

d Divide and conquer algorithms: binary search algorithm.

e strassens matrix multiplication, Time Complexity of Algorithms.

f Complexity of Problems, Tractable and Intractable Problems.

4. Graphs and Trees (08 Hours, 16 marks)

a Basic terminology, multigraphs and weighted graph , paths and circuits.

b Dijkstra's shortest path algorithms.

c Euler and Hamiltonian Paths and circuits .

d factors of a graph, Planner graph.

e Trees, rooted trees, path length in rooted trees.

f prefix code, binary search trees.

g spanning trees and cut set, minimum spanning trees.

h kruskal's and prim's algorithms for minimum spanning tree.

5. Algebraic system Boolean algebra (08 Hours, 16 marks)

a Semigroup, Subsemigroup, Monoid, Submonid.

b Abelian Group, Subgroups.

c Isomorphism, Automorphism,Homomorphism .

d Ring, Integral domain ,field .

e Lattice and Algebraic systems, Principle of duality.

f basic properties of lattice defined by lattices, distributive and complemented lattices.

g Boolean lattices and Boolean algebras, Boolean functions and Boolean Expressions.

h Number system and Interconversion of number systems.

Text Books:

1. C.L. Liu , " Elements of Discrete Mathematics", Second edition, TMH.
2. Seymour Lipschutz, Marc Lipson, " Discrete Mathematics", Second edition, TMH.

Reference Books:

1. Kenneth H. Rosen, Discrete Mathematics and its Application, Fifth edition, TMH.
2. V. K. Balakrishnan, " Graph Theory", TMH.
3. B. Kolman , R. Busby and S. Ross, "Discrete Mathematical Structures" Fourth edition, Pearson .
4. J. Treamblay , R. Manohar ," Discrete Mathematical structures with application to computer science" , TMH.
5. Sukhendu dey, "Graph theory and its applications", Shroff publications.
6. John Dossey,Otto,Spence,Eynden, "Discrete Mathematics", Pearson publications, Fifth edition.

Digital System and Microprocessor

COURSE OUTLINE

Course Title	Short Title	Course Code
Digital system and Microprocessor	**DSM**	

Course Description:

The objective of this course is to introduce the students with a comprehensive study of the digital system covering basic concepts of digital system and microprocessors.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	**15**	**45**	**03**

Prerequisite Course(s): Fundamental knowledge of digital system and microprocessors.

COURSE CONTENT

Digital System and Microprocessor **Semester-III**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week **End Semester Examination (ESE) : 80 Marks**
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. **Review of fundamental concepts of digital electronics**
   (08 Hours, 16 marks)
   a. Logic Gates
   b. Implementation of logic gates using universal gates
   c. Digital Signal: Positive & Negative logic
   d. Boolean Algebra
   e. Kmap representation (2, 3 and 4 variable)
   f. Grouping in the Kmap
   g. Don't Care condition in Kmap

2. **Combination logic design** **(08 Hours, 16 marks)**
   a. Kmap representation (5 and 6 variable)
   b. Grouping in the Kmap

c. Don't Care condition in Kmap
d. Design of adder and subtractor
e. Design of BCD adder and BCD subtractor
f. Combination logic design examples
g. Design of multiplexer & its examples
h. Demultiplexer & its examples
i. Design of comparator

3. Sequential logic design (08 Hours, 16 marks)

a. Sequential Logic Design
b. One bit memory cell
c. SR and JK flip flop
d. D and T flip flop
e. Design of synchronous and asynchronous counter
f. Sequence generator & detector

4. 8086 Microprocessor (08 Hours, 16 marks)

a. 8086 Architecture & Register Organisation
b. 8086 Memory Segmentation
c. 8086 Addressing Modes
d. 8086 Signal Descriptions
e. 8086 Instruction Set

5. 8086 assembly programming (08 Hours, 16 marks)

a. Assembler directives
b. DOS and BIOS interrupts
c. Macros and Procedures
d. Assembly language programming of 8086

Text Books:

1. R.P. Jain, "Modern Digital Electronics", Tata McGraw Hill, Fourth edition.
2. A. K. Ray and K.M. Bhurchandi, "Advanced Microprocessors and Peripherals", Tata McGraw Hill, Third edition.

Reference Books:

1. M. Morris Mano, "Digital Logic and Computer Design", Pearson, 1979.
2. V.K.Puri, "Digital Electronic Circuit and System", Tata McGraw Hill, 1997.
3. F.J. Hill, "Digital Logic and Microprocessor", John Willy & sons.

4. Anandkumar, “Fundamentals of Digital Circuits”, Pearson.
5. John Wiley and Sons, “Introduction to Switching Theory and Logic Design”, Hill and Peterson, Third edition.
6. Douglas V Hall, “Microprocessor and Interfacing, Programming and Hardware”, Tata McGraw Hill, Second edition.
7. Soumitra Kumar Mandal, “Microprocessor and Microcontroller: Architecture, Programming and Interfacing using 8085, 8086 and 8051”, Tata McGraw Hill.
8. B Ram, “Advanced Microprocessors and Interfacing”, Tata McGraw Hill.
9. Peter Abel, “IBM PC Assembly Language and Programming”, Pearson, Fifth edition.

Object Oriented Technology

COURSE OUTLINE

Course Title	Short Title	Course Code
Object Oriented Technology	**OOT**	

Course Description:

The objective of this course is to introduce the students to the concepts of C++ programming language and enable them to apply these concepts for solving real world problems.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	**15**	**45**	**03**

Prerequisite Course(s): C Programming.

COURSE CONTENT

Object Oriented Technology **Semester-III**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Introduction to Object Oriented Programming

(08 Hours, 16 marks)

a. Introduction to procedural, modular and object-oriented programming techniques.
b. Limitations of procedural programming.
c. Need of object-oriented programming. Advantages, disadvantages and applications of OOP.
d. Class, objects, abstraction, encapsulation, data hiding, inheritance, polymorphism and message passing.
e. The basics of C++
f. Expressions

2. Classes and Objects, Function and Operator Overloading

(08 Hours, 16 marks)

a. Class and objects
b. Constructors and destructors:
c. Functions in C++
d. Function Overloading
e. Operator overloading

3. Pointers and Arrays (08 Hours, 16 marks)

a. Introduction, pointer declaration, voids pointers.
b. Pointers to class objects, this pointer.
c. Pointers to members, accessing private members with pointers.
d. Characteristics of arrays, initialization of arrays.
e. Arrays within a class, arrays of objects.
f. Dynamic memory allocation using new and delete operators.
g. One dimensional and two dimensional arrays using pointers.

4. Inheritance, Virtual functions and Polymorphism

(08 Hours, 16 marks)

a. Introduction, base and derived classes. Inheritance types, access modifiers.
b. Single inheritance, multiple and multilevel inheritance, hybrid, hierarchical, multipath inheritance and virtual base classes.
c. Overriding base class members. Constructors and inheritance, calling base class constructor.
d. Static and dynamic binding. Pointers to base and derived classes.
e. Virtual functions, rules for virtual functions, working of virtual functions, pure virtual functions.
f. Virtual base classes.

5. Files and Streams, Managing Console I/O Operations and Templates

(08 Hours, 16 marks)

a. Concept of a file, file stream operations.
b. Opening a file using constructor and open function, closing a file, detecting end-of-file, file modes, file pointers.
c. Introduction to C++ streams, stream classes, unformatted and formatted I/O.
d. ios class functions and flags, manipulators.
e. Introduction to function template and class template.
f. Overloading of templates functions.

g. Member function templates and template arguments.
h.

Text Books:

1. E. Balagurusamy, “Object Oriented Programming with C++”, Fifth Edition, Tata McGraw Hill, 2011.
2. Robert Lafore, “Object Oriented Programming in C++”, Fourth Edition, Pearson Education, 2002.

Reference Books:

1. Ashok N. Kamthane, “Object-Oriented Programming with ANSI and Turbo C++”, Pearson Education, 2006.
2. Rajesh K. Shukla, “Object-Oriented Programming in C++”, Wiley India, 2008.
3. Bjarne Stroustrup, “C++ Programming Language”, Third Edition, Addison Wesley, 2002.
4. Yashavant P. Kanetkar, “Let Us C++”, Second Edition, BPB Publications, 2003.
5. Venugopal K.R., “Mastering C++”, First Edition, TMH, 1999.
6. Mahesh Bhave, Sunil Patekar, “Object Oriented Programming with C++”, Second Edition, 2012.
7. Herbert Schildt, “The Complete Reference C++”, Fourth Edition, TMH, 2003.

Soft Skills – III

COURSE OUTLINE

Course Title	Short Title	Course Code
Soft Skills – III	**SK-III**	

Course Description:

Through this course we have tried to prepare the students for the industry. Most companies test mathematical and logical ability through an aptitude test. This subject aims at working on these skills of a student through strategies formulae and practice exercises.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	1	**14**	**14**	**2**

Prerequisite Course(s): Fundamental knowledge of High School Mathematics.

COURSE CONTENT

Soft Skills – III **Semester-III**

Teaching Scheme **Examination Scheme**

Lecture: 1 hour / week **Internal Continuous Assessment (ICA): 50 Marks**

Unit-I: Arithmetic-1 **(03 Hours, 10 marks)**

a. Basic Formulae

i. Divisibility Rules
ii. Speed Maths
iii. Remainder Theorem
iv. Different Types of Numbers
v. Applications

b. HCF, LCM and Linear Equations

i. HCF – Successive Division and Prime Factorization Methods
ii. LCM – Successive Division and Prime Factorization Methods
iii. Applications

iv. Linear Equations – Elimination Method
v. Substitution Method
vi. Applications

c. Averages and Mixtures

i. Concept of Average
ii. Faster Ways of Finding It
iii. The Allegation Method
iv. Applications

Unit-II: Arithmetic–II **(03 Hours, 10 marks)**

a. Percentages

i. Concept of Percentage
ii. Working with Percentages
iii. Applications

b. Profit and Loss

i. Difference between Cost and Selling Price
ii. Concept of Profit Percentage and Loss Percentage
iii. Applications

c. Time and Work

i. Basic Time and Work Formula
ii. Relation between Time and Work
iii. Applications

Unit-III: Arithmetic–III **(03 Hours, 10 marks)**

a. Permutations and Combinations

i. Sum Rule of Disjoint Counting
ii. Product Rule of Counting
iii. Concept of Factorial
iv. Permutations
v. Linear Permutations
vi. Combinations
vii. Circular Permutations
viii. Applications

b. Probability

i. Definition and Laws of Probability
ii. Mutually Exclusive Events
iii. Independent Events
iv. Equally Likely Events
v. Exhaustive Events
vi. Cards
vii. Dice
viii. Applications

c. Time and Distance

i. Speed
ii. Conversion Factors for Speed
iii. Average Speed
iv. Moving Bodies – Passing, Crossing and Overtaking
v. Relative Speed
vi. Boats and Streams
vii. Applications

Unit-IV: Non-Verbal Reasoning (02 Hours, 10 marks)

a. Analogies

i. Examples
ii. Applications

b. Classification

i. Examples
ii. Applications

c. Sequences

i. Examples
ii. Applications

Unit-V: Analytical Reasoning (03 Hours, 10 marks)

a. Analytical Puzzles

i. Classification Puzzles
ii. Ordering Puzzles
iii. Assignment Puzzles
iv. Applications

b. Letter and Number Series

i. Different Types of Letter Series
ii. Different Types of Number Series
iii. Mixed Series

c. Coding and Decoding

i. Letter Coding
ii. Number Coding
iii. Mixed Coding
iv. Odd Man Out
v. Applications

Guide lines for ICA:
ICA will be based on credit tests and assignments submitted by the student in the form of journal.

Reference Books:

1. R. S. Aggarwal, "Quantitative Aptitude", S. Chand Publication, New Delhi, 2012.
2. R. S. Aggarwal, "A Modern Approach to Verbal Reasoning", S. Chand Publication, New Delhi, 2012.
3. R. S. Aggarwal, "A Modern Approach to Non-Verbal Reasoning", S. Chand Publication, New Delhi, 2012.

Information Theory Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Information Theory	**IT**	

Course Description:

This laboratory provides students with a comprehensive study of the basic concepts of cryptography and data compression. It will helps the students to understand how programmers and electronic communications professionals can use cryptography-the technique of enciphering and deciphering messages-to maintain the privacy of computer data and also shows how they can be used to solve security problems.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**02**	**15**	**30**	**01**

Total Semester Credits: 1

Prerequisite Course(s): Fundamental knowledge of Computers and any programming language (Ex. C language).

LAB COURSE CONTENT

Outline of Content:

(Note: Minimum SIX Experiments from group A and FOUR from group B.)

Group A

1. **Program for simple encryption and decryption of the message**
   - A simple encryption and decryption of a message can be implemented by using any programming language
   - The program should consist of two modules: Encryption and Decryption
2. **Program for Vernam Cipher (One-time Pad)**
   - Program should consist of encryption and decryption module
3. **Program for Simple Transposition Technique**

- A simple transposition technique such as 'Rail Fence' technique can be implemented
- In this technique plain text is written in zig - zag form to obtain cipher text

4. **Program for Electronic Code Book (ECB) Mode**
   - Algorithmic mode ECB can be implemented
   - Program must exhibits the working of ECB i.e. block-by-block encryption and decryption

5. **Program for Cipher Block Chaining (CBC) Mode**
   - Algorithmic mode CBC can be implemented
   - Program must exhibits the working of CBC

6. **Program for Chinese Remainder Theorem**
   - A simple program is written to show the working of Chinese remainder theorem

7. **Program for Diffie-Hellman Key Exchange Algorithm**
   - Key exchange is a big problem in symmetric key and it can be resolved by using Diffie-Hellman key exchange algorithm

8. **Program for RSA algorithm**
   - Public key algorithm (RSA) can be implemented for simple input
   - Program must consist of three modules: Key generation, Encryption and Decryption

9. **Study of Digital Signature**
   - A digital signature is a mechanism that enables the creator of a message to attach a code that acts as a signature.

Group B

1. **Program for Caesar Cipher**
   - A simple program on Caesar cipher can be implemented
   - It should consists of two modules: encryption and decryption
   - Encryption: Cipher text=Plain text + (Key=3)
   - Decryption: Plain text= Cipher text - (Key=3)

2. **Program for Simple Stream Cipher**
   - Stream ciphers works on bit-by-bit basis
   - It should consists of two modules: encryption and decryption
   - Encryption: Cipher text bit=Plain text bit XOR Key bit
   - Decryption: Plain text bit = Cipher text bit XOR Key bit

3. **Study of JPEG Standard**
   - Image compression standard

4. **Study of Adaptive Huffman Coding Technique**
   - Limitation of Huffman coding techniques are removed in adaptive coding

5. **Program for RLE Encoding Technique**
   - Run-Length encoding technique is lossless data compression technique. It is generally used for text and image compression.

Reference Books:

1. William Stallings, "Cryptography and Network Security", Fifth edition, Pearson, 2011
2. Mark Nelson and Jean-Loup Gailly, "The Data Compression Book", Second edition, BPB Publications
3. Bruce Schneider, "Applied cryptography: Protocols, Algorithms and sources code in C", Second edition, Willey, 2008.
4. Atul Kahate, "Cryptography and Network Security", Second edition, TMH, 2007.
5. D.C. Hankerson , Greg A. Harris and Peter D. Johnson Jr., "Introduction to Information Theory and Data Compression", Second edition, CRC Press, 2003.
6. Alfred J. Menezes, Paul C. van Oorschot and Scott A. Vanstone, "Handbook of Applied Cryptography", CRC Press, 1996.
7. Forouzan, "Cryptography & Network Security ", Second edition, TMH, 2010.

Discrete Structure and Graph Theory Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Discrete Structure and Graph Theory	**DSGT LAB**	

Course Description:

This laboratory provides students with a comprehensive study of the C programming language in discrete structures and graph theory. Classroom lectures stress the strengths of C which provide students with the means of writing efficient codes for discrete structures and graph theory.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**02**	**15**	**30**	**01**

Total Semester Credits: 1

Prerequisite Course(s): Fundamental knowledge of C.

LAB COURSE CONTENT

Outline of Content:

(Note: Minimum FIVE experiments from the group A and minimum FIVE experiments from the group B.)

(Group A)

1. **A program for logical operations using bitwise operators.**
   Perform logical operations like AND,OR,NOT,IF THEN,IF AND ONLY IF
2. **A program for set operations: Union, Intersection, Difference, Symmetric difference.**
   Perform set operations like union, intersection, difference, symmetric difference, complement
3. **A program for generation of Power set of a given set.**
   Producing power set for a given input set.
4. **A program for generation of permutations.**
   Producing permutations set for a given input set.

5. **A program for generation of combinations.**

   Producing permutations set for a given input set.
6. **A Program for Bubble sort.**

   Sorting of given numbers by using Bubble sort.

(Group B)

1. **A Program for Matrix multiplication.**

   Performing Multiplication of two matrices.
2. **A Program for Binary search.**

   Searching of a given number using binary search.
3. **A Program for Shortest Path algorithm using Dijkstra's.**

   Finding shortest path in a graph using Dijkstra's algorithm.
4. **A program for implementation of Kruskal's algorithm.**

   To find minimum spanning tree using kruskals algorithm.
5. **A program for implementation of Prim's algorithm.**

   To find minimum spanning tree using kruskals algorithm.
6. **A program for Inter conversion of number system.**

   Interconverting numbers from one base to another base.

Reference Books:

1. Kenneth H. Rosen, Discrete Mathematics and its Application, Fifth edition, TMH
2. V. K. Balakrishnan, " Graph Theory", TMH.
3. B. Kolman , R. Busby and S. Ross, "Discrete Mathematical Structures", Fourth edition, Pearson.

Digital System and Microprocessor Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Digital System and Microprocessor	**DSM**	

Course Description:

This laboratory provides students with a comprehensive study of the digital system covering basic concepts of digital system and microprocessor covering microprocessor concepts. This laboratory focuses on basic analysis and design of digital circuit's and the basic concepts and programming related to microprocessor.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**02**	**15**	**30**	**01**

Total Semester Credits: 1

Prerequisite Course(s): Fundamental knowledge of basic digital design and microprocessor concepts.

LAB COURSE CONTENT

Outline of Content:

(Note: Minimum SIX experiments from group A and FOUR experiments from group B)

Group A (Digital System)

1. **Verify the truth table of all logic gates and verify the Demorgan's theorem**
    a. Draw the logical symbol and truth table
    b. Implement the connection on bread board and verify the truth table
2. **Implement any logic gates by using universal gates**
    a. Construct logic gates using universal gates
    b. Implement the connection on bread board and verify the truth table

3. **Construct and Implement Half Adder and Full adder**

    a. Construct Half Adder and Full adder
    b. Implement the connection on bread board and verify the truth table

4. **Construct and Implement Half Subtractor and Full Subtractor**

    a. Construct Half Subtractor and Full Subtractor
    b. Implement the connection on bread board and verify the truth table

5. **Construct and Implement various Code converters (Binary to Gray and Gray to Binary)**

    a. Construct Code Converter
    b. Implement the connection on bread board and verify the truth table

6. **Verify Muliplexer and Demultiplexer**

    a. Construct Muliplexer and Demultiplexer
    b. Implement the connection on bread board and verify the truth table

7. **Verify the truth table of BCD to 7-Segment display**

    a. Construct BCD to 7-Segment display
    b. Implement the connection on bread board and verify the truth table

8. **Implement and verify S-R, J-K,D, and T flip flop using ICs**

    a. Construct flip flops
    b. Implement the connection on bread board and verify the truth table

Group B (8086 Microprocessor)

Program using Macro

Display personal information using Macro

1. **Program using NEAR and FAR Procedure**

    Addition of two numbers using NEAR and FAR Procedure Perform

2. **Perform arithmetic operations on two numbers**

    Addition/subtraction/multiplication of two numbers using NEAR and FAR Procedure

3. **Find factorial of given number**

    Factorial of given number using recursive instruction

4. **Program for Password Verification**

   Program for Password Verification

5. **Perform the BCD Addition**

   Addition of two 16 bit BCD numbers

6. **Program to Display System Time & Date**

   Display current Time & Date of system

7. **Convert HEX To BCD and BCD to HEX**

   a. HEX to BCD Conversion
   b. BCD to HEX Conversion

Guide lines for ESE:

- ESE will be based on the practical assignments submitted by the students in the form of journal.
- In the ESE, the students may be asked to perform the practical assignment with minor modification.
- Evaluation will be based on the paper work of algorithm, understanding of the logic and the syntax, quality of the program, execution of the program, type of input and output for the program.

Reference Books:

1. M. Morris Mano, "Digital Logic and Computer Design", Pearson, 1979.
2. V.K.Puri, "Digital Electronic Circuit and System", Tata McGraw Hill, 1997.
3. F.J. Hill, "Digital Logic and Microprocessor", John Willy & sons.
4. Anandkumar, "Fundamentals of Digital Circuits", Pearson.
5. John Wiley and Sons, "Introduction to Switching Theory and Logic Design", Hill and Peterson, Third edition.
6. Douglas V Hall, "Microprocessor and Interfacing, Programming and Hardware", Tata McGraw Hill, Second edition.
7. Soumitra Kumar Mandal, "Microprocessor and Microcontroller: Architecture, Programming and Interfacing using 8085, 8086 and 8051", Tata McGraw Hill.
8. B Ram, "Advanced Microprocessors and Interfacing", Tata McGraw Hill.
9. Peter Abel, "IBM PC Assembly Language and Programming", Pearson, Fifth edition.

Object Oriented Technology Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Object Oriented Technology	**OOT**	

Course Description:

This laboratory provides students with a comprehensive study of the C++ programming language. Classroom lectures stress the strengths of C++, which provide students with the means of writing efficient, maintainable, and portable code.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**02**	**15**	**30**	**01**

Total Semester Credits: 1

Prerequisite Course(s): Fundamental knowledge of Computers and C programming

LAB COURSE CONTENT

Outline of Content:

(Note: Minimum SIX Experiments from group A and FOUR from group B.)

Group A

1. **Write a program for a simple class and object.**
   Performing simple arithmetic operations using C++ class and object like,
   a. Addition,
   b. Subtraction,
   c. Multiplication,
   d. Division.
2. **Write a program for parameterized constructor.**

Demonstrate the use parameterized constructor by passing different types of parameters to the constructor.

3. **Write a program for overloading constructors.**
   Demonstrate the concept of overloading constructor functions using class and object.

4. **Write a program to find the area of rectangle, triangle and sphere using function overloading.**
   To calculate the area of rectangle, triangle and sphere using function overloading and class and object.
5. **Write a program to overload unary operator using member function.**
   Demonstrate the overloading of unary operators using the concept of member functions.
6. **Write a program to overload binary operator using member function.**
   Demonstrate the overloading of binary operators using the concept of member functions.
7. **Write a program for arrays of pointers to objects.**
   Declaring an array of pointers to objects using suitable example.
8. **Write a program using single inheritance, multiple inheritance and hierarchical inheritance.**
   Demonstrate the use of single inheritance, multiple inheritance and hierarchical inheritance by taking suitable example.
9. **Write a program using multilevel inheritance and hybrid inheritance.**
   Demonstrate the use of multilevel inheritance and hybrid inheritance by taking suitable example.
10. **Write a program for virtual base classes.**
    To calculate the total mark of a student using the concept of virtual base class.
11. **Write a program to read and write class objects from files.**
    Writing/reading class object to/from file.
12. **Write a program to format output using ios class functions and flags.**
    To format the output using different ios class functions and flags.
13. **Write a program to format output using manipulators.**
    To format the output using different manipulators.
14. **Write a program using class template.**
    To swap the numbers using the concept of function template.
15. **Write a program for overloading of template functions.**
    Overload templates functions with the number of parameters.

Group B

1. **Write a program for the copy constructor.**
   To calculate factorial of a given number using copy constructor.
2. **Write a program to overload unary operator using friend function.**
   Demonstrate the overloading of unary operators using the concept of friend function.

3. **Write a program to overload binary + operator using member function for concatenation of two strings.**
   Demonstrate the overloading of binary + operator using the concept of member function for concatenation of two strings.
4. **Write a program for matrix multiplication using new and delete dynamic memory allocation operators.**
   Perform the matrix multiplication using new and delete dynamic memory allocation operators.
5. **Write a program to convert class type data to basic type data.**
   Perform the class type data conversion to any basic type data.
6. **Write a program for run time polymorphism using virtual functions.**
   Perform the run time polymorphism using virtual functions.
7. **Write a program for bubble sort using template functions.**
   Perform the bubble sort using the concept of template functions.

Reference Books:

1. E. Balagurusamy, "Object Oriented Programming with C++", Fifth Edition, Tata McGraw Hill, 2011.
2. Robert Lafore, "Object Oriented Programming in C++", Fourth Edition, Pearson Education, 2002.
3. Ashok N. Kamthane, "Object-Oriented Programming with ANSI and Turbo C++", Pearson Education, 2006.
4. Rajesh K. Shukla, "Object-Oriented Programming in C++", Wiley India, 2008.
5. Bjarne Stroustrup, "C++ Programming Language", Third Edition, Addison Wesley, 2002.
6. Yashavant P. Kanetkar, "Let Us C++", Second Edition, BPB Publications, 2003.
7. Venugopal K.R., "Mastering C++", First Edition, TMH, 1999.
8. Mahesh Bhave, Sunil Patekar, "Object Oriented Programming with C++", Second Edition, 2012.
9. Herbert Schildt, "The Complete Reference C++", Fourth Edition, TMH, 2003.

Guide lines for ESE:-

- ESE will be based on the practical assignments submitted by the students in the form of journal.
- In the ESE, the students may be asked to perform the practical assignment with minor modification.
- Evaluation will be based on the paper work of algorithm, understanding of the logic and the syntax, quality of the program, execution of the program, type of input and output for the program.

NORTH MAHARASHTRA UNIVERSITY,

JALGAON (M.S.)

Second Year Engineering

(Information Technology)

Faculty of Engineering and Technology

COURSE OUTLINE

Semester – IV

W.E.F 2013 – 2014

Data Communication

COURSE OUTLINE

Course Title	Short Title	Course Code
Data Communication	**DC**	

Course Description:

This course is aimed at introducing the fundamentals of data communications to undergraduate students. The goals of the course are to understand the basics and knowledge about the Data Communications using components and protocols of data communications.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	**15**	**45**	**03**

Prerequisite Course(s): Fundamentals of Data Communication.

COURSE CONTENT

Data Communication **Semester- IV**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1 Introduction to Data Communication and Signals

(08 Hours, 16 marks)

a Basics of Data Communication: Characteristics and Components
b Data Representation and Data Flow
c Networks, Introduction to ISO-OSI Reference model
d Introduction to Signals and Transmission Impairments: Analog and Digital
e Periodic Analog Signals, Digital Signals
f Transmission impairment, data rate limits, Performance

2 Digital transmission and Analog transmission

No of Lect – 8, Marks:16

a Digital to Digital Conversion

b Analog to Digital Conversion
c Transmission Modes
d Digital-to-analog Conversion

3 Multiplexing and Transmission Media (08 Hours, 16 marks)

a Multiplexing
b Guided Media
c Unguided Media

4 Switching and Multiple Access (08 Hours, 16 marks)

a Circuit-switched Networks
b Datagram networks
c Virtual-circuit networks
d Multiple Access

5 Error Control and Data Link Control (08 Hours, 16 marks)

a Types of errors
b Block coding
c Linear block codes
d Cyclic codes
e Checksum
f Flow and error control

Text Books:

1. Behrouz A Forouzan, "Data Communications and Networking", Fourth edition: Tata McGraw Hill.
2. P. C. Gupta, "Data Communications", PHI Publications.

Reference Books:

1. William Stallings, "Data & Computer Communications", Seventh edition: PHI Publication.
2. Leon - Garcia, Indra Widijaja, "Communication Networks Fundamental Concepts and Key Architectures", Second edition: McGraw Hill Education.
3. Achyut Godbole, "Data Communication Networks", Tata McGraw Hill.
4. Bruce Hartpence, "Packet Guide to Routing and Switching", O'Reilly.
5. Bruce Hartpence, "Packet Guide to Core Network Protocol" , O'Reilly.
6. James Irvine & David Harle, "Data Communication and Networks: An Engineering Approach", Wiley Edition.

Microprocessor & Microcontroller Interfacing

COURSE OUTLINE

Course Title	Short Title	Course Code
Microprocessor & Microcontroller Interfacing	**MPMCI**	

Course Description:

The objective of this course is to introduce the students to the fundamentals of microprocessor & microcontroller interfacing with assembly programming language and enable them to apply these concepts for real world applications.

Lecture	Hours / Week	No. of Weeks	Total Hours	Semester Credits
	03	15	45	04
Tutorial	01	15	15	

Prerequisite Course(s): Fundamental knowledge of Microprocessors & Microcontrollers.

COURSE CONTENT

Microprocessor & Microcontroller Interfacing **Semester- IV**

Teaching Scheme	Examination Scheme	
Lecture: 3 hours / week	**End Semester Examination (ESE)**	**: 80 Marks**
Tutorial: 1 hour / week	**Paper Duration (ESE)**	**: 03 Hours**
	Internal Sessional Exam (ISE)	**: 20 Marks**

1. Basic I/O Interface

(08 Hours, 16 marks)

a. MSDOS FAT
b. MS DOS Device Drivers Types, Structure of device drivers.
c. 8255 PPI : Internal block diagram, control word and status word, modes of operation, numericals on control word design.

2.

(08 Hours, 16 marks)

a. 8254(PIT) : Internal block diagram, control word format, operating modes, numericals on control word design.

b. 8251(USART) : Architecture and signal description, operating modes, interfacing with 8086 and numericals.
c. TSR programs : concept and implementation.

3. Overall Motherboard Component Logic (08 Hours, 16 marks)

a. Functional block diagram of PC.
b. Motherboard (8086/8088 based) : Motherboard components.
c. Motherboard logic : Reset logic, Interrupt logic, RAM parity logic, NMI logic, Wait state logic, Bus Arbitration logic, RAM & ROM logic, CPU logic, DMA logic, keyboard interface block diagram.
d. Microcomputer Display : Raster scan basics, Overview of character display control system.
e. PC display adapters : CGA,EGA,VGA.
f. Introduction to LCD and Plasma display.

4. 8086 Microprocessor interface (08 Hours, 16 marks)

a. Parallel Printer Interface
b. 7 segment display interface.
c. Disk reading methods: FM , MFM.
d. Internal structure of Floppy disk and hard disk.
e. Floppy Disk Controller : Overview, FDC system interface, Overall operation of floppy disk subsystem, 8272 FDC : internal block diagram and commands.
f. Hard disk controller : HDC commands and device control block.

5. Microcontrollers and Interfacing (08 Hours, 16 marks)

a. Interfacing LEDs and of 7-segment displays.
b. Interfacing keys and keyboard interfacing .
c. Interfacing 0808/0809 ADC.
d. Interfacing DAC 0808.
e. Interfacing stepper motor.

Reference Books:

1. Douglas V. Hall, " Microprocessors and Interfacing : Programming and Hardware", Second edition , Tata McGraw Hill.
2. A. K. Ray & K. M. Bhurchandi, "Advanced Microprocessor and Peripherals – Architecture, Programming and Interfacing", Third edition, Tata Mc Graw Hill.
3. Ray Duncan, "Advanced MS-DOS Programming", Second edition, Microsoft Press.
4. Peter Abel, " IBM PC Assembly language and programming" , Fifth edition, Pearson education/ Prentice Hall of India Pvt. Ltd.
5. B. Govindarajalu, "IBM PC and Clones", Second edition, Tata McGraw Hill.

Data Structures

COURSE OUTLINE

Course Title	Short Title	Course Code
Data Structures	**DS**	

Course Description:

The objective of this course is to introduce the students to the fundamentals of Data Structure with concepts of the C programming language and enable them to apply these concepts for solving real world problems.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Lecture	**03**	**15**	**45**	**04**
Tutorial	**01**	**15**	**15**	

Prerequisite Course(s): Fundamental knowledge of C

COURSE CONTENT

Data Structures **Semester - IV**

Teaching Scheme	**Examination Scheme**	
Lecture: 3 hours / week	**End Semester Examination (ESE)**	**: 80 Marks**
Tutorial: 1 hour / week	**Paper Duration (ESE)**	**: 03 Hours**
	Internal Sessional Exam (ISE)	**: 20 Marks**

1. Introduction to Data Structures (08 Hours, 16 marks)

a Introduction of data and data object.
b Data structure and Abstract Data Type(ADT).
c Implementation of different data structures.
d Basic terminologies with data structures, types of data structures.
e Data structure operations.
f Concept of arrays,pointer and structures.

2. Stack and Queue (08 Hours, 16 marks)

a Detailed knowledge of data structure like stack, queue & circular queue.
b Polish notations & interconversions by using stack.
c Use of stack in function call,recursion,tower of Hanoi.

3. Linked Lists (08 Hours, 16 marks)

a Understand the concept of linked list data structure.

b Pros & Cons of array compared with linked list.

c Creation,traversing,searching,insertion,deletion opertions w.r.t. single linked list.

d Pros & cons of single linked list, double linked list

e Polynomial addition using single linked list as well as storing multivariable polynomials using generalised list.

4. Trees (08 Hours, 16 marks)

a Creation,traversing,searching,insertion,deletion opertions w.r.t. binary search tree.

b Concept of threaded binary tree,tree traversals(recursive & non-necursive).

c Concept of Huffman Algorithm.

e Height Balanced Tree(AVL Search Tree).

5. Searching and Sorting (08 Hours, 16 marks)

a Basics of searching techniques.

b Basics of sorting techniques.

c Different sorting algorithms including Bubble, Insertion, Selection,Quick,Merge,Heap,Radix.

d Time and Space complexity of an algorithm with big 'O', '' , 'Ω' notations.

e Best, Worst, and Avgerage case time complexity of each of these algorithms.

Text Books:

1. Seymour Lipschutz, "Data Structures", Schaums Outlines Tata McGraw Hill, 2006.
2. Ellis Horowitz and Sartaj Sahani, "Fundamentals of Data Structures", Galgotia Publication.

Reference Books:

1. G.S.Baluja, "Data Structures through C", Dhanpatrai Publications.
2. Ashok N. Kamthane, "Introduction to Data structures in C", Person Publications, 2007.
3. Aarom Tanenbaum, Yedidyah Langsam, Moshe Augenstein, "Data structures using c", Pearson Publication.
4. Alfred Aho, John Hopcroft, Jeffrey Ullman, "Data Structures and Algorithms",Pearson Publications.
5. E.Balagurusamy,"Data Structures using C",Tata MacGraw Hill Publications.
6. P.S.Deshpande,O.G.Kakde,"C and Data Structures",dreamtech press Publications.
7. Rajesh K.Shukla, "Data Structures using C and C++" ,Willy India Publication.
8. Larry Nyhoff, "ADTs' Data Structures and prolems with C++",Pearson Publications.

Computer Organization

COURSE OUTLINE

Course Title	Short Title	Course Code
Computer Organization	**CO**	

Course Description:

This course introduces the students about the computer. It includes the terms, concepts, architectures, formats and addressing. This course also describes the Memory organization etc.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	**15**	**45**	**03**

Prerequisite Course(s): Introduction to Computer.

COURSE CONTENT

Computer Organization **Semester- IV**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Introduction to system concepts (08 Hours, 16 marks)

a. To introduce students to System Concept.
b. To learn about Instruction format.
c. To learn General addressing Modes.
d. To learn about Expanding op-codes.
e. To learn about Bus Structures.

2. Arithmetic (08 Hours, 16 marks)

a To know how Numbers are represented.
b To learn Multiplication using Booths and Bit-pairing Algorithms.
c To learn Division using Restoring and Non-Restoring Methods.
d To learn addition and Subtraction of signed numbers.
e To learn Floating point System.

3. Processing Unit (08 Hours, 16 marks)

a To design control unit.

b Designing Control unit using hardwired and Micro programmed methods.

c Learning Wilkes Design method.

d To learn Bus organization.

e To learn execution of complete instruction.

4. Memory (08 Hours, 16 marks)

a Memory organization techniques.

b To know cache memory organization.

c To know Virtual memory.

d To learn basic concepts of memory.

e Introduction to SDRAM, RDRAM, DDRSDRAM, Flash memory.

5. System Organization (08 Hours, 16 marks)

a To know concepts system buses.

b To know Daisy chaining, polling.

c Concepts of PCI bus, SCSI bus, Universal Serial Bus.

d RISC and CISC .

Text Book:

1. Hamacher, Vransic, Zaky, "Computer Organization", Fifth edition, McGraw Hill international.

Reference Books:

1. J.P. Hayes, "Computer Architecture and Organization", Third edition, McGraw Hill international.
2. Sajjan Shiva, "Computer Organization Design & Architecture", CRC Press Publication.
3. Tanenbaum, "Structured Computer Organization", Pearson.
4. William Stallings, "Computer Organization and Architecture", Sixth edition, Pearson.
5. Swati Saxena,"Computer Organization" Dhanpat Rai.
6. Murdocca, Heuring, "Computer Architecture & Organization", Second edition, Wiley.
7. Nicholas Carter, "Computer Architecture", Schaum's Outline.

Computer Graphics and Multimedia

COURSE OUTLINE

Course Title	Short Title	Course Code
Computer Graphics & Multimedia	**CGM**	

Course Description:

This course introduces the students about the concepts of user interface with graphics system. It includes the graphics standards, transformations, filling & clipping objects, 2D & 3D as well as multimedia concepts. This course also describes about graphics applications corresponds with scientific work as well as animation, simulation etc.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	15	45	03

Prerequisite Course(s): Engineering Graphics.

1. **Basic Concepts** **(08 Hours, 16 marks)**
   a. Introduction to computer graphics
   b. Graphics Standards
   c. Interactive Computer Graphics
   d. Linear and Circle Generation

2. **Polygons** **(08 Hours, 16 marks)**
   a. Polygons
   b. Types of Polygons
   c. Polygon filling
   d. Scan conversion algorithm
   e. Segments

3. **2D & 3D Geometry** **(08 Hours, 16 marks)**
   a. 2D transformation primitives and concepts
   b. 3 D transformations
   c. 3D viewing transformation
   d. Concept of parallel perspective projections
   e. Viewing parameters

4. **Multimedia** **(08 Hours, 16 marks)**
   a. Multimedia Presentation & Production
   b. Hardware & software requirements
   c. Analog & digital representations
   d. Introduction to text & image presentation.

5. Multimedia Architecture (08 Hours, 16 marks)

a. Multimedia Architecture
b. Multimedia Extensions
c. Distributed multimedia applications
d. Introduction to animation
e. Principles of animation

Text Books:

1. "Computer graphics", ISRD group, THM publications, Eleventh reprint 2012.
2. Ranjan Parekh, "Principles of Multimedia", McGraw Hill.

Reference Books:

1. David F. Rogers, "Procedural Elements for Computer Graphics, Tata McGraw Hill, Second edition.
2. Shirley, Marshner, "Fundamentals of Computer Graphics", Third edition, CRC Publication/ A.K. Peters.
3. Steven Harringtom, "Computer graphics A Programming Approach", MGH.
4. Mukherjee, "Fundamentals of Computer Graphics and Multimedia", PHI.
5. Maurya, "Computer Graphics: with virtual reality system", Wiley India.
6. Donald Hearn and Pauline Baker," Computer Graphics", Pearson LPE, Second edition.
7. Rao and Prasad, "Graphics user interface with X windows and MOTIF", New Age.
8. Foley, Vandam, Feiner, Hughes, "Computer Graphics Pricipals & Practice", Pearson Second edition.

Application Development Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Application Development Lab	**ADL**	

Course Description:

The objective of this course is to introduce the students to the fundamentals of web development. It includes the technologies like HTML, XML, CSS and Scripting Languages.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	01	**15**	**15**	**02**

Prerequisite Course(s): Fundamental knowledge of Computers.

LAB COURSE CONTENT

This course will use advanced techniques in creating documents for the World Wide Web. Emphasis will be placed on HTML, JavaScript, XML and Java.

1 Introduction to HTML (03 Hours)

a. Tags and Elements
b. Separating Heads from Bodies
c. Attributes
d. Basic Text Formatting
e. Presentational and Phrase Elements
f. List
g. Links and Navigation

2 CSS Style Sheet and Scripting Languages (03 Hours)

a. URLs
b. Images, Audio, and Video
c. Tables, Forms and Frames
d. Cascading Style Sheets
e. Page Layout
f. Scripting Language (Java, VB)

3 Introduction to XML (03 Hours)

a. XML Basics

b. XML Elements
c. Working with DTD

4 DTD and Style Sheet (03 Hours)

a. Adding Style, Using Schemas

5 Introduction to Java (03 Hours)

a. Basic Input/output
b. Applet Class
c. Event handling
d. Introduction to AWT: working with windows, Graphics and Text

Reference Books:

1. Jon Duckett, "Beginning HTML, XHTML, CSS, and JavaScript", John Wiley & Sons publication, 2010.
2. Heather Williamson, "XML: The Complete Reference", First edition, Tata McGraw-Hill Education, 2001.
3. Herbert Schildt, "Java: The Complete Reference", Seventh edition, Tata McGraw-Hill Education, 2006.
4. Thomas A. Powell, "HTML & CSS: The Complete reference", Fifth edition, TMH 2010.
5. Elliotte Rusty Harold, "XML 1.1 Bible", Third edition, Willey Publication, 2004.
6. Steven Holzner, "XML: A Beginner's Guide", First edition, TMH, 2009.
7. Herbert Schildt, "Java: A Beginners Guide", Fifth edition, TMH, 2011.
8. Yashavant Kanetkar, "Let Us Java", BPB Publication, 2011.

Data Communication Lab

LAB COURSE OUTLINE

Course Title	Short Title Course Code
Data Communication Lab	**DC**

Course Description:

This laboratory provides students with a comprehensive study of the Data Communication concepts and practical implementation of Data Communication concepts.

Laboratory	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	02	15	30	01

Total Semester Credits: 1

Prerequisite Course(s): Fundamental knowledge of Data Communication.

LAB COURSE CONTENT

Outline of Content:

Group A

1. Comparative analysis of different types of network cables with Specifications
   - Study of different types of Network cables – CAT-5, CAT – 6.
   - Study of different cable specifications comparisons.
2. Implementation of Network performance calculator.
   - Simple Program for Calculating Network Performance.
3. Network related commands such as ARP, IPCONFIG, PING, TRACERT, NSLOOKUP, GETMAC, NETSTAT etc.
   - Practical use of Network commands ARP
   - Study of IPCONFIG for IP configurations
   - Study of PING command for finding destination reachable or not.
   - Study of TRACERT command
   - Study of NSLOOKUP command
   - Study of GETMAC to get MAC address.

- Study of NETSTAT to get the network status.

4. I.T Infrastructure planning using Network Connecting Devices.
   - Consider our own college as a case & prepare a planning for I.T. infrastructure.
5. Network Connecting Devices Specifications and configurations.
   - Practical study of Network Connecting device – Repeater.
   - Practical study of Network Connecting device – Switch /HUB.
   - Practical study of Network Connecting device – Router

Group B

1. Implementation of Stop and Wait Protocol
   - Study the working of stop and wait protocol
   - Implementation of simple client and server should be simple
   - Modular approach should be followed.
2. Implementation of Internet checksum
   - Consider a simple example
   - Study it theoretically.
   - Implementation of same .
3. Crimping of cross-wire and straight-through UTP cable to inter-connect two computers.
   - Study of crimping tool.
   - Study of color coding of Network cables.
   - Crimping the cable using Crimping Tool
   - Test the crimping by interconnecting two computers
4. Interconnections of computers in Local Area Network to share resources.
   - Study of concept of LAN & Shared resources.
   - Interconnect computers in LAN
   - Share and make the use of shared resources.
5. Implementation of cyclic redundancy check
   - Study the concept of CRC.
   - Consider Suitable example.

Implement same using modular approach.

Note:

- Concerned faculty should suitably frame 08 practical assignments (Four from PART – A and Four from PART – B) from above list.

- Every student is required to submit the assignments in the form of journal.

Reference Books:

1. Behrouz A Forouzan, “Data Communications and Networking”, Fourth edition: Tata McGraw Hill.
2. P. C. Gupta, “Data Communications”, PHI Publications.
3. William Stallings, “Data & Computer Communications”, Seventh edition: PHI Publication.
4. Leon - Garcia, Indra Widijaja, “Communication Networks Fundamental Concepts and Key Architectures” Second edition: McGraw Hill Education.
5. Achyut Godbole, “Data Communication Networks”, Tata McGraw Hill.
6. Bruce Hartpence, “Packet Guide to Routing and Switching”, O’Reilly.
7. Bruce Hartpence, “Packet Guide to Core Network Protocol” , O’Reilly.
8. James Irvine & David Harle, “Data Communication and Networks: An Engineering Approach”, Wiley Edition.

Microprocessor & Microcontroller Interfacing Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Microprocessor & Microcontroller Interfacing Lab	**MPMCI**	

Course Description:

This laboratory provides students with a comprehensive study of the 8086 and 8051 assembly programming language.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**2**	**15**	**30**	**1**

Total Semester Credits: 1

Prerequisite Course(s): Fundamental knowledge of microprocessors & microcontroller along with instruction set and addressing modes.

LAB COURSE CONTENT

Outline of Content:

(**Note:** Any 6 experiments from Group A and any 4 experiments from Group B. Total 10 experiments should be conducted.)

Group A

Assembly language programming for 8086.

1. Program for mouse interfacing.
2. Program for graphics editor.
3. Program for PC to PC communication using serial port.
4. Program for parallel printer interfacing.
5. Program for ADC interfacing with 8086.
6. Program for DAC interfacing with 8086.
7. Program for stepper motor interfacing.
8. Program for printer device driver.

Group B

Assembly language programming for 8051.

1. Program for interfacing LEDs.
2. Program for interfacing 7-segment displays.
3. Program for keyboard interfacing.
4. Program for ADC interfacing.
5. Program for DAC interfacing.

6. Program for stepper motor interfacing.

Guide lines for ESE:-

- ESE will be based on the practical assignments submitted by the students in the form of journal.
- In the ESE, the students may be asked to perform the practical assignment with minor modification.
- Evaluation will be based on the paper work of algorithm, understanding of the logic and the syntax, quality of program, execution of the program, type of input and output for the program.

Reference Books:

1. Douglas V. Hall, " Microprocessors and Interfacing : Programming and Hardware", Second edition , Tata McGraw Hill.
2. A. K. Ray & K. M. Bhurchandi, "Advanced Microprocessor and Peripherals – Architecture, Programming and Interfacing", Third edition, Tata Mc Graw Hill.
3. Ray Duncan, "Advanced MS-DOS Programming", Second edition, Microsoft Press.
4. Peter Abel, " IBM PC Assembly language and programming" , Fifth edition, Pearson education/ Prentice Hall of India Pvt. Ltd.
5. B. Govindarajalu, "IBM PC and Clones", Second edition, Tata McGraw Hill.

Data Structures Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Data Structures Lab	**DS**	

Course Description:

This laboratory provides students with a comprehensive study of the C programming language in data structures. Classroom lectures stress the strengths of C which provide students with the means of writing efficient codes for different data types and data structures.

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Laboratory	**2**	**15**	**30**	**1**

Total Semester Credits: 1

Prerequisite Course(s): Fundamental knowledge of C.

LAB COURSE CONTENT

Outline of Content:

(Note: Minimum FIVE experiments from the Group A and FIVE experiments from the Group B .)

(Group A)

1. **Implementation of stack using array or linked list.**
   Performing simple operations like push, pop and display with respect to stack.

2. **Implementation of queue using array or linked list.**

   Performing simple operations like insertion and deletion of an element into the queue.

3. **Implementation of circular queue using array or linked list.**
   Performing simple operations like insertion and deletion of an element into the circular queue.
4. **Conversion of infix expression to postfix expression.**
   Performing simple conversions of given infix expression into postfix expression.

5. **Conversion of postfix expression to infix expression**.

Performing simple conversions of given postfix expression into infix expression.

6. **Program for addition of two single variable polynomials using Linked List.**

   Performing the addition of two polynomials using Linked List.

(Group B)

1. **Implementation of double linked list & perform insertion, deletion and searching.**

   Performing the operations on double linked list like insertion, deletion and searching.

2. **Creation of binary tree & perform all non-recursive traversals**.

   Create the binary tree and perform the Inorder,Preorder and Postorder traversal.

3. **Creation of binary search tree & perform insertion, deletion and printing in tree shape.**

   Create the Binary Search tree performing the operations on BST like insertion, deletion and printing in tree shape.

4. **Create a hash table and handle the collision using linear probing with or without replacement**

   Creation of hash Table and handle the collision using linear probing with or without replacement.

5. **Implementation of Quick Sort.**

   Sort the given set of numbers using Quick sort.

6. **Implementation of Radix Sort.**

   Sort the given set of numbers using Radix sort.

7. **Implementation of Merge Sort.**

   Sort the given set of numbers using Merge sort.

8. **Conversion of Infix Expression to Prefix Expression.**

   Performing Simple conversions of given Infix Expression into prefix Expression.

Reference Books:

1. G.S.Baluja, “Data Structures through C”, Dhanpatrai Publications.
2. Ashok N. Kamthane, “Introduction to Data structures in C”,Person Publications,2007.
3. Aarom Tanenbaum,Yedidyah Langsam,Moshe Augenstein, “ Data structures using C”,Pearson Publications.

4. Alfred Aho,John Hopcroft,Jeffrey Ullman, “Data Structures and Algorithms”,Pearson Publications.
5. E.Balagurusamy, “Data structures using C”,Tata McGraw Hill publications.
6. P.S.Deshpande,O.G.Kakde,”C and Data Structures”,dreamtech press publications.
7. Rajesh K.Shukla, “Data Structures using C and C++” ,Willy India Publication.
8. Larry Nyhoff, “ADTs’ Data Structures and prolems with C++”, Pearson Publications.

Guide lines for ESE:-

- ESE will be based on the practical assignments submitted by the students in the form of journal.
- In the ESE, the students may be asked to perform the practical assignment with minor modification.
- Evaluation will be based on the paper work of concept understanding of topic and algorithm, understanding of the logic and the syntax, quality of program, execution of the program, type of input and output for the program.

Computer Graphics and Multimedia Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Computer Graphics & Multimedia	**CGM LAB**	

Course Description:

This laboratory provides students with a comprehensive study of graphics commands , animation & use of multimedia. The practical's make students able for draw different line styles, polygon, circle as well as clipping of polygons & filling of polygons. It also implements 2D & 3D transformations. Because of it students with the means of writing efficient, maintainable, and portable code.

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Laboratory	**2**	**10**	**20**	**1**

Total Semester Credits: 1

Prerequisite Course(s): Fundamental knowledge of C, C++ & Graphics.

Group A: Computer Graphics

1. Study of various Graphics Commands
2. Line generation using DDA
3. Different Line Style using Bresenham's Algorithm
4. Circle Generation using Bresenham's Algorithm
5. Program for Polygon Filling
6. Program for 2D Transformations (Translation, Rotation and Scaling)
7. Program for Segmentation
8. Program for 3D rotation
9. Program for Parallel Projections
10. Program for Perspective Projection

Group B: Multimedia

1. Program for animation using C/C++.
2. Program using flash.
3. Program using dream viewer.
4. Mini Project based on creating animation using Maya.

Concerned faculty should suitably frame at least 10 practical assignments. Any seven lab assignments from computer graphics & any three from multimedia.

Guide lines for ESE:-

- ESE will be based on the practical assignments submitted by the students in the form of journal.
- Evaluation will be based on the paper work of flowchart and algorithm, understanding of the logic and the syntax, quality of program code, execution of the program code, type of input and output for the program code.
- Simple program codes may be asked based on above syllabus.

Reference Books:

1. David F. Rogers, "Procedural Elements for Computer Graphics, Tata McGraw Hill, Second edition.
2. Shirley, Marshner, "Fundamentals of Computer Graphics", Third edition, CRC Publication/ A.K. Peters.
3. Steven Harringtom, "Computer graphics A Programming Approach", MGH.
4. Mukherjee, "Fundamentals of Computer Graphics and Multimedia", PHI.
5. Maurya, "Computer Graphics: with virtual reality system", Wiley India.
6. Donald Hearn and Pauline Baker," Computer Graphics", Pearson LPE, Second edition.
7. Rao and Prasad" Graphics user interface with X windows and MOTIF", New Age.
8. Foley, Vandam, Feiner, Hughes, "Computer Graphics Principals & Practice", Pearson Second edition.

NORTH MAHARASHTRA UNIVERSITY, JALGAON (M.S.)

Second Year Engineering

(Mechanical Engineering)

Faculty of Engineering and Technology

COURSE OUTLINE

SEMESTER – III

W.E.F 2013 – 2014

SE Semester - III

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
		Theory		PR	Total						
		TH Hr/W	Tut Hr/W	PR Hr/W	Total	ISE	ESE	ICA	ESE	Total	
Fluid Mechanics	D	3	1	---	4	20	80	---	---	100	4
Engineering Thermodynamics	B	3	---	---	3	20	80	---	---	100	3
Strength of Materials	D	3	1	---	4	20	80	---	---	100	4
Material Science and Metallurgy	D	3	---	---	3	20	80	---	---	100	3
Manufacturing Engineering -I	D	3	---	---	3	20	80	---	---	100	3
Soft Skills - III	C	1	---	2	3	---	---	50	---	50	2
Engineering thermodynamics-Lab.	B	---	---	2	2	---	---	50	---	50	1
Fluid Mechanics Lab.	D	---	---	2	2	---	---	25	25	50	1
Material Science and Metallurgy Lab.	D	---	---	2	2	---	---	25	25	50	1
Workshop Practice -III	D	---	---	2	2	---	---	25	25	50	1
Total		16	2	10	28	100	400	175	75	750	23

ISE: Internal Sessional Examination **ESE:** End Semester Examination **ICA:** Internal Continuous Assessment

SE Semester - IV

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
		Theory		PR	Total						
		TH Hr/W	Tut Hr/W	PR Hr/W	Total	ISE	ESE	ICA	ESE	Total	
Engineering Mathemathics -III	A	3	1	---	4	20	80	---	---	100	4
Theory of Machines -I	D	3	---	---	3	20	80	---	---	100	3
Applied Thermodynamics	D	3	1	---	4	20	80	---	---	100	4
Basic Electrical Drives and Controls	D	3	---	---	3	20	80	---	---	100	3
Manufacturing Engineering -II	D	3	---	---	3	20	80	---	---	100	3
Machine Drawing Lab.	B	1	---	2	3	---	---	50	---	50	2
Basic Electrical Drives and Controls Lab.	D	---	---	2	2	---	---	50	---	50	1
Applied Thermodynamics Lab.	D	---	---	2	2	---	---	25	25	50	1
Theory of Machines -I Lab	D	---	---	2	2	---	---	25	25	50	1
Workshop Practice- IV	D	---	---	2	2	---	---	25	25	50	1
Total		16	2	10	28	100	400	175	75	750	23

ISE: Internal Sessional Examination **ESE:** End Semester Examination **ICA:** Internal Continuous Assessment

Course Outline

Fluid Mechanics	**FM**
Course Title:	Short Title Course Code
Branch - Mechanical / Automobile Engineering	**Year – Second Year**

Course Description: This course introduces undergraduate students to Fluid Mechanics. The background required includes a sound knowledge of Mathematics (Calculus), Engineering Mechanics and Physics of first year Level. The course aims at imparting knowledge of Fluid properties and analysis of forces inside the fluid.

Teaching Scheme:

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	3	14	42	4
Tutorial	1	14	14	

Examination scheme:

End semester exam (ESE)	80 Marks	Duration : 03 hours
Internal Sessional exam (ISE)	20 Marks	

Purpose of Course: Degree Requirement

Prerequisite Course(s): Mathematics (Calculus) and Engineering Mechanics at first year level.

Outline of Content: This course contains:

UNIT-1

1.	Fluid properties & Hydrostatic	No. of Lectures – 12, Marks: 16
	a	Fluid properties & its definitions, definition of fluid, Viscosity, Bulk modulus of elasticity, Vapour pressure, Surface tension, Capillarity, Manometers (No numerical on manometers)
	b	Pascal's law, Hydrostatic law its derivation
	c	Total pressure & Centre of pressure on vertical, horizontal, inclined, curved surface its derivation
	d	Concept Of buoyancy & flotation Meta centre, metacentric height its derivation. Stability, unstability, equilibrium of floating & submerged body

UNIT-2

2.	FLUID KINEMATICS AND DYNAMICS	No. of Lectures – 08, Marks: 16
	a	Types of flow, Definition of steady, Unsteady, Uniform, Non uniform, Laminar, Turbulent, Compressible, incompressible, rotational, Irrotational flow, 1D-2D flows, Stream line, Streak line, Path line, concept of Velocity, potential & stream function flow net (no numerical treatment)
	b	Continuity equation for steady, Unsteady, Uniform, Non uniform, Compressible incompressible,2D Euler's equation, Bernoulli's equation along a stream line for incompressible flow
	c	Practical applications of Bernoulli's equation - Pitot tube, Venturi meter, Orifice meter.

UNIT-3

3.	VISCOUS AND BOUNDARY LAYER FLOW	No. of Lectures – 08, Marks: 16
	a	Introduction to flow of viscous fluid through circular pipes, two parallel plates derivation
	b	kinetic and momentum energy correction factor (only theory no numerical)
	c	Power absorbed in viscous flow, viscous resistance to journal bearing, footstep bearing, collar bearing.
	d	Introduction to boundary layer flow, laminar and turbulent boundary layer, laminar sub layer, boundary layer thickness, displacement thickness, momentum thickness, separation of boundary layer. (No numerical treatment)

UNIT-4

4.	Dimensional analysis and Flow through Pipes **No. of Lectures – 07, Marks: 16**	
	a	Introduction to dimensional analysis, dimensional homogeneity, methods of dimensional analysis- Rayleigh's method, Buckingham's π-theorem, dimensionless numbers. (No numerical treatment)
	b	Loss of energy in pipes, loss of energy due to friction, minor energy losses, concept of HGL and TEL, flow through syphon, flow trough pipes in series or compound pipes, equivalent pipe, parallel pipes, branched pipes.
	c	Power transmission through pipes. Water hammer phenomenon (No numerical on water hammer)

UNIT-5

5.	**CENTRIFUGAL AND RECIPROCATING PUMP** **No. of Lectures – 07, Marks: 16**	
	a	Introduction to main parts of centrifugal pump, working & construction of centrifugal pump, types of impellers, types of casings, priming.
	b	Work done on centrifugal pump, various heads and efficiencies of centrifugal pump, minimum starting speed of a centrifugal pump, multistage centrifugal pump, principles of similarity applied to centrifugal pump.
	d	Specific speed, NPSH, cavitations in pumps.
	e	Introduction to main parts of Reciprocating pump, construction & working of Reciprocating pump, classification of Reciprocating pump, slip of reciprocating pump, air vessels. (No numerical on Reciprocating pump)

References

1. Introduction to Fluid Mechanics and Fluid Machines, S.K. Som and G. Biswas, Tata McGraw Hill Education Publishing Company Limited, 2007.
2. Fluid Mechanics, F.M. White, McGraw-Hill, 2005.
3. Fluid mechanics and Hydraulic machines, Dr. R. K. Bansal , Laxmi Publication, Delhi, 2005
4. Fluid Mechanics and Machines, Kotharduraon and Rudramoorthy, New Age Internationals, 2007
5. Hydraulics And Fluid Mechanics Including Hydraulics Machines, Dr. P.N.Modi , Dr. S.M. Seth, Standard Book House / Rajsons Publications p ltd, Delhi, 2011.
6. Fluid Mechanics, Mohanty A.K., Prentice Hall of India, 2005.
7. Fluid Mechanics, Streeter, Tata McGraw Hill (SI).
8. Fluid Mechanics and Hydraulic Machines, S C Gupta, Pearson Publication.

Course Outline

Engineering Thermodynamics	**ET**	
Course Title	Short Title	Course Code

Mechanical / Automobile Engineering	**Second Year**	**Second**
Branch	Year	Semester

Course Description:

The course aims at imparting knowledge of basic Thermodynamics. The background required includes a sound knowledge of Mathematics (Calculus), Physics and Chemistry at Higher Secondary Level. The objectives of the course are to understand thermodynamics concepts, its laws, and their applications and gas/vapor processes.

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	3	14	42	3

Examination scheme:

End semester exam (ESE)	80 Marks	Duration : 03 hours
Internal Sessional exam (ISE)	20 Marks	20 Marks

Prerequisite Course(s): Fundamental knowledge of Physics, Chemistry and Engineering Mathematics.

Outline of Content: This course contains:

1	**Introduction to Engineering Thermodynamics No. of Lectures – 9, Marks: 16**	
	a	Scope and applications of thermodynamics, System, surroundings, boundary, control volume, types of system, unit and dimensions.
	b	Macroscopic and Microscopic view point, Thermodynamic Properties, Path function, Point function,
	c	State and Equilibrium, Process, Cycle, Quasi-static process and its significance.
	d	Energy, Flow Energy, Potential energy, Kinetic energy, Heat transfer, sign convention. Numerical.
	e	Work transfer, shaft work, displacement work, power. Numerical.
	f	Zeroth law of thermodynamics, temperature, temperature scales
	g	Numerical on temperature measurement.
	h	Pressure, Absolute and gauge pressure, simple manometer, Bourdon's pressure gauge.
2	**First Law of Thermodynamics No. of Lectures – 8, Marks: 16**	
	a	Joule's experiment, internal energy as a property, 1^{st} law of thermodynamics
	b	First Law applied to closed system undergoing a process/ a cycle, PMM-I
	c	Numerical on application of 1^{st} law to closed system.
	d	Enthalpy and internal energy of an ideal gas, specific heat, Cv and Cp.
	e	Principles of conservation of mass and energy, steady state steady flow process, continuity equation.
	f	Steady flow energy equation (SFEE), applications of SFEE.
	g	Significance of $-\int vdP$, relation between $\int Pdv$ and $-\int vdP$,
	h	Numerical on application of 1^{st} law to steady flow systems.
3	**Second Law of Thermodynamics No. of Lectures – 8, Marks: 16**	
	a	Limitations of First Law, thermal reservoir, heat engine & its efficiency, Refrigerator and Heat pump, Coefficient of Performance.
	b	Statements of second law, Equivalence of statements of second law, PMM-II
	c	Numerical on application of 2^{nd} law.
	d	Reversibility and Irreversibility, Causes of irreversibility, Carnot cycle, Reversed Carnot cycle, their analysis.
	e	Carnot theorem, Absolute temperature scale
	f	Numerical on Carnot cycle, Carnot theorem and temperature scales.
	g	Entropy – Introduction, Law for two isentropic path, Entropy as property,

		Clausius theorem. (No numerical)
	h	Clausius statement, Clausius inequality, Entropy principle
4	**Properties of Ideal Gases** **No. of Lectures – 8, Marks: 16**	
	a	Ideal gas, Laws for an ideal gas, Equation of state, Universal gas constant Characteristic gas constant, Relation between Cp, Cv and R.
	b	Numerical on above syllabus.
	c	Ideal Gas Processes, their presentation on p-v, T-S plane, Analysis for Heat transfer, Work transfer, change in Internal Energy, enthalpy and Entropy – Isobaric, Isochoric and Isothermal processes.
	d	Numerical on above gas processes.
	e	Reversible Adiabatic process, presentation on p-v, T-S plane, Analysis for Heat transfer, Work transfer, and change in Internal Energy, enthalpy and Entropy.
	f	Reversible Polytropic process, presentation on p-v, T-S plane, Analysis for Heat transfer, Work transfer, and change in Internal Energy, enthalpy and Entropy.
	g	Numerical on above gas processes.
	h	Numerical on cyclic gas processes.
5	**Properties of Steam** **No. of Lectures – 8, Marks: 16**	
	a	Pure substance, Phases of pure substances, Phase change diagrams (p-v, p-T, T-s) for water substance at standard atmospheric pressure, sensible heat and latent heat of steam.
	b	Terminology: dry, superheated, wet steam, saturation temperature, critical point and triple point, use of steam table.
	c	Numerical using steam table.
	d	Numerical using Mollier diagram.
	e	Measurement of dryness fraction by using separating and throttling calorimeter. Numerical.
	f	Vapor processes- sketch on P-V, T-S, H-S diagrams, analysis for property changes, heat and work transfer.
	g	Numerical on steam processes
	h	Numerical on steam processes

References:

1	Engineering thermodynamics, P K Nag; Tata McGraw Hill.
2	Thermodynamics, C P Arora;Tata McGraw Hill.
3	Fundamentals of classical thermodynamics, G J Van Wylen, Richard E Sonntag; Wiley.
4	Engineering thermodynamics, Y V C Rao; Universities Press.
5	Engineering thermodynamics, J B Jones and R E Dugan; PHI.
6	Thermodynamics, 6th Edition, Yunus Cengel and M A Boles; Tata McGraw Hill.
7	Basic Engineering Thermodynamics, A. Venkatesh; Universities Press.
8	Basic Thermodynamics" by Dr. Ganesan, Tata McGraw Hill.

Course Outline

Strength of material **SOM**

Course Title: Short Title Course Code

Branch - Mechanical / Automobile Engineering **Year – Second Year**

Course Description: This course introduces undergraduate students to Strength of material. The background required includes a sound knowledge of Mathematics (Calculus), Engineering Mechanics and Physics of first year Level. The course aims at imparting knowledge of strength of materials.

Teaching Scheme:

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	3	14	42	4
Tutorial	1	14	14	

Examination scheme:

End semester exam (ESE)	80 Marks	Duration : 03 hours
Internal Sessional exam (ISE)	20 Marks	

Purpose of Course: Degree Requirement

Prerequisite Course(s): Mathematics (Calculus) and Engineering Mechanics at First year level.

Outline of Content: This course contains:

UNIT-1

1.	Introduction to Strength of material	No. of Lectures – 12, Marks: 16
	a	Concept of stress and strain (linear, lateral, shear and volumetric),Hook's law, Poisson's ra modulus of elasticity, modulus of rigidity, stress-strain diagram for ductile and brittle materials, factor of safety and working stress, concept of 3-D stress state, bulk modulus, in relation Between elastic modulus.
	b	Axial force diagram, stress-strain, deformations in determinate homogeneous and composite bars of following types. 1) Prismatic 2) Linearly varying 3) Stepped section under concentrated loads and self-weights.
	c	Axial stresses and strain in determinate members –axial stress, strain and deformation in following indeterminate, homogeneous and composite bars. 1) Prismatic 2) Linearly varying 3) Stepped section under concentrated loads, self-weights.
	d	Temperature stresses & strain for Prismatic, Linearly varying & composite bars

UNIT-2

2.	PRINCIPLE STRESSES AND STRAINS	No. of Lectures – 08, Marks: 16
	a	Introduction to Normal and shear stress on any oblique plane, concept of principle plane.
	b	Derivation of expression for principle stresses and planes and plane of max. Shear stress, position of principle plane and plane of max. Shear,
	c	Graphical solution using Mohr's circle of stresses.
	d	Combined effect of shear and bending in beams.
	e	Strain energy and impact-concept of stain energy, derivation and use of expression for deformation of axially loaded members under gradual, sudden and impact loads. Strain energy due to self-weight.

UNIT-3

3.	SHEAR FORCE AND BENDING MOMENT DIAGRAM No. of Lectures – 07, Marks: 16	
	a	Introduction to different types of beams, different types of supports & loads.
	b	Concept and definition of shear force and bending moment in determinant beams due to concentrated loads, UDL, UVL and couple.
	c	Relation between SF, BM and intensity of loading, construction of shear force and bending moment diagram for cantilever, simple and compound beams, defining critical and maximum value and position of point of contra flexure.
	d	Construction of BMD and load diagram from SFD, Construction of load diagram and SFD from BMD.

UNIT-4

4.	BENDING STRESSES No. of Lectures – 07, Marks: 16	
	a	Theory of simple bending, assumptions in bending theory, Derivation of flexural formula
	b	Area center and moment of inertia of common cross section (regular section, T-section, channel section, I-section) with respect to centroidal and parallel axis, bending stress distribution diagram, moment of resistance and section modulus calculations.
	c	Direct and bending stresses in short column with eccentric point loads, concept of core section, middle third rule.
	d	Shear stresses: - Concept, derivation of shear stress distribution formula, shear stress distribution diagram for common cross section, maximum and average shear stresses, shear connection between flange and web.

UNIT-5

5.	TORSION IN CIRCULAR SHAFTS No. of Lectures – 08, Marks: 16	
	a	Stresses, strains and deformations in solid and hollow shafts, homogeneous and composite circular cross-sections subjected to torsion.
	b	Derivation of torsion equation. Stress due to combined torsion, bending and axial force on shafts.
	c	Thin and thick walled pressure vessels: - Stress, strain and deformation in thin wall seamless cylindrical and spherical vessel due to internal fluid pressure, change in volume, constants, effects of additional compressible and incompressible fluid injected under pressure.

REFERENCES

1) Timoshenko, Mechanics of Materials, CBS Publisher &Distributor.
2) Ramamruthum, Strengths of Materials, Dhanpat Rai Publication.
3) Junnarkar & Advi, Mechanics of Structure, Charorar Publication House, ANAND.
4) Bear &Johnson, Mechanics of Materials.
5) Shigley J.E., Mechanical Engineering Design.

Course Outline

Material Science and Metallurgy **MSM**

Course Title Short Title Course Code

Branch - Mechanical / Automobile Engineering **Year – Second Year**

Course Description:

This course provides the introduction of the fundamentals of Material Science and Metallurgy to undergraduate students. The objective of the course is to understand the basic principles of material science and metallurgy. It includes mechanical testing to determine mechanical properties. It also includes various heat treatments, introduction of furnaces and various engineering materials and their applications.

Teaching Scheme:

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	3	14	42	3

Examination scheme:

End semester exam (ESE)	80 Marks	Duration : 03 hours
Internal Sessional exam (ISE)	20 Marks	

Prerequisite Course(s): Fundamental knowledge of Engineering Chemistry and Physics

Outline of Content: This course contains:

1 Nature of Metals and Alloys No of Lect – 8, Marks: 16

a Relationship between Structure-Property-Processing-Performance. Elastic and plastic deformation and its mechanism i.e. slip and twinning.

b Relation of crystal structure with plastic deformation i.e. effects of BCC,FCC or HCP structure on plastic deformation.

c Dislocation theory of slippage, strain hardening.

d Crystal defects and their effects on plastic deformation i.e. description of point, line and surface defects.

e Plastic deformation in polycrystalline metals.

f Cold working- recovery, recrystllisation, grain growth and hot working.

g Strengthening mechanisms in metals - solid solution strengthening, Strain hardening.

h Dispersion and precipitation hardening, phase transformation.

2 Properties of Metals and Testing No of Lect – 8, Marks: 16

a Tension test, engineering and true stress-strain curves, evaluation of properties, ductility, brittleness and toughness.

b Types of engineering stress-strain curve, compression test.

c Hardness testings- Brinell hardness Test, Poldi hardness Test, Rockwell hardness Test , Vickers hardness Test.

d Durometers, microhardness. Relation among the various hardness test and hardness to tensile strength.

e Impact test- charpy and izod impact test.

f Fatigue and creep test.

g Non-destructive test of metals-dye penetrant test, magnetic particle test.

h Ultrasonic testing, radiography and eddy current testing.

3 Ferrous Metals and its Alloys No of Lect – 8, Marks: 16

a Iron, allotropy, cooling curves and volume changes of iron.

b Iron-carbon equilibrium dig., critical temperatures, various phase reactions, solubility of carbon in iron.

	c	Microstructures of slowly cooled steels.
	d	Non - equilibrium of cooling of steels.
	e	Cast Irons- types like gray cast iron, nodular cast iron.
	f	Austempered cast iron, white cast iron, malleable C .I .
	g	Effects of various parameters on structure and properties of C.I. like carbon equivalent, cooling rate during eutectic reaction and alloying additions.
	h	Properties, compositions, applications and specifications of C.I.

4 Heat Treatments No of Lect – 8, Marks: 16

	a	Introduction and principles of heat treatment of steels, processing heat treatments for steels like full annealing, normalizing, process and stress relief anneal, spheroidization. Heat treatments for non-ferrous metals.
	b	Strengthening heat treatments for steels, isothermal transformation diagram.
	c	Tempering of martensite, continuous cooling transformations.
	d	Jominy test for hardenability and its considerations. Quench media, austempering and martempering.
	e	Surface hardening of steels- flame, induction , laser and electron beam hardening
	f	Pack, gas and liquid carburizing, nitriding ionnitriding.
	g	Heat treatment furnaces and atmospheres, classification of furnaces.
	h	Heat treatment and energy and controlled atmospheres.

5 Alloy Steels and Advanced Materials No of Lect – 8, Marks: 16

	a	Alloy steels – Limitation of plain carbon steels, effects of major alloying elements in steels.
	b	Classification of alloying elements, examples of alloy steels.
	c	Stainless steels –classification ,heat treatment of stainless steels.
	d	Tool steels-classification, cold work and hot work tool steels.
	e	High speed tool steels , heat treatment of high speed tool steel, special purpose tool steels.
	f	Introduction of Advanced materials- types and properties of composite materials.
	g	High temperature materials.
	h	Engineering ceramics.

Reference Books:

1. Degarmo's "Materials and processes in manufacturing", by J.T. Black,Ronald A. Kosher, Willey student edition.
2. "Material Science and Metallurgy for Engineers", by V.D.Kodgire, Everest Publishing House. Pune
3. "Introduction to Engineering Materials", by B. K. Agrawal, Tata Mcgraw Hill, New Delhi.
4. "An Introduction to Physical Metallurgy", by S.H. Avner, Tata Mcgraw Hill, New Delhi.
5. "Fundamentals of modern manufacturing materials, processesand systems" , by Mikell P. Groover, Wiley student edition, New Delhi.
6. "Material Science and Metallurgy", by Parashivamurthy K. I., Pearson Publication
7. "Material Science and Metallurgy", by U. C. Jindal, Pearson Publication
8. "Introduction to Materials Science for Engineers", by James F. Shackleford & Madanapalli K. Muralidhara, Pearson Publication
9. "A textbook of Material Science and Metallurgy", by O. P. Khanna, Dhanpat Rai Publication
10. "Metallurgy", by A.S.Gholap and Dr. M.S. Kulkarni, "Nirali Prakashan.

Course Outline

Manufacturing Engineering-I **ME-I**
Course Title Short Title Course Code

Branch - Mechanical / Automobile Engineering **Year – Second Year**

Course Description:
This course provides the basic knowledge of manufacturing processes. Course includes fundamentals of casting processes, Metal forming processes, Welding and joining processes, Metal removing processes, Powder metallurgy.

Teaching Scheme:

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	3	14	40	3

Examination scheme:

End semester exam (ESE)	80 Marks	Duration : 03 hours
Internal Sessional exam (ISE)	20 Marks	

Prerequisite Course(s): This course is aimed at introducing the Manufacturing processes to undergraduate students. The background expected familiar with Workshop Practice I & II.

Outline of Content: This course contains:

1	**Fundamental of Casting**		**No. of Lect – 8, Marks: 16**
	a	Introduction to Casting process	
	b	Casting terminology	
	c	Pattern and sand casting	
	d	Solidification and Molten metal problems	
	e	Melting furnaces	
2	**Metal forming processes**		**No. of Lect – 8, Marks: 16**
	a	Introduction to metal forming processes	
	b	Rolling processes	
	c	Forging processes	

	d	Extrusion methods
	e	Drawing processes
3	**Welding and joining processes**	**No. of Lect – 8, Marks: 16**
	a	Introduction to welding and joining processes
	b	Welding joints
	c	Fusion welding
	d	Pressure welding
	e	Riveting, Soldering and brazing
4	**Metal removing processes**	**No. of Lect – 8, Marks: 16**
	a	Introduction to Lathe machine
	b	Lathe Machine operations
	c	Milling machine operations
	d	Drilling operations
	e	Grinding operations
	f	Finishing operations operations
5	**Powder metallurgy**	**No. of Lect – 8, Marks: 16**
	a	Introduction to Powder metallurgy
	b	Powder manufacturing process
	c	Powder testing and evaluation
	d	Powder Metal production
	e	Secondary operations

Reference Books

1. Materials and processes in manufacturing , J T Black, Ronald A. Kosher, De Garmos, , Wiley student edition
2. Manufacturing technology , P. N. Rao , vol-I & II McGrow Hill publications
3. A Textbook of Production Engineering , P. C. Sharma, , S. Chand & Company. Ltd.
4. A Textbook of Production Technology , P. C. Sharma, S. Chand & Company. Ltd.
5. Process and Material of Manufacturing, S. Chand Publication. Roy A Lindberg, prentice Hall of india pvt ltd,
6. Elements of Workshop Technology Volume I&II , Hajara Choudhari, Bose S.K.
7. Manufacturing Technology –S. K. Garg- Fire wall media ltd.

8. Fundamental of modern manufacturing, Mikell P groover, Wiely asia student edition
9. Manufacturing process and system, Phillip C Ostawald, jairo Munoz, wiely India.
10. Manufacturing Technology, D.K. Singh, Pearson New Delhi.
11. Manufacturing process Vol-I, H. S. Shah, Pearson New Delhi.
12. Manufacturing Engineering and Technology, Serope Kalpakjian, Pearson New Delhi.
13. Manufacturing Processes, Serope Kalpakjian, Pearson New Delhi.

Soft Skills – III

COURSE OUTLINE

Course Title	Short Title	Course Code
Soft Skills – III	**SK-III**	

Course Description: Through this course we have tried to prepare the students for the industry. Most companies test mathematical and logical ability through an aptitude test. This subject aims at working on these skills of a student through strategies formulae and practice exercises.

Lecture	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
	1	**14**	**14**	**2**

Prerequisite Course(s): Fundamental knowledge of High School Mathematics.

COURSE CONTENT

Soft Skills – III **Semester-III**

Teaching Scheme **Examination Scheme**

Lecture: 1 hour / week **Internal Continuous Assessment (ICA): 50 Marks**

Unit-I: Arithmetic-1 **No. of Lect. – 3, Marks: 10**

a. Basic Formulae

i. Divisibility Rules
ii. Speed Maths
iii. Remainder Theorem
iv. Different Types of Numbers
v. Applications

b. HCF, LCM and Linear Equations

i. HCF – Successive Division and Prime Factorization Methods

ii. LCM – Successive Division and Prime Factorization Methods
iii. Applications
iv. Linear Equations – Elimination Method
v. Substitution Method
vi. Applications

c. Averages and Mixtures

i. Concept of Average
ii. Faster Ways of Finding It
iii. The Allegation Method
iv. Applications

Unit-II: Arithmetic–II **No of Lect. – 3, Marks: 10**

a. Percentages

i. Concept of Percentage
ii. Working with Percentages
iii. Applications

b. Profit and Loss

i. Difference between Cost and Selling Price
ii. Concept of Profit Percentage and Loss Percentage
iii. Applications

c. Time and Work

i. Basic Time and Work Formula
ii. Relation between Time and Work
iii. Applications

Unit-III: Arithmetic–III **No of Lect. –3, Marks: 10**

a. Permutations and Combinations

i. Sum Rule of Disjoint Counting
ii. Product Rule of Counting
iii. Concept of Factorial

iv. Permutations
v. Linear Permutations
vi. Combinations
vii. Circular Permutations
viii. Applications

b. Probability

i. Definition and Laws of Probability
ii. Mutually Exclusive Events
iii. Independent Events
iv. Equally Likely Events
v. Exhaustive Events
vi. Cards
vii. Dice
viii. Applications

c. Time and Distance

i. Speed
ii. Conversion Factors for Speed
iii. Average Speed
iv. Moving Bodies – Passing, Crossing and Overtaking
v. Relative Speed
vi. Boats and Streams
vii. Applications

Unit-IV: Non-Verbal Reasoning **No of Lect. 2,** **Marks: 10**

a. Analogies

i. Examples
ii. Applications

b. Classification

i. Examples
ii. Applications

c. Sequences

i. Examples
ii. Applications

Unit-V: Analytical Reasoning **No of Lect. – 3, Marks: 10**

a. Analytical Puzzles

i. Classification Puzzles
ii. Ordering Puzzles
iii. Assignment Puzzles
iv. Applications

b. Letter and Number Series

i. Different Types of Letter Series
ii. Different Types of Number Series
iii. Mixed Series

c. Coding and Decoding

i. Letter Coding
ii. Number Coding
iii. Mixed Coding
iv. Odd Man Out
v. Applications

Guide lines for ICA:
ICA will be based on credit tests and assignments submitted by the student in the form of journal.

Reference Books:

1. R. S. Aggarwal, "Quantitative Aptitude", S. Chand Publication, New Delhi, 2012.
2. R. S. Aggarwal, "A Modern Approach to Verbal Reasoning", S. Chand Publication, New Delhi, 2012.
3. R. S. Aggarwal, "A Modern Approach to Non-Verbal Reasoning", S. Chand Publication, New Delhi, 2012.

Lab - Course Outline

Engineering Thermodynamics Lab	**ET Lab**
Course Title	Short Title & Course Code

Mechanical / Automobile Engineering	**Second Year**	**Second**
Branch	Year	Semester

Course Description:

This lab includes performance and study practical related to Engineering Thermodynamics.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1
			Total Semester Credits:	1

Evaluation Scheme:

Internal Continuous Assessment (ICA)	50 Marks

Prerequisite Course(s): 11th Physics, 12th Physics

Outline of Content:

This practical contains

Any EIGHT of the following performance practical	
01	**Study and Demonstration of Pressure measuring devices.** Study the principle, construction and working of pressure measurement devices. Demonstrate construction and working of pressure measurement devices practically. Student Activity: Discuss relative merits and demerits of above devices.
02	**Study and Demonstration of Temperature measuring devices.** Study the principle, construction and working of Temperature measuring devices. Demonstrate construction and working of Temperature measuring devices practically. Student Activity: Discuss relative merits and demerits of above devices.
03	**Study and Demonstration of Centrifugal Pump.** Study the principle, construction and working of Centrifugal Pump. Demonstrate construction and working of Centrifugal Pump practically. Student Activity: Discuss application of 1st law to Centrifugal Pump.
04	**Study and Demonstration of Joule's paddle wheel experiment.** Study the Joule's paddle wheel experiment. Demonstrate of Joule's paddle wheel experiment practically. Student Activity: Discuss conclusion of Joule's paddle wheel experiment.
05	**Determination of Dryness fraction using separating throttling calorimeter.** Study the separating throttling calorimeter. Demonstrate of construction, working and determination of dryness fraction using separating throttling calorimeter practically. Student Activity: Discuss merits and demerits of separating throttling calorimeter
06	**Determination and Verification of SFEE for Nozzle.** Study application of SFEE to nozzle. Demonstrate of application of steady flow energy equation to nozzle practically. Student Activity: Verify SFEE using nozzle.
07	**Determination of actual Coefficient of performance of House hold refrigerator.** Study 2nd law of thermodynamics using house hold refrigerator. Demonstrate of application of 2nd law to house hold refrigerator practically. Student Activity: Verify second law using house hold refrigerator.

08	**Numerical Assignment on Unit III (Minimum five Problems)**
09	**Numerical Assignment on Unit IV. (Minimum five Problems)**
10	**Numerical Assignment using steam table/Mollier chart on Unit V. (Minimum five Problems)**

Note: any EIGHT practical from Engineering Thermodynamics Lab shall be conducted during 14 weeks available during semester.

Guide lines for ICA:-

ICA will be based on practical assignments submitted by the student in the form of journal. Evaluation will be based on paper work.

Lab - Course Outline

Fluid Mechanics — Course Title
FM — Short Title & Course Code

Branch - Mechanical / Automobile Engineering
Year – Second Year

Course Description:

This lab includes different fluid mechanics practical's .The course aims at imparting knowledge of Fluid properties and analysis of forces inside the fluid.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Evaluation Scheme:

Internal Continuous Assessment (ICA)	25 Marks	50 Marks
End Semester exam (ESE) (Practical)	25 Marks	

Prerequisite Course(s): The background required includes a sound knowledge of Mathematics (Calculus), Engineering Mechanics and Physics of first year Level.

Outline of Content: This course contains

1. Experiment on Red wood viscometer
2. Experiment on Reynolds's apparatus
3. Experiment on Bernoulli's theorem
4. Experiment on flow measurement by orifice meter
5. Experiment on flow measurement by venturi meter
6. Experiment on determination of metacentric height of a floating body
7. Trial on centrifugal pumps
8. Experiment on determination of major and minor losses for flow through pipes
9. Study of sharp edged circular orifice / mouthpieces
10. Study of velocity distribution in boundary layer and its thickness.
11. Study of Manometers.

Note: Lab file should contain at list EIGHT experiments from above mentioned list.

ESE (Practical Examination)

• The Practical Examination will comprise of performing the experiment and viva on the Practical's.

Lab - Course Outline

Material Science and metallurgy **MSM LAB**

Course Title Short Title & Course Code

Branch - Mechanical / Automobile Engineering **Year – Second Year**

Course Description:

This lab includes the practicals related to different testing machines. It also includes preparation and study of different microstructures and introduction of furnace.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Evaluation Scheme:

Internal Continuous Assessment (ICA)	25 Marks
End Semester exam (ESE) ORAL	25 Marks

Prerequisite Course(s): Engineering Chemistry and Engineering Physics

Outline of Content:
This practical contains

S. No.	Group A
1	Tensile test, to compare tensile strength, yield point and ductility of three metallic materials.
2	Brinell or Poldi hardness test on steel, cast iron, brass.
3	Vickers hardness test on steel, cast iron, brass.
4	Rockwell and Rockwell superficial hardness measurement.
5	Izod or Charpy impact test to compare impact values of cast iron and mild steel or alluminium and brass.
6	Erichsen Cupping Test
7	Measurement Non-destructive tests: Dye penetrant test, Magnetic particle testing , ultrasonic testing ,eddy current test.(any two)

S. No.	Group B
8	Micro Specimen Preparation and use of metallurgical microscope
9	Study and drawing microstructure of mild steel, medium carbon, eutectoid steel, hypereutectoid steel .
10	Demonstration of Annealing,Normalising and Hardening of medium carbon steel specimens and measurements of hardness and drawing icrostructures.
11	Jominy Hardenability test.
12	Study and drawing microstructure of white, malleable, gray and ductile cast iron or any four non-ferrous metals.
13	Observe and record the microstructures of heat affected zones of fusion welded joint.

Note: The student should maintain a journal keeping record of <u>any four</u> experiments from <u>group A</u> and <u>group B</u> each.

Guide lines for ESE:-

ESE will be based on practical assignments submitted by the student in the form of journal.

Evaluation will be based on paper work.

Lab - Course Outline

Workshop Practice III **WP-III**

Course Title Short Title & Course Code

Branch - Mechanical / Automobile Engineering **Year – Second Year**

Course Description:

Workshop Practice III covers the basic knowledge and practices on conventional lathe machine in machine shop I (Turning shop), various welding joints and welding processes in welding shop, pattern making practices in carpentry shop and casting practices in foundry shop in order to improve the practical skill of students in different workshops.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Evaluation Scheme:

Internal Continuous Assessment (ICA)	25 Marks
End Semester exam (ESE) (ORAL)	25 Marks

Prerequisite Course(s): WP-I, WP-II, Engineering Drawing, Engineering Materials.

Outline of Content:

This practical contains

1. **Carpentry shop**

Preparation and manufacturing of solid wooden pattern for foundry shop involving Wood Turing lathe machine.

2. **Foundry Shop**

Mould making Practice: Preparation of mould of above pattern, casting from this mould. Actual weight calculation, yield & casting of item should be performed.

3. **Welding Shop**

One job on welding (fabrication) preparing a component comprising welding joints such as shoe rack, book rack, stands for flower pots, house hold applications, stools etc.(Group of 4 to 5 Students)

4. **Machine shop-I (Turning Shop)**

One job (by each Student) consisting of Turning, Thread Cutting (Internal, External), Facing, Plain turning, Taper turning, Step Turning, chamfering, Grooving, Drilling, boring, Reaming, Knurling etc. operations.

Note:

1. Candidates are required to finish the job to the following limits

   Machine Shop: + 0.5mm or -0.5mm

   CNC Machine: +0.01mm or -0.01mm
2. Workshop book to be submitted comprising of Job drawing, process sheet for a given job along with the sketches of tools used for operations.
3. CNC Programming restricted to class only.

Reference Books:

1. Element of Workshop Technology Volume I and II -Hajara Chaudhary and Bose S.K., Asia Publishing House.

2. Production Technology Volume I and II –P.N.Rao, Tata McGraw Hill Publication.

3. Production Technology- R.K.Jain, Khanna Publications.

4. Production Technology- P.C.Sharma, Khanna Publication.

5. Workshop Technology-Chapman W.A.J., ELBS Publication.

6. Production Technology- HMT, Tata McGraw Hill Publication.

Course Outline

Engineering Mathematics-III **EM-III**
Course Title Short Title Course Code

Course Description:
This course provides the elementary level knowledge of Linear Differential Equations, Transforms, Statistics and Probability Distributions. Course includes solution of n^{th} order linear differential equations, solution of one and two dimensional heat equation, Laplace transform, Fourier transform, and probability distribution and basic of vector differentiation.

	Hours per Week		No. Of Weeks		Total Hours		Semester Credits
Lecture	3		14		40		4
Tutorial	1	1	14	14	14	14	

Examination scheme:

End semester exam (ESE)	80 Marks	Duration : 03 hours
Internal Sessional exam (ISE)	20 Marks	20 Marks

Prerequisite Course(s): Engineering Mathematics-I, Engineering Mathematics-II.

Outline of Content: This course contains:

1.	**Linear Differential Equations No of Lect – 8, Marks: 16**	
	a	Introduction to nth order Linear Differential Equation, Auxiliary Equation, Complimentary Functions
	b	Solution of nth order L.D.E using General Method
	c	Particular Integral using short cut Methods
	d	Solution of 2^{nd} order L.D.E using Variation Parameter Methods
	e	Solution of Cauchy's D.E.
	f	Solution of Legendre's D.E

2.	**Applications of Linear Differential Equations and Partial Differential equations No of Lect – 8, Marks: 16**	
	a	Mathematical Model of mass spring system and its solution
	b	Introduction to One Dimensional Heat Flow equation and its solution using method of separation of variables
	c	Introduction to Two Dimensional Heat Flow equation and its solution using method of separation of variables

3.	**Laplace Transform No of Lect – 8, Marks: 16**	
	a	Definition of Laplace Transform, Existence of Laplace Transform, Laplace Transform of standard Functions.
	b	Theorems and properties of Laplace transform and its use.
	c	Inverse Laplace Transform of standard functions.
	d	Properties of Inverse Laplace Transform and its use.
	e	Laplace Transform of Unit Step Functions.
	f	Solution of Differential equations using Laplace Transform .

4.	**Statistics and Probability distributions** **No of Lect – 8, Marks: 16**	
	a	Introduction to Mean, Mode, Median standard deviation, Variance, Coefficient of Variation.
	b	Moments, Skewness and Kurtosis.
	c	Correlation and Regression.
	d	Introduction to Binomial, Poisson's Distributions
	e	Introduction to Normal Distributions

5.	**Fourier Transform and Vector Differentiation** **No of Lect – 8, Marks: 16**	
	a	Introduction to Fourier Integral theorem Fourier Transforms, Fourier Cosine Transforms, Fourier Sine Transform and their inverse.
	b	Gradient of Scalar point function.
	c	Directional Derivatives of scalar point functions
	d	Divergence and curl of vector field
	e	Solenoidal and Irrotational vecor fields

Reference Books:

1. H.K. Dass - Advanced Engineering Mathematics (S. Chand Publication) New Delhi, 2008.
2. Erwin Kreyszig - Advanced Engineering Mathematics (Wiley Eastern Ltd.) Tenth Edition.
3. B.S. Grewal - Higher Engineering Mathematics, Khanna Publication, Delhi, 42nd Edition,2012.
4. Wylie C.R. & Barrett - Advanced Engineering Mathematics - Mc Graw Hill, 6th Revised edition ,1995.
5. B.V. Raman - Engineering Mathematics - Tata Mc- Graw – Hill, 2007.
6. A Text Book of Engineering Mathematics, By N. P. Bali, Laxmi Publication,2004 .

Course Outline

Theory of Machines-I **TOM-I**

Course Title Short Title Course Code

Branch - Mechanical / Automobile Engineering **Year – Second Year**

Course Description:

This course provides the elementary level knowledge of Theory of Machines. Course includes introduction to kinematics of machines and mechanisms, various methods of velocity and acceleration analysis of plane mechanisms. Friction and friction devices are also included in the syllabus. One unit on belt, rope and chain drives cover the necessary details of these power transmitting devices.

Teaching Scheme:

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	3	14	42	3

Examination scheme:

End semester exam (ESE)	80 Marks	Duration : 03 hours
Internal Sessional exam (ISE)	20 Marks	

Prerequisite Course(s): Knowledge of vector algebra and Engineering Mechanics.

Outline of Content:

This course contains:

1	**Simple Mechanisms**	**No. of Lectures – 9, Marks: 16**
	a	Introduction, Kinematics, Kinetics, Static & Dynamics, Machine, Kinematic link or element, Type of links, Structure, Difference Between a Machine and a structure, Types of Constrained Motions, Classification of Kinematic Pairs.
	b	Kinematic Chain, Types of Joints in a Chain, Types of Kinematic Chains, Mechanism, Number of Degrees of Freedom for Plane Mechanisms, Application of Kutzbach Criterion to Plane Mechanisms, Grubler's Criterion for Plane Mechanisms.
	c	Inversion of Mechanism, Four Bar Chain or Quadric Cycle Chain, Inversions of Four Bar Chain, Single Slider Crank Chain, Inversions of Single Slider Crank Chain, Double Slider Crank Chain, Inversions of Double Slider Crank Chain(no numerical treatment)
	d	Introduction, Relative & Absolute velocity, Velocity of a point on a link by Instantaneous Centre of Rotation (ICR) method, Properties of ICR, Location of ICRs, Space and Body Centrodes
	e	Kennedy's or Three Centers in Line Theorem, ICR method for different Mechanisms
	f	Relative Velocity Method, Relative Velocity of Two Bodies Moving in Straight Lines, Motion of a Link, Velocity of a Point on a Link by Relative Velocity Method, Velocities in a Four bar mechanism, Slider Crank Mechanism & other inversions, Rubbing Velocity at a Pin Joint, Mechanical Advantage
2	**Acceleration in Mechanisms**	**No. of Lectures – 8, Marks: 16**
	a	Introduction to Linear, Angular, Centripetal, Tangential acceleration, Acceleration Diagram for a Link, Acceleration of a Point on a Link,

		Acceleration in the Four bar Mechanisms
	b	Acceleration in the Slider Crank Mechanism and other inversions
	c	Introduction to Coriolis Component of Acceleration, magnitude and direction, Coriolis Component of Acceleration for different mechanisms
	d	Klien's Construction, different cases of slider crank mechanisms
3	**Inertia Forces in Reciprocating Parts No. of Lectures – 8, Marks: 16**	
	a	Introduction, D-Alembert's Principle, Analytical Method for Velocity and Acceleration, Forces on the Reciprocating Parts of an Engine
	b	Equivalent Dynamical System, Determination of Equivalent Dynamical System of Two Masses by Analytical Method, Correction Couple, Analytical Method for Inertia Torque
	c	Mechanisms with Lower Pairs, Pantograph, Straight Line Mechanism, Approximate Straight Line Motion Mechanisms, Steering Gear Mechanism
	d	Universal or Hooke's Joint, Double Hooke's Joint
4	**Friction No of Lectures – 9, Marks: 16**	
	a	Introduction, Types of Friction, Friction Between Lubricated Surfaces, Limiting Friction, Laws of Solid Friction, Laws of Fluid Friction, Coefficient of Friction, Limiting Angle of Friction, Angle of Repose, Friction of a Body Lying on a Rough Inclined Plane, Efficiency of Inclined Plane
	b	Screw friction, Terminology of screw, Screw Jack, Torque requirements, Efficiency, Friction of a V-thread
	c	Friction in Journal Bearing- Friction Circle, Friction of Pivot and Collar Bearing, Flat Pivot Bearing, Conical Pivot Bearing, Trapezoidal or Truncated Conical Pivot Bearing, Flat Collar Bearing
	d	Friction Clutches, Single Disc or Plate Clutch, Multiple Disc Clutch, Cone Clutch, Centrifugal Clutch
5	**Belt, Rope and Chain Drives No. of Lectures – 8, Marks: 16**	

	a	Introduction, Selection of a Belt Drive, Types of Belt Drives, Types of Belts, Material used for Belts, Types of Flat Belt Drives, Velocity Ratio, Slip of Belt, Creep of Belt
	b	Length of an Open Belt Drive and Cross Belt Drive, Power Transmitted, Ratio of Driving Tensions, Angle of Contact, Centrifugal Tension, Condition For the Transmission of Maximum Power, Initial Tension
	c	V-belt drive, Advantages and Disadvantages, Driving Tensions for V-belt,Rope Drive, Fiber Ropes, Advantages, Sheave for Fiber Ropes, Wire Ropes
	d	Chain Drives, Kinematic of Chain Drive, Classification, Advantages and Disadvantages, Terminology, Chain Speed and Angular Velocity of Sprocket, Length of Chain

Reference Books:

1. Theory of Machines, S. S. Rattan, Tata McGraw Hill, New Delhi.
2. Theory of Mechanisms & Machines, Jagdish Lal, Metropolitan Book Co.
3. Theory of Machines, Longman's Green & Co., London.
4. Theory of Machines, W. G. Green, Blackie & Sons, London
5. Theory of Machines, V.P. Singh, Dhanpat Rai & Co.
6. Theory of Machines and Mechanisms, Shigley, J.E and Uicker, J.J, McGraw-Hill International Book Co.
7. Mechanisms and Machines theory, Rao J.S. and Dukkipati R.V, Wiley Eastern Ltd.
8. The Theory of Machines through solved problems by J.S.Rao. *New age international publishers.*
9. *A text book of Theory of Machines by Dr.R.K.Bansal. Laxmi Publications (P) Ltd.*
10. Theory of Machines by Sadhu Singh, Pearson Publication

Course Outline

Applied Thermodynamics	**AT**	
Course Title	Short Title	Course Code
Mechanical/Automobile Engineering	**Second Year**	**Second**
Branch	Year	Semester

Course Description:

This course imparts knowledge of Applied Thermodynamics to undergraduate students. The background required includes a sound knowledge of course in Engineering Thermodynamics and use of Steam tables. The objectives of the course are to understand various real-life applications of basic Thermodynamics including Reciprocating and rotary Air compressors, Boilers, Steam power plant, etc.

Teaching Scheme:

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	3	14	42	4
Tutorial	1	14	14	

Examination scheme:

End semester exam (ESE)	80 Marks	Duration : 03 hours
Internal Sessional exam (ISE)	20 Marks	20 Marks

Prerequisite Course(s):

Fundamental knowledge of Physics and Engineering Thermodynamics.

Outline of Content: This course contains

1	**Boiler and Boiler Performance**	**No. of Lectures – 8, Marks: 16**
	a	Steam Power Plant layout, Classification and selection of boilers, Stocker fired boiler.
	b	Modern boilers with various fossil fuels, IBR act, Energy conservation opportunities, waste heat recovery boiler.
	c	Boiler performance - Equivalent evaporation, boiler efficiency (direct and indirect Method).
	d	Numerical on boiler performance.
	e	Heat balance for a boiler.
	f	Numerical on boiler Heat balance.
	g	Boiler Draught, Natural & Artificial draught, losses, Condition for maximum discharge through chimney.
	h	Numerical on draught.
2	**Vapor Power Cycle and Steam Condenser**	**No. of Lectures – 8, Marks: 16**
	a	Fundamentals of Vapor Processes, Steam power cycles- Carnot Cycle, Rankine cycle.
	b	Analysis of Rankine cycle for work ratio, efficiency, Power output, specific steam consumption, heat rate. Comparison of Rankine and Carnot cycle.
	c	Numerical on Rankine cycle
	d	Methods to improve Rankine cycle efficiency - Regeneration, Reheating, Co-generation. (Elementary treatment)
	e	Numerical on reheat Rankine cycle, regenerative Rankine cycle.
	f	Condenser, classification of condenser, Necessity of condenser, Vacuum measurement, Condenser efficiency, Vacuum efficiency, Calculation of cooling water required.
	g	Air leakage and its effect on condenser performance, Air extraction pump,

		cooling towers.
	h	Numerical on condenser performance.
3	**Compressible Flow and Steam Nozzle**	**No. of Lectures – 8, Marks: 16**
	a	Compressible fluid flow, Static and Stagnation properties, numerical.
	b	Sonic velocity, Mach number, type of nozzles and diffusers.
	c	One dimensional steady isentropic flow through nozzles and diffusers, Critical pressure ratio, maximum discharge, choked flow.
	d	Numerical on flow through nozzles and diffusers.
	e	Effect of variation in back pressure on nozzle characteristics, Effect of friction and nozzle Efficiency.
	f	Numerical on Effect of friction and nozzle Efficiency.
	g	Super saturated flow, Fanno line, Rayleigh lines (No numerical).
	h	Normal and oblique shock losses. (No numerical)
4	**Reciprocating Air Compressor**	**No. of Lectures – 8, Marks: 16**
	a	Introduction, use of compressed air, terminology used in compressor, Classification of compressors.
	b	Construction and working of single stage compressor, Thermodynamic analysis of reciprocating air compressor without clearance volume, Isothermal Efficiency, Double acting Compressor.
	c	Numerical of reciprocating air compressor without clearance.
	d	Effect of clearance, analysis of reciprocating air compressor with clearance volume, volumetric efficiency, FAD, Actual Indicator diagram.
	e	Numerical of reciprocating air compressor with clearance.
	f	Improvements in volumetric efficiency, multistage compression, Condition for minimum work of compression, Intercooler, after cooler, heat rejected.
	g	Numerical on reciprocating air compressor.
	h	Numerical on reciprocating air compressor.

5	**Rotary air Compressor**	**No. of Lectures – 7, Marks: 16**
	a	Introduction, classification of rotary compressors; construction, working, analysis and application of roots blower.
	b	Construction, working, analysis and application of vane type compressor
	c	Construction, working, analysis and application of screw type compressor
	d	Introduction, classification of fans and blowers, Fan characteristics.
	e	Construction and working of centrifugal fan and axial flow fan.
	f	Numerical only on fan.
	g	Numerical only on fan.

References:

1	Thermodynamics: an Engineering Approach, Y A Cengel and M A Boles, Tata McGraw Hill.
2	Applied Thermodynamics for Engineering Technologists, T. D. Eastop and A. McConkey, Pearson Education India
3	Power Plant Engineering, P K Nag, Tata McGraw Hill.
4	Power Plant Technology, M. M. El-Wakil, Tata McGraw Hill.
5	Thermal Engineering, R K Rajput, Laxmi Publication New Delhi.
6	Steam & Gas Turbines & Power Plant Engineering, R. Yadav, Central Publishing House, Allahabad
7	Engineering Thermodynamics, P.K. Nag, Tata McGraw Hill
8	Course in Thermal Engineering, C. P. Kothandaraman, Domkundwar, Domkundwar S, Dhanpat Rai & Company (P) Limited.

Course Outline

Basic Electrical Drives & Controls **BEDC**

Course Title Short Title Course Code

Branch - Mechanical / Automobile Engineering **Year – Second Year**

Course Description:

This course provides the elementary level knowledge of Basic Electrical Drives & Controls. Course includes introduction to Electric power measurement, Electric Energy measurement, Illumination DC Machines. The course also introduces students to concept of Single phase & three phase transformers & Three Phase Induction Motor, Single phase Induction motors & Synchronous Generator**,** Special purpose machines, Sensors, Robotics, DAS and Relays.

Teaching Scheme:

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	3	14	42	3

Examination scheme:

End semester exam (ESE)	80 Marks	Duration : 03 hours
Internal Sessional exam (ISE)	20 Marks	

Prerequisite Course(s): Elements of Electrical and Electronics Engineering

.

Outline of Content: This course contains:

1	**Electric power measurement, Electric Energy measurement, Illumination No of Lect – 8, Marks: 16**	
	a	Three phase power measurement by single watt meter method, two Watt meter method, three watt meter method.
	b	Effect of load power factor on wattmeter reading. Measurement of reactive power by one wattmeter method.
	c	Single phase energy meter (construction and working).
	c	Various term related to illumination, types
	d	Requirement of good lighting scheme, special purpose lighting.
2	**DC Machines,Special purpose machines No of Lect – 9, Marks: 16**	
	a	Constructional, Working principle of D.C.generator, Types of D.C. generator EMF Equation of D.C. Generator (Theoretical concept only).
	b	Working principle of D.C.Motor, back EMF, EMF Equation Types of D.C.Motor, and torque equation for D.C.Motor.
	c	Characteristics of Shunt, series, compound motors, methods for speed control of D.C. Shunt and series motor & applications of DC motor.
	d	Explain the necessity of starter and types.
	e	Principle, working and application of stepper motor, servo motor.
3	**Single phase & Three phase transformers & Three Phase Induction Motor No of Lect – 9, Marks: 16**	
	a	Working Principle & Construction of Single phase transformer & derive EMF equation. Efficiency of Transformers & condition for maximum efficiency of Transformer
	b	Types of Transformer connection star / star, delta / delta, star / delta, delta / star connections, V-V and Scott connections.
	c	Constructional features of induction motor and Working principle of three phase induction motor, types
	d	Define slip and derive torque equation , explain torque slip characteristics, power stages
	e	Explain different types of starters and applications of induction motors.

4	**Single phase Induction motors & Synchronous Generator** **No of Lect – 8 Marks: 16**	
	a	Principle of operation, types, and applications.
	b	Constructional features (Salient and Non-salient) of alternators and principle of operation.
	c	Pitch Factor or Chording Factor & Distribution Factor or winding factors, EMF equation.
	d	Alternator on load, concept of synchronous reactance and impedance, Phaser diagram of loaded alternator.
	e	Voltage regulation of alternator by Direct loading method and synchronous impedance method.
5	**Sensors, Robotics,DAS and Relays** **No of Lect – 8, Marks: 16**	
	a	Proximity sensors, Light sensors,
	b	Hall effect sensors, Ultrasonic sensors.
	c	Robotics, Block diagram and operation of Data acquisition system.
	d	Electromechanical control relays, solid state relays, Timing and Latching relays.

References:

1	B L Theraja and A K Theraja, "A Text book of Electrical Technology- Vol-I", S. Chand, 1ST Edition, 2001
2	B L Theraja and A K Theraja, "A Text book of Electrical Technology- Vol-II", S. Chand, 1ST Edition, 2001
3.	Ashfaq Husain, Fundamental of Electrical Engineering,Dhanpat Rai & co.
4	Electrical machines D P Kothari and I J Nagrath, Tata McGraw Hill, Third Edition
5	Electrical Machinery S.K. Bhattacharya TTTI Chandigad
6	Electrical Technology Edward Hughes Pearson Education
7	Art and Science of Utilization of Electrical Energy H Pratap Dhanpat Rai and Co, Third Edition

Course Outline

Manufacturing Engineering-II **ME-II**
Course Title Short Title Course Code

Branch - Mechanical / Automobile Engineering **Year – Second Year**

Course Description:
This course provides the basic knowledge of Advance manufacturing processes. Course includes fundamentals of metal cutting, Design of jigs and fixtures, Sheet metal working, Gear manufacturing and CNC machine, Unconventional machining processes.

Teaching Scheme:

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	3	14	40	3

Examination scheme:

End semester exam (ESE)	80 Marks	Duration : 03 hours
Internal Sessional exam (ISE)	20 Marks	

Prerequisite Course(s): This course is aimed at introducing the Manufacturing processes to undergraduate students. The background expected familiar with Workshop Practice I & II and Manufacturing Engineering-I.

Outline of Content: This course contains:

1	**Theory of metal cutting**	**No. of Lect – 8, Marks: 16**
	a	Introduction to single point cutting tool
	b	Angle & forces of single point cutting tool
	c	Tool life & Tool wear
	d	Measurement of cutting forces
	e	Cutting power
2	**Design of jigs and fixtures**	**No. of Lect – 8, Marks: 16**
	a	Introduction to jigs and fixtures
	b	Design principle
	c	Clamping
	d	Drill bushes
	e	Fixtures
3	**Sheet metal working**	**No. of Lect – 8, Marks: 16**
	a	Introduction to press tools
	b	Design of dies
	c	Selection of die and presses
4	**Gear manufacturing and CNC machine**	**No. of Lect – 8, Marks: 16**
	a	Introduction to broaching
	b	Gear manufacturing
	c	Introduction to Numerical controls and machine centers
5	**Unconventional machining processes**	**No. of Lect – 8, Marks: 16**
	a	Mechanical Processes
	b	Thermal processes
	c	Electrochemical machining
	d	Electric discharge machining

Reference Books:

1. Workshop technology – Raghuwanshi vol-1 &2, Dhanpatrai , New delhi.
2. Workshop technology – Hajra Choudhary vol-1 &2, Media promoters, Mumbai
3. Plastic technology- W.J. Patton

4. Manufacturing technology (Foundary forming & welding) P. N. Rao, McGraw Hill publications, New Delhi
5. Manufacturing science- Ghosh and Malik
6. P. C. Sharma, A Textbook of Production Engineering by - S. Chand & Company. Ltd.
7. P. C. Sharma, A Textbook of Production Technology by - S. Chand & Company. Ltd.
8. Production Technology- R K Jain, Khanna, publication.
9. Materials and processes in manufacturing , J T Black, Ronald A. Kosher, DeGarmos, Wiley student edition
10. Fundamental of modern manufacturing , Mikell P groover, , Wiely asia student edition
11. Manufacturing process and system , Phillip C Ostawald, jairo Munoz, , wiely india
12. Manufacturing Technology, D.K. Singh, Pearson New Delhi.
13. Manufacturing process Vol-I, H. S. Shah, Pearson New Delhi.
14. Manufacturing Engineering and Technology, Serope Kalpakjian, Pearson New Delhi.
15. Manufacturing Processes, Serope Kalpakjian, Pearson New Delhi.

Course Outline

Machine Drawing	**MD**
Course Title	Short Title & Course Code
Branch - Mechanical Engineering	**Year – Second Year**

Course Description:

This course provides the elementary level knowledge of Machine Drawing. Course includes introduction to machine drawing, dimensioning, elements of production drawing, types of fits, surface roughness, conventional representation of machine components, riveted joints and welded joints. The course also introduces students to study sequences of preparing the assembly drawing and bill of materials.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours
Lecture	1	14	14

Prerequisite Course(s): Knowledge of Engineering Graphics

Outline of Content:

This course contains:

1	**Introduction to Machine Drawing** **No. of Lectures – 1**
	Introduction to Machine Drawing, Types of Machine Drawing, Sheet layout and Sketching - Sheet layout – Sheet sizes, Margin, Border lines, Title block , Scale and Scale drawing , Sketching and its materials.
2	**Dimensioning** **No. of Lectures – 1**
	Dimensioning terms and notations, General rules for dimensioning, placing of dimensions, methods of dimensioning common features such as diameters,radii,position of holes, curved surfaces, key way, taper features, etc.
3	**Assembly Drawing** **No. of Lectures – 3**
	Introduction, Types of Assembly drawing, Accepted norms to be observed for assembly drawing, Sequences of preparing the assembly drawing, Bill of materials.
4	**Elements of Production Drawing** **No of Lectures – 2**
	Introduction to Geometric tolerances and Dimensional tolerances, Representation of Geometric tolerances and Dimensional tolerances on a drawing.
5	**Fits** **No. of Lectures – 2**
	The Indian standard system of limits and fits, Types of fits, Selection of fits, Hole basis system and Shaft basis system.
6	**Surface Roughness** **No. of Lectures – 2**
	Terminology for surface roughness, Machining symbols, Roughness symbols, values, and grades recommended by BIS, Representation of Surface Roughness on drawing.
7	**Conventional Representation of machine Components** **No. of Lectures – 1**
	Screw Threads, springs, Gears, Bearings, etc.
8	**Riveted joints and Welded joints** **No. of Lectures – 2**

	Introduction to Riveting, Forms and proportion of rivet heads, Types of riveted joints, Introduction to welded joints, Representation of welded joints.

Reference Books:

1. Machine Drawing, N. D. Bhatt, Chorotar Publishing House, Anand, India.
2. Mechanical Engineering Design, J. E. Shingle & C. R. Mischke,Tata McGraw Hill Publications, New Delhi.
3. Machine Drawing, N. Sidheswar & Kannaiah, Tata McGraw Hill Publications, New Delhi.
4. Machine Drawing, N. D. Junnarkar, Pearson Education.

Lab Course Outline

Machine Drawing Lab	**MD LAB**
Course Title	Short Title & Course Code
Branch - Mechanical Engineering	**Year – Second Year**

Course Description:

This lab includes drawing sheets related to assembly and details of a machine unit such as couplings, bearings, lathe parts, screw jack, vices, valves, etc. The course also introduces students to study sequences of preparing the assembly drawing and bill of materials.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	2	14	28	2

Examination scheme:

Internal Continuous Assessment (ICA) 50 Marks

Prerequisite Course(s): Knowledge of Engineering Graphics

Outline of Content:

This lab contains

Machine Drawing Lab

Sheet No. 1 and 2- Assembly and details of a machine unit.

This project consisting of a full imperial size sheets each involving assembly drawing with a part list, overall dimensions, and detailed drawing of couplings, bearings, lathe parts, screw jack, vices, valves, etc. manufacturing tolerances, surface finish symbols, and geometric tolerances should be specified so as to make it a working drawing.

Sheet No. 3 and 4- Assembly and details of a machine unit.

This project consisting of a full imperial size sheets each involving assembly drawing with a part list, overall dimensions, and detailed drawing of couplings, bearings, lathe parts, screw jack, vices, valves, etc. manufacturing tolerances, surface finish symbols, and geometric tolerances should be specified so as to make it a working drawing.

Assignment:

It should contain all the machining symbols, tolerances and welding symbols, etc. on A4 size sheet.

Note: All the four sheets and assignment must be completed during 14 weeks available during semester.

Guide lines for ICA:

ICA will be based on four drawing sheets and assignment submitted by the student in the form f journal.

Reference Books:

1. Machine Drawing, N. D. Bhatt, Chorotar Publishing House, Anand, India.
2. Mechanical Engineering Design, J. E. Shingle & C. R. Mischke,Tata McGraw Hill Publications, New Delhi.
3. Machine Drawing, N. Sidheswar & Kannaiah, Tata McGraw Hill Publications, New Delhi.
4. Machine Drawing, N. D. Junnarkar, Pearson Education.

Lab - Course Outline

Basic Electrical Drives & Controls **BEDC LAB**

Course Title Short Title & Course Code

Branch - Mechanical / Automobile Engineering **Year – Second Year**

Course Description:

This lab includes elementary level knowledge of Basic Electrical Drives & Controls by study the practicals.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Evaluation Scheme:

Internal Continuous Assessment (ICA) 50 Marks

Prerequisite Course(s): Elements of Electrical and Electronics Engineering

Outline of Content:

This practical contains

Basic Electrical Drives & Controls

1) Speed control of DC Shunt motor by armature control and flux control methods.
2) Load test on DC Shunt Motor.
3) Load test on DC Series Motor.
4) Measurement of active power in a three phase balanced inductive load using two wattmeter methods.
5) Regulation of an alternator by synchronous impedance method.
6) Regulation of an alternator by Direct Loading method.
7) Load Test on three Phase Induction Motor
8) Study of D.C. Motor Starters & Three Phase Induction Motor Starter.

Note: All the eight experiments must be completed during 15 weeks available during semester.

Lab - Course Outline

Applied Thermodynamics Lab	**AT LAB**	
Course Title	Short Title & Course Code	
Mechanical/Automobile Engineering	**Second Year**	**Second**
Branch	Year	Semester

Course Description:

This lab includes performance practical and study practical related to Applied Thermodynamics.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Evaluation Scheme:

Internal Continuous Assessment (ICA)	25 Marks
End Semester exam (ESE) (Oral)	25 Marks

Prerequisite Course(s):

11^{th} standard Physics, 12^{th} standard Physics, Engineering Thermodynamics.

Outline of Content:
This Lab contains

Following **THREE** performance practical	
01	Determination of heating value of a solid / liquid fuel using Bomb Calorimeter.
02	Exhaust gas analysis using Gas Analyzer OR Orsat Apparatus.
03	Determination of Isothermal and Volumetric efficiency of reciprocating air compressor.
Any FIVE of the following study practical	
04	Study of boiler draught.
05	Study of High pressure boiler.
06	Study of Steam condensers and cooling towers.
07	Study of Steam Nozzles and diffusers.
08	Study of Steam Power Plant.
09	Visit to any thermal power plant, prepare a detailed visit report.
10	Evaluation of Boiler efficiency by Direct and Indirect Method (Through Numerical).

Note:

FIVE Compulsory Assignment on **EACH** unit shall be included in the journal. Each assignment should have at least **FIVE** solved numerical. These assignments should be thoroughly conducted over tutorial sessions under teacher guidance.

Guide lines for ESE:-

End Semester Examination (ESE) **(Oral Exam)** will be based on practical and assignment submitted by the student in the form of journal.

Evaluation will be based on paper work.

Lab – Course Outline

Theory of Machines-I	**TOM-I LAB**
Course Title	Short Title & Course Code

Branch - Mechanical / Automobile Engineering **Year – Second Year**

Course Description:

This lab includes drawing sheets related to velocity and acceleration analysis of various mechanisms. Experiments on determination of mass moment of inertia and slip & creep in belt drive are also included. In addition two assignments, one on inversions of mechanisms and one on study of various clutches are also added.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Evaluation Scheme:

Internal Continuous Assessment (ICA)	25 Marks
End Semester exam (ESE) ORAL	25 Marks

Prerequisite Course(s): Engineering Mathematics, Physics

Outline of Content:

This practical contains

Theory of Machines-I Lab

1. **Drawing sheets on ICR method (2 problems), relative velocity and acceleration method (4 problems) and Klein's construction (2 problems)**
2. **To study the various inversions of kinematic chains. (Assignment)**
3. **To determine slip and creep for a belt-pulley combination.**
4. **To determine mass moment of inertia of compound pendulum.**
5. **To determine mass moment of inertia of rigid body by using bifilar or trifilar suspension method.**
6. **To study the different types of clutches.(Assignment)**

Note: All the six experiments must be completed during 15 weeks available during semester.

Guide lines for ESE:-

ESE will be based on practical assignments submitted by the student in the form of journal. Evaluation will be based on paper work.

Lab - Course Outline

Workshop Practice IV	**WP-IV**
Course Title	Short Title & Course Code
Branch - Mechanical / Automobile Engineering	**Year – Second Year**

Course Description:

Workshop Practice IV covers the basic knowledge and practices on conventional machines like Lathe, Milling, Drilling, Shaper, and Grinding Machines in machine shop II as well as CNC machines like CNC Lathe, CNC Milling in CNC shop along with CNC Job development and programming in order to improve the practical skill of students in different workshops.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Evaluation Scheme:

Internal Continuous Assessment (ICA)	25 Marks
End Semester exam (ESE) (Practical)	25 Marks

Prerequisite Course(s): WP-I, WP-II, WP-III, Engineering Drawing, Engineering Materials.

Outline of Content:

This practical contains

1. **Machine shop-II**

One composite job by each student involving different machining operations on Lathe, Milling, Drilling, Shaper, Grinding Machines

2. **CNC Lathe**

One job for programming and manufacturing on CNC lathe machine for each student consisting operations like Turning, Thread Cutting (Internal or External), Facing, Plain turning, Taper turning, Step Turning, Chamfering, Grooving, Drilling etc. operations.

3. **VMC (CNC Milling)**

One job for programming and manufacturing on VMC, CNC Milling machine for each student performing drilling, tapping, milling etc

Note:

4. Candidates are required to finish the job to the following limits

   Machine Shop: + 0.5mm or -0.5mm

   CNC Machine: +0.01mm or -0.01mm
5. Workshop book to be submitted comprising of Job drawing, process sheet for a given job along with the sketches of tools used for operations.
6. CNC Programming restricted to class only.

Guide lines for ESE:-

End Semester Examination (ESE) **(Practical Examination)** will be based on above mention practical list in CNC shop and conventional machine shop which will perform by students during the current semester. The students must be performing the practical in front of the examiner. The workshop instructors will only provide the raw material, tools, and equipments to students and also arrange the set up required for conducting workshop practical in CNC shop and conventional machine shop.

Reference Books:

1. Element of Workshop Technology Volume I and II -Hajara Chaudhary and Bose S.K., Asia Publishing House.

2. Production Technology Volume I and II –P.N.Rao, Tata McGraw Hill Publication.

3. Production Technology- R.K.Jain, Khanna Publications.

4. Production Technology- P.C.Sharma, Khanna Publication.

5. Workshop Technology-Chapman W.A.J., ELBS Publication.

6. Production Technology- HMT, Tata McGraw Hill Publication.

NORTH MAHARASHTRA UNIVERSITY,

JALGAON (M.S.)

Third Year Engineering

(Mechanical Engineering)

Faculty of Engineering and Technology

Course Outline

Semester- V &VI

TE Semester - V

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
		Theory		PR	Total						
		TH Hr/W	Tut Hr/W	PR Hr/W	Total	ISE	ESE	ICA	ESE	Total	
Heat Transfer	D	3	---	---	3	20	80	---	---	100	3
Internal Combustion Engine	D	3	---	---	3	20	80	---	---	100	3
Machine Design - I	D	3	---	---	3	20	80	---	---	100	3
Theory of Machine - II	D	3	---	---	3	20	80	---	---	100	3
Industrial Safety and Engineering	C	3	---	---	3	20	80	---	---	100	3
Heat Transfer Lab.	D	---	---	2	2	---	---	25	25	50	1
Internal Combustion Engine Lab.	D	---	---	2	2	---	---	25	---	25	1
Machine Design - I Lab.	D	---	---	2	2	---	---	25	25	50	1
Theory of Machine - II Lab.	D	---	---	2	2	---	---	25	25	50	1
Computer Graphics Lab.	B	1	---	2	3	---	---	50	---	50	2
Ind Training /EDP/ Special Study	D	---	---	---	---	---	---	25	---	25	2
Total	16	---	10	26	100	400	175	75	750	23	

TE Semester - VI

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
		Theory		PR	Total						
		TH Hr/W	Tut Hr/W	PR Hr/W	Total	ISE	ESE	ICA	ESE	Total	
Machine Design - II	D	3	--	---	3	20	80	---	---	100	3
Numerical Analysis and Computational Methods	D	3	---	---	3	20	80	---	---	100	3
Metrology and Quality Control	D	3	---	---	3	20	80	---	---	100	3
Turbomachinery	D	3	---	---	3	20	80	---	---	100	3
Project and Business Management	C	3	---	---	3	20	80	---	---	100	3
Machine Design - II	D	---	---	2	2	---	---	25	25	50	1
Turbomachinery	D	---	---	2	2	---	---	25	25	50	1
Metrology and Quality Control	D	---	---	2	2	---	---	25	25	50	1
Programing in C++	B	---	---	2	2	---	---	25	---	25	1
Minor Project	D	---	---	2	2	---	---	50	---	50	2
Seminar-I	D	---	---	2	2	---	---	25	---	25	2
Total	15	---	12	27	100	400	175	75	750	23	

ISE: Internal Sessional Examination **ESE:** End Semester Examination **ICA:** Internal Continuous Assessment

Note : Out of 3 practical ESE heads, at least 1 head should be practical**.**

Course Outline

Heat Transfer HT

Course Title: Short Title Course Code

Branch - Mechanical / Automobile Engineering **Year – Third Year**

Course Description: This course introduces undergraduate students to Heat Transfer. The background required includes a sound knowledge of Mathematics (Calculus), Engineering Thermodynamics, Applied Thermodynamics and Fluid Mechanics of second year Level. The course aims at imparting knowledge of Heat Transfer and modes of Heat Transfer.

Teaching Scheme:

	Hours Per Week	No. of Weeks	Total Hours	Semester Credits
Lectures	**3**	14	40	3
Practical	**2**	14	28	1

Examination scheme:

End semester exam (ESE) 80 Marks Duration: 03 hours

Internal Sessional exam (ISE) 20 Marks

Purpose of Course: Degree Requirement

Prerequisite Course(s): Mathematics (Calculus) at first year level and Engineering Thermodynamics, Applied Thermodynamics and Fluid Mechanics at Second Year Level.

Outline of Content: This course contains:

UNIT-I

1.	**Heat Conduction**	**No. of Lectures - 8 Marks : 16**
	a	Concepts and Mechanism of heat flow: Steady and unsteady state heat transfer, Modes of heat transfer, their physical mechanism.
	b	Laws of heat transfer, thermal conductivity, heat transfer coefficient, radiation heat transfer coefficient.
	c	Isotropic and an-isotropic materials, Insulation materials, Thermal resistance and thermal conductance.
	d	Generalized one dimensional heat conduction equation and reduction to Fourier, Poisson and Laplace equations, Boundary conditions, Steady state heat conduction without heat generation in plane wall, cylinder and sphere, Thermal contact resistance, critical thickness of insulation on cylindrical bodies.

UNIT-II

2.	**Heat Transfer in Extended Surfaces No. of Lectures - 8 Marks : 16**	
	a	Steady state heat conduction with heat generation in plane and composite wall, hollow cylinder, hollow sphere.
	b	Extended Surface: Types of fins, governing equation for pin fin for infinite long fin and fin with negligible heat loss, Fin performance, fin efficiency, fin effectiveness, overall fin effectiveness, approximate solution of fins.
	c	Error in temperature measurement by thermometer.

UNIT-III

3.	**Convection Heat Transfer No. of Lectures - 8 Marks : 16**	
	a	Principle of heat convection: mechanism, natural and forced convection.
	b	Non Dimensional Numbers, Dimensional analysis for Natural and Forced Convection.
	c	convection boundary layers: laminar, turbulent, momentum and energy equation, Laminar flow over bodies, turbulent flow inside circular and non-circular ducts, Reynolds Colburn analogy for flow over flat plate and flow inside tube, coefficient of friction and friction factor
	d	Heat transfer in fully developed flow, Natural convection over vertical planes, use of empirical correlation for convection, Principle of condensation and boiling (No numerical treatment).

UNIT-IV

4.	**Radiation Heat Transfer No. of Lectures - 8 Marks : 16**	
	a	Thermal radiation: Concept, Black body radiation, Spectral and total emissive power, Stefan Boltzmann law, Radiation laws.
	b	Irradiation and radiosity, Surface absorption, reflection and transmission, emissivity.
	c	Radiation view factor, Properties of view factor, (*No numerical treatment on view factor*), radiation heat exchange between two diffuse gray surface, radiation shield.

UNIT-V

5.	Heat Exchangers	No. of Lectures - 8 Marks : 16
	a	Classification of heat exchangers, temperature distribution in parallel, counter flow arrangement, condenser and evaporator, Overall heat transfer coefficient, fouling factor.
	b	Log-mean temperature difference method and NTU –effectiveness method of analysis for rating and sizing of heat exchangers.
	c	Requirement of good heat exchanger and heat exchanger and design and selection, practical applications, heat pipe.

- **Note-** Use of Heat transfer data book is allowed in the examination.
- **Note for paper setter:**

Paper setter should provide the required data for numerical problems in question paper itself.

Experiment must be set simultaneously and the no. of student in each group working on a setup should not exceed 05 (five) student.

References

1. J.P.Holman 1992 “Heat Transfer”Mc Graw Hill VII Edition.
2. P.Kothandaraman”Fundamentals of Heat and Mass Transfer”.
3. R.K.Rajput”Heat and Mass Transfer”, S.Chand & Company Ltd., New Delhi.
4. D.S.Kumar “Heat and Mass Transfer” D.S.Kumar S.K.Kataria & Sons, Delhi.
5. P.K.Nag “Heat Transfer” Tata McGraw Hill Publishing Company Ltd., New Delhi.
6. Sachdeva R.C., “Fundamentals of Heat and Mass Transfer” Wiley Eastern Limited, Third Edition.
7. Sukhatme S.P, “A Text Book on Heat Transfer” (1989), IIIrd Edition, Orient Longmans Ltd., New Delhi.
8. Arora S.C. & Domkundwar S., “A Course in Heat and Mass Transfer” (1994), Dhanpat Rai & Sons, IVth Edition.
9. Chapman A.J., “Heat Transfer” (1989), IVth Edition.
10. Yunus A. Cengel, “Heat Transfer –A Practical Approach” (Tata McGraw Hill)
11. M. M. Rathore “Engineering Heat and Mass Transfer”, 2nd Edition, Laxmi Publications, New Delhi.
12. M. Thirumalseshwar,”Fundamentals of Heat and Mass Transfer” Pearson Education.
13. R. Rudramoorthy, K. Mayilsomy, “Heat Transfer”, Pearson Education.

Lab - Course Outline

Heat Transfer **HT LAB**

Course Title: Short Title Course Code

Branch - Mechanical / Automobile Engineering **Year – Third Year**

Course Description:

This lab includes different practical of Heat Transfer. The course aims at imparting knowledge of Heat Transfer and its modes.

Teaching Scheme:

	Hours Per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**2**	14	28	1

Evaluation scheme:

Internal Continuous Assessment (ICA) 25 Marks 50 Marks

End Semester exam (ESE) (Practical) 25 Marks

Prerequisite Course(s): Mathematics (Calculus) at first year level and Engineering Thermodynamics, Applied Thermodynamics and Fluid Mechanics at Second Year Level.

Outline of Content: This course contains:

1. Determination of thermal conductivity of metal rod.
2. Determination of thermal conductivity of insulating powder.
3. Determination of thermal conductivity of composite wall.
4. Determination of heat transfer coefficient in natural convection.
5. Determination of heat transfer coefficient in forced convection.
6. Determination of temperature distribution, fin efficiency in natural and forced convection.
7. Determination of emissivity of a test surface.
8. Determination of Stefan Boltzmann constant.
9. Study of pool boiling phenomenon and determination of critical heat flux.
10. Determination of LMTD, overall heat transfer coefficient and effectiveness of heat exchanger in parallel and counter flow arrangement.

11. Determination of heat transfer from a heat pipe.
12. Calibration of thermocouple.

Note: Lab file should contain at list EIGHT experiments from above mentioned list.

ESE (Practical Examination)

The Practical Examination will comprise of performing the experiment and viva on the Practical's.

Instructions for practical Exam. :-

1. Five experiments should be selected for Practical Examination.

2. The Number of Students for each Practical set up should not be more than 5 Students.

3. Oral will be based on the Practical Performed in the examination and the experiments included in the Journal.

Internal Combustion Engine (Theory)

Internal Combustion Engine	**ICE**	
Course Title	Short Title	Course Code

Branch- Mechanical/ Automobile Engineering **Year- Third Year**

Course Description:
This course provides the knowledge of Internal Combustion Engine. Course includes different engine cycles its performance analysis, various systems in IC Engine such as fuel feed, lubrication, cooling, ignition, supercharging and turbo charging. Fundamental of combustion in I C Engine, types and design of combustion chambers. Various emission control norms.

Teaching Scheme:

Lecture hours per Week	No. of Weeks	Total hours	Semester Credits
03	14	40	03

Examination Scheme:

End semester exam (ESE)	80 Marks	Duration: 03 Hours
Internal Sessional Exam (ISE)	20 Marks	

Prerequisite Course(s): Mathematics (calculus), Basic thermodynamics cycles, various ideal gas processes, Engineering Thermodynamics, Applied Thermodynamics.

Objectives:

1. Analysis of air standard cycles in the regard of I C Engine.
2. Understanding of induction system along with fuel feed system.
3. To impart insight in various operating systems like cooling, lubrication, Ignition system.
4. To be familiar with combustion chamber design and pollution control norms.
5. Performance analysis of I C Engine.

Unit. I

1	**BASIC CONCEPTS AND ENGINE CYCLES No. of Lect.-8, Marks-16**
	a)**Introduction**: Classification, engine components and their functions, Terminology, Work (indicated and brake), mean effective pressure, torque and power (brake and indicated), mechanical efficiency, thermal and volumetric efficiencies of engine, air fuel ratio, specific fuel consumption. **b) Air Standard Cycles**: Assumptions, Otto, Diesel, Dual Combustion cycle, derivation of their efficiency equation, work done and mean effective pressure. Comparison on the basis of heat input, compression ratio, Maximum pressure and temperature, Actual cycle, deviation from theoretical cycles. Pumping losses, time losses.

Unit. II

2	**FUEL FEEDING SYSTEMS No. of Lect.-8, Marks-16**
	a) Charge, intake valve and manifold, valve timing diagram, valve overlap, choked flow. **Carburetion**: Requirement, types of carburetors according to fluid flow, simple carburetor, Air fuel ratio calculation, effect of altitude, disadvantages of simple carburetor, compensating devices for starting, economy range, acceleration, compensating jet etc. additional systems in modern carburetors, Solex carburetor. Disadvantages of carburetion and gasoline injection, MPFI. **b) Fuel feeding systems in CI engines**: Requirement, classification, fuel feed pump, jerk type injection fuel pump, distributor type pump, injection pump governor, fuel injector and nozzles.

Unit. III

3	**OPERATING SYSTEM No. of Lect.-8, Marks-16**
	a) Cooling systems: requirement, types of cooling systems, thermostat and additives. **b) Lubrication**: Mechanism of lubrication, different methods, important properties of lubricating oils. **c) Ignition Systems**: requirement, battery ignition, magneto ignition, electronic ignition system, Ignition timing, spark timing advance. **d) Starting methods of engines**: Types of superchargers, Super charging, effect of super charging, limitations and advantages of supercharging, and turbo charging of engines.

Unit. IV

4	**COMBUSTION IN SI AND CI ENGINES No. of Lect.-8, Marks-16**
	a) Homogeneous and heterogeneous mixtures, **Combustion in SI engines**: Stages in combustion, Ignition lag, velocity of flame propagation, factors influencing flame speed, rate of pressure rise, Detonation, factors affecting the detonation, pre-ignition. Rating of SI engines fuels, Dopes, combustion chamber of SI engines. **b) Combustion in CI engine**; stages of combustion, factors affecting the delay period. Diesel knock, Effect of engine variables on Diesel knock , Rating of CI engine fuels: Cetane number, performance number, comparison of knock in SI and CI engines. Combustion chamber for CI engines.

Unit. V

5	**ENGINE TESTING AND PERFORMANCE No. of Lect.-8, Marks-16**
	a) Measurement of indicated power, brake power, Morse test, energy balance and efficiency calculations. **b)** BIS specification. Recent trends in internal combustion engines. Engine emission, air pollution due to engines, various Euro norms, Unburnt hydrocarbon emission in two stroke and CI engines, CO and Nox emission, particulate traps, EGR, emission control methods catalytic converters (Introductory), crank blow by losses

TERM WORK-

Practical: 2Hrs/week ICA: 25 Marks

Minimum **EIGHT** experiment should be performed form the following lists:

1) Study of cooling systems.
2) Study of lubrication systems.
3) Study of simple and Solex carburetors.
4) Study of fuel pump and fuel injector.
5) Trial on a petrol engine and calculation of air/fuel ratio, volumetric, thermal and mechanical efficiencies.
6) Trial of a Diesel engine and calculation of air/fuel ratio, volumetric, thermal and mechanical efficiencies.
7) Morse test and determination of bsfc and isfc.
8) Study of combustion chambers of SI engines.
9) Study of combustion chambers of CI engines.
10) Study and demonstration of mechanical and Pneumatic governors.
11) Study and analysis of exhaust emission from the engine (PUC).

RECOMMENDED BOOKS:

1) V. Ganeshan, “Internal Combustion Engines”, 2/e, Tata McGraw Hill, New Delhi.
2) R. K. Rajput , “Internal Combustion Engines”’, Laxmi Publications, New Delhi.
3) W. W. Pulkrabek , “Fundamentals of Internal Combustion Engines”, Prentice Hall of India (P) Ltd., New Delhi.
4) E. F. Obert , “Internal Combustion Engines and Air Pollution”, Harper and Row, New York.
5) Ferguson C. R , “Internal Combustion Engines”, Wiley Inc. New York.
6) Sharma R.P. and Mathur M.L., “Internal Combustion Engines”, Standard Publications, New Delhi.
7) Domkundwar, ., “Internal Combustion Engines”, Dhanpat Rai & Co. New Delhi.
8) Willard W Pulkrabek. “Internal Combustion Engines”, Pearson Education
9) Shyam K. Agrawal, “Internal Combustion Engines”, New Edge International Publication.
10) K.K. Ramalingam, “Internal Combustion Engines”, Scitech Publication.

Course Outline

Design of Machine Element **DOME**

Course Title Short Title Course Code

Branch - Automobile Engineering **Year – Third Year**

Course Description: This course introduces undergraduate students to imparting knowledge of Machine Design. The background required includes a sound knowledge of Mathematics, mechanics, Strength of Material, and various machine components. The course aims at imparting knowledge of Machine Design.

Course Objectives

1. To provide an opportunity for students to apply knowledge of mathematics, for solution to design engineering problems.
2. To introduce numerical and machine design approach for solving design perspectives.
3. To apply the knowledge of these methods to solve practical problems with suitable software.

Course Outcome

At the end of the course the students are able to

1. Develop the engineering model with respect to aesthetic and ergonomic consideration.
2. Apply design technique to formulate and solve structural and design problems.

Teaching Scheme:

	Hours Per Week	No. of Weeks	Total Hours	Semester Credits
Lectures	3	14	40	3
Tutorials	--	--	--	--

Examination scheme:

End semester scheme (ESE)	80 marks	Duration: 03 Hrs.
Internal Sessional Examination (ISE)	20 marks	

Purpose of Course: Degree Requirement

Prerequisite Course(s): Fundamental knowledge about mathematics, mechanics, strength of material and machine design.

Outline of Content: This course contains:

UNIT-I

1.	**Fundamental of Design**	**No. of Lectures - 8 Marks : 16**
	a	Mechanical Engineering design, Aesthetic considerations in design, ergonomic consideration in design.
	b	Man/Machine closed loop system, Standardizations.
	c	Selection of material, mechanical properties of material.
	d	Limits, fits, tolerance, factor of safety, theories of failure.

UNIT-II

2.	**Design against fluctuating load**	**No. of Lectures - 8 Marks : 16**
	a	Fluctuating stresses, S-N diagram for fatigue loading, endurance limit.
	b	Endurance strength Modifying factors, stress concentration, causes and remedies, notch sensitivity,
	c	Design of finite and infinite life under reverse stresses, cumulative damage in fatigue failure.
	d	Solderberg & Goodman diagram, Modified Goodman diagram, fatigue design for component such as shaft, bolted joints & springs under combined stresses.

UNIT-III

3.	**Design of shaft keys and coupling**	**No. of Lectures - 8 Marks : 16**
	a	Shafts: Introduction, types of shafts, design of shafts subjected to twisting moments, bending moments, combined twisting and bending moments.
	b	Keys: Types of keys, design of keys.
	c	Coupling: Design of rigid coupling & design of flexible coupling.

UNIT-IV

4.	**Design of Gears**	**No. of Lectures - 8 Marks : 16**
	a	Spur gear: Design of spur gear and helical gear, laws of gearing, terminology of spur Gear, force, analysis, face width, no. of teeth, beam strength and wear strength of gear, tooth, gear tooth failure.
	b	Helical gear: Terminology of helical gear, virtual no. of teeth, tooth

		properties, force analysis, beam strength and wear strength
	c	Design of bevel: Terminology, force analysis, beam strength and wear strength.

UNIT-V

5.	**Miscellaneous design**	**No. of Lectures - 8 Marks : 16**
	a	Design of power screw self locking of power screws, recirculating ball screw.
	b	Design of springs: Types application, materials of springs – stress deflection equation of helical springs, Wahl's factor, Leaf Spring.
	c	Design of Brakes.

References

1 Shigley J. E. and Mischke C. R. ,"Mechanical Engineering Design", McGraw Hill Publication Co. Ltd.

2 Bhandari V. B. ,"Design of Machine Elements", Tata McGraw Hill Publication Co. Ltd.

3 Design Data", P. S. G. College of Technology, Coimbatore.

4 Juvinal R.C., "Fundamentals of Machine Components Design", John Wiley and Sons.

5 P. Kannaiah, "Machine Design", Scitech publication

Course Outline

Theory of Machines – II TOM-II

Course Title: Short Title Course Code

Branch - Mechanical / Automobile Engineering Third Year First

Branch Year Semester

Course Description:

The course under Theory of Machine-II has been designed to cover the concepts of force analysis, construction, working and applications of important components of machines. The students will understand the overall working of machines and able to understand constructional and working features of important machine elements. The students should be able to understand the basic theoretical and numerical methods, which is the pre-requisites to design and selection of these components of machines for different applications.

Course Objectives:

1. To understand various types of machine components, its working & applications.
2. To understand the force analysis of power train components gears.
3. To study the need and different methods of balancing of rotating and reciprocating masses.
4. To aware about the speed regulating components such as governors, flywheel, etc.
5. To describe graphical and analytical methods.

Course Outcomes:

Development of concepts and logics about machine components.
Development of problem solving approach by graphical and analytical methods.
Understanding of functional requirements of machine components for designing purpose.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	3	14	40	3

Examination scheme:		
End semester exam (ESE)	80 Marks	Duration : 03 hours
Internal Sessional exam (ISE)	20 Marks	

Purpose of Course: Degree Requirement

Prerequisite Course(s): Mathematics (Calculus), Engineering Drawing & Element of Mechanical Engineering, Engineering Mechanics at first year level and Theory of Machine-I at Second Year Level.

Course Contents:

UNIT-I

1.	**Flywheel and CAM**	**No. of Lectures - 8 Marks : 16**
	a	Turning moment diagram and fluctuation of the crankshaft speed, D' Alemberts principle Equivalent offset inertia force
	b	Determination of flywheel size for different types of engine and machine.
	c	Types of cams and followers, Analysis of motion of follower
	d	Determination of cam profile for given follower motion
	e	Analysis of cam with specified counters – Circular arc cam, Tangent cam

UNIT-II

2.	**Brakes & Dynamometer**	**No. of Lectures - 8 Marks : 16**
	a	**Brakes:** Types of brakes, Force analysis of brakes, external and internal expanding shoe brakes, block brakes.
	b	Band brakes, Band and block brakes, Breaking torque.
	c	**Dynamometer:** Absorption dynamometers: Prony brakes, Rope brake, Band brake
	d	Transmission dynamometer- belt transmission type, Fluid coupling

UNIT-III

3.	**Governor & Gyroscope**	**No. of Lectures - 8 Marks : 16**
	a	**Governor**: Types of governors – Watt, Porter, Proell, Hartnell, Sensitiveness of governors, Hunting, Isochronisms, Stability.
	b	Effect of governor, Power of governor, Controlling force.
	c	**Gyroscope**: Angular velocity and acceleration, Gyroscopic forces and couple, Gyroscopic effect on naval ships
	d	Gyroscopic stabilization, Stability of two wheel vehicle.

UNIT-IV

4.	**Balancing**	**No. of Lectures - 8 Marks : 16**
	a	Balancing of rotating masses in one and several planes.
	b	Balancing of reciprocating masses in single and multi-cylinder engine, radial and V-types.
	c	Primary and secondary balancing analysis, Concept of direct and reverse cranks.
	d	Balancing of locomotive engines and effect of partial balancing. , Static and dynamic balancing machine.

UNIT-V

5.	**Gears**	**No. of Lectures - 8 Marks : 16**
	a	**Spur Gears**:- Terminology used in gears, conjugate action,.
	b	Involute and cycloidal profile, Path of contact, Arc of contact, Contact ratio.
	c	Interference, Undercutting, Methods to avoid undercutting and interface, Gear standardization,
	d	Effect of center distance variation on the velocity ratio for involute profile tooth gears, Friction between gear teeths.

References:

1. Theory of Machines, S. S. Rattan, Tata McGraw Hill, New Delhi.
2. Theory of Mechanisms & Machines, Jagdish Lal, Metropolitan Book Co.
3. Theory of Machines, Longman's Green & Co., London.
4. Theory of Machines, W. G. Green, Blackie & Sons, London.
5. Theory of Machines, V.P. Singh, Dhanpat Rai & Co.
6. Theory of Machines – II, H. G. Phakatkar, Nirali Publication.
7. Theory of Machines and Mechanisms, Shigley, J.E and Uicker, J.J, McGraw45 Hill International Book Co.
8. Mechanisms and Machines theory, Rao J.S. and Dukkipati R.V, Wiley Eastern Ltd.
9. The Theory of Machines through solved problems , J.S.Rao. New age international publishers.
10. A text book of Theory of Machines, Dr.R.K.Bansal. Laxmi Publications
11. Theory of Machines, Sadhu Singh, Pearson Publication.
12. Theory of machine, P. L. Ballaney, Khanna publication.

Lab - Course Outline

Theory of Machines -II **TOM-II LAB**

Course Title: Short Title Course Code

Branch - **Mechanical / Automobile Engineering** Year – **Third Year**

Course Description:

This lab includes drawing sheets related to cam profile & balancing of rotating & reciprocating masses. Experiments on determination of characteristic curves of the centrifugal governor and verification of principle of working of gyroscope are also included. In addition study of gear boxes and Balancing machine.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Evaluation Scheme:

Internal Continuous Assessment (ICA)		: 25 Marks
End Semester exam (ESE) ORAL		: 25 Marks

Prerequisite Course(s): Engineering Mathematics, Theory of machine-I

Outline of Content:

This practical contains

1. To determine the characteristic curves of the centrifugal governor and find its coefficient of insensitivity and stability.
2. To study various types of gear boxes.
3. To verify the principle of working of gyroscope.
4. To study the static & dynamic balancing machine & balancing of masses in different planes.
5. To study graphical methods and prepare drawing sheets for – Drawing sheet 1:- Balancing of rotating masses and reciprocating masses. (2 Problems)
6. To study graphical methods and prepare drawing sheets for Drawing sheet 2: Draw cam profile for various types of follower motion.

Guide lines for ESE:-

ESE (Oral Examination)

The Oral Examination will comprise of viva on the above six experiments.

Lab - Course Outline Cover Page

Computer Graphics **CG**

Course Title Short Title Course Code

Branch - Mechanical / Automobile Engineering **Year – Third Year**

Course Description: This course includes design and drafting related to mechanical elements. Lab's related to elementary level knowledge of drafting and Auto-LISP program. Sketching and computer aided design tools are used to create the various types of views needed for design and documentation.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	01	14	14	01
Practical	02	14	28	01

Purpose of Course: Degree Requirement

Prerequisite Course(s): Engineering Graphics, Essential Computer Knowledge Required.

Outline of Content: This course contains:

AUTOCAD

1	**No. of Lectures – 07**	
	a	Introduction to CAD. Advantages and Applications of CAD. Difference between conventional drafting methods and CAD.
	b	Introduction to Auto-cad (Latest Version). Details of various menu bars and tool bars, Drawing Area etc.
	c	Draw Toolbar- Line, Arc, Rectangle, Circle, Polygon, Text, Boundary Hatching etc.
	d	Modify Toolbar – Copy, Move, Erase, Mirror, Chamfer, Fillet, Array, Trim etc.
	e	Dimension Toolbar – Linear, Angular, Radius, Diameter, etc
	f	Properties Toolbar – Line Types, Colors, Line Weight, Text, etc
	g	Settings - Snap settings, Grid settings, parameter settings, print settings, etc

AUTO-LISP

2	**No. of Lectures – 07**	
	a	Introduction to Auto-LISP. Advantages and Applications of Auto-LISP .
	b	Auto-LISP commands
	c	Auto-LISP Programs for simple geometric shapes-line, circle, rectangle, pentagon, etc
	d	Auto-LISP Programs for elements geometric shapes such as circle in rectangle, triangle in rectangle, etc.
	e	Auto-LISP Programs for simple machine elements. (Nut, Bolt, Stud, Flange, etc)
	f	Auto-LISP Programs for simple machine elements. (Nut, Bolt, Stud, Flange, etc)
	g	Auto-LISP Programs for simple machine elements (Nut, Bolt, Stud, Flange, etc)

Course Objectives:

This course includes design and drafting related to mechanical elements. This lab related to elementary level knowledge of drafting and Auto-LISP program. Sketching and computer aided design tools are used to create the various types of views needed for design and documentation.

Course Outcomes: Upon successful completion of these practical the student will be able to

1. Demonstrate and understand the basic concepts of geometric modeling and computer graphics.
2. Design and Drafting of mechanical elements.
3. Programs for mechanical elements in Auto-LISP.

Assignment:

1. Two assignments on AutoCAD (preferably latest version).
2. Two assignments on Auto LISP (such as Design and drafting of any mechanical component through Auto LISP)

REFERENCES:

1. AutoCAD reference manual
2. Auto-LISP Developer's Guide
3. George Omura, ABCs of Auto LISP, BPB. Publication
4. H.G. Phakatkar, Engineering Graphics, Nirali publication

Course Outline

Transport Management and Safety Regulation **TMSR**

Course Title | Short Title | Course Code:

Branch - Automobile Engineering **Year – Third Year**

Course Description: This course introduces undergraduate students to imparting knowledge of central motor vehicle act, taxation, insurance, fleet management, garage layouts, and safety aspects on the road. The course aims provide knowledge of the basic transport management which is automotive engineer must take into consideration.

Course Objectives

1. To provide students with an overall understanding of the reasons for people and goods movement, patterns of travel and to gain knowledge of the evolution of transport technologies, and their feature that fulfil the desire for travel. To obtain an understanding of the techniques and theories of studying traffic flow and transport demand and supply.
2. Manage the organization, personnel, and operational requirements for a successful transportation/distribution department.
3. The administration of a business concern or public undertaking. Management includes the actions of planning, organizing, directing, coordinating, controlling and evaluating the use of people, money, materials and facilities to accomplish missions and tasks.

Course Outcome

At the end of the course the students are able to

1. Have a critical understanding of current developments in transport and logistics systems.
2. Demonstrate critical awareness of the strategic significance of Transport and Logistics systems.
3. Be able to understand the transport and logistics theoretical frameworks.
4. Be capable of interpretation, and critical analysis of transport and logistics strategies.
5. Be able to using current theories, and reflect on their work experience to produce better transport and logistics performance.
6. Be able to find, collate, synthesize and interpret literature in areas of transport and logistics research in a cohesive and analytical fashion.

Teaching Scheme:

	Hours Per Week	No. of Weeks	Total Hours	Semester Credits
Lectures	3	14	40	3
Tutorials	--	--	--	--

Examination scheme:

End semester scheme (ESE)	80 marks	Duration: 03 Hrs.
Internal Sessional Examination (ISE)	20 marks	

Purpose of Course: Degree Requirement

Prerequisite Course(s): Fundamental knowledge about Transport Management and Safety Regulations.

Outline of Content: This course contains:

UNIT-I

1.	**Motor Vehicle Act-1989** **No. of Lectures - 8 Marks : 16**	
	a	Short Titles and definitions laws governing use of motor vehicle & vehicle transport.
	b	Licensing of drivers and conductor, Registration of vehicle, state and interstate permits.
	c	Taxation structure and methods of laving taxation, insurance type and significance.
	d	Furnishing particulars of vehicles involved in accident, award of claim tribunal.
	e	Duty of driver & conductor in case of accident, traffic rules, signals and controls, accidents causes and analysis.
	f	Liabilities and preventive measures, Design of road complex , Responsibility of driver , Public authorities, offences, penalties and procedures.
	g	Different types of forms, Government administration structure, personnel authorities and duties.

UNIT-II

2.		**No. of Lectures - 8 Marks : 16**
	a	**Transport terminology -** Important terms used in road transport organization like HMV , LMV, Fleet utilization , breakdown rate, accident rate, route, seat km etc.
	b	**Cost of Services-** Capital cost & operating cost, fixed cost & variable cost, direct & indirect cost, excess capacity and effect on route
	c	**Operational productivity and efficiency** Productivity in road transportation organization, the environment of road transport system, Optimizing fleet and vehicle utilization, conservation of fuel and economy, control of breakdown, effective traffic operation

UNIT-III

3.		**No. of Lectures - 8 Marks : 16**
	a	**Infrastructure in road transportation organization** Garages, essential requirements of garages, fleet maintenance record , bus station , bus shelter, bus stop, essential requirement, staffing, management of transport organization and its of objectives, Typical depot layout structure of passages and goods transport organization
	b	**Motor industry** Manufacturing techniques and quality control of automobile components such as piston, cylinder, valves, crankshaft, camshaft, bearing.

UNIT-IV

4.		**No. of Lectures - 8 Marks : 16**
	a	**Significance of Road Transportations** Road transportation as an agent of change and development ,National scene, transport policy and co-ordination, operating characteristic s in transportation, engineering flexibility ,speed and acceleration, dependability and safety performance criteria
	b	**Transport planning** Strategic planning, management control, operational control

UNIT-V

5.		**No. of Lectures - 8 Marks : 16**
	a	**Road safety and Health** Driving comfort, avoiding fatigue, the road to exhaustation, poisonous car fumes, car sickness, drugs & driving first aid for motorist, first aid kits, braking & stopping interpreting the signs ,rain, floods, hot, mistcare &precaution , ice snow skidding, emergencies & road observations.
	b	**Accidents** Definition of accident, legal obligation, causes ofaccident, Insurance, Documantation, Analysis & preventions of accidents, Road Safety & Drivers Role , a defensive driver, driver selection test, Drivers training.
	c	**Security Devices** Dog Restraint, Rear fog lamp, guard lamp, reversing light, bonet, brakes locks, vibrator alarm, fog lamp, Toe bar, Rouf racks, Luggage containers.

References

1 Goverment Publication, The Motor vehicle Act, 1989.

2 Kadiyali.L.R., Traffic engineering and Transport Planning.

3 3 P.G.Patankar, “Road passenger Transport in India”, C.I.T.T. Publication

4 Santosh Sharma, “Productivity In Road Transportation”A.S.R.T.V.Publication

5 Compendum of Transport Terms- C.I.R.T.Pune

COURSE CONTENT

Industrial Training / EDP / Special Study — Course Title
IT/EDP/SS — Short Title Course Code

Semester-V
Total Semester Credits: 02

Examination Scheme
Internal Continuous Assessment (ICA): 25 Marks

Industrial Training

- Student shall undergo industrial training for a minimum period **of two weeks** during summer vacations between fourth semester and fifth semester.
- The industry in which industrial training is taken should be a medium or large scale industry
- The paper bound report on training must be submitted by the student in the beginning of Fifth semester along with a certificate from the company where the student took training.
- Every student should write the report separately.
- Institute / Department/T&P Cell have to assist the students for finding Industries for the training.
- Students must take prior permission from Department before joining for Industrial Training.

OR

EDP (Entrepreneurship Development Program)

- Student has to participate in Entrepreneurship Development Program for a minimum period of **One week** during summer vacations between fourth semester and fifth semester.
- Every student must submit the paper bound report based on the program in the beginning of Fifth semester along with a certificate (Course / Program completion) from the program organizers.
- Every student should write the report separately.
- Institute / Department may arrange Entrepreneurship Development Program at their campus.
- Students must take prior permission from Department before attending any Entrepreneurship Development Program.

OR

Special Study

- Student has to submit name of three topics of his interest to the department.
- Special study in a group shall not be allowed.
- The three-member committee appointed by Head of Department shall allot one topic out of the three topics submitted by the student.
- Every student must submit the paper bound report based on special study at the end of Firth semester.

- Department should allot guide to all such students, for monitoring their progress and guide them for literature survey / report writing etc.
- Evaluation of special study shall be done based on presentation made by student, followed by brief question answer session.

Evaluation of Industrial Training / EDP / Special Study

ICA: The Internal Continuous Assessment shall be based on the active participation of the students in the training / EDP / Special study and based on knowledge / skill acquired by the student. The three-member committee appointed by Head of Department shall assess the reports and award marks based on following:

(a) Report		10 marks.
(b) Presentation		10 marks.
(c) Viva-voce at the time of presentation		05 marks.
	Total:	**25 marks.**

Course Outline

Autotronics **Atrx**

Course Title Short Title Course Code:

Branch - Automobile Engineering **Year – Third Year**

- **Course Description:** This course introduces undergraduate students to imparting knowledge of Autotronics. The course aims provide combined knowledge of electrical, electronic and mechanical systems those are used in automobile subsystems, which the automotive engineer must take into consideration.

Course Objectives

4. To study the electronics system used in automobile.
5. Autotronics is involves the study of mechanics, electronics, control engineering and computing to generate new ways of designing and producing new, high performance machines and products

Course Outcome

At the end of the course the students are able to

1. It will provide Interest towards the automation.
2. Study about the electronics used in automobile.

Teaching Scheme:

	Hours Per Week	No. of Weeks	Total Hours	Semester Credits
Lectures	3	14	40	3
Tutorials	--	--	--	--

Examination scheme:

End semester scheme (ESE)	80 marks	Duration: 03 Hrs.
Internal Sessional Examination (ISE)	20 marks	

Purpose of Course: Degree Requirement

Prerequisite Course(s): Fundamental knowledge about Electrical engineering, electronics engineering and mechanical engineering.

Outline of Content: This course contains:

UNIT-I

1.	**Autotronics and Sensors in Automobiles**	**No. of Lectures - 8** **Marks : 16**
	a	Measurement systems: Basic Principles of transductions related to Resistive, Capacitive, Inductive, Piezoelectric, Thermoelectric and Photovoltaic.
	b	Stages of measurement, static characteristics of instruments, and commonly used automobile and electronics components.
	c	Electromagnetic Sensors, Optical Sensor, Temperature Sensor, Manifold Absolute Pressure Sensor, Knock Sensor, Throttle position sensor, Exhaust Gas Sensors, Air flow measurement

UNIT-II

2.	**Vehicle Management System**	**No. of Lectures - 8** **Marks : 16**
	a	ABS system, its need, layout and working.
	b	Electronic control of suspension – Damping control, Electric power steering.
	c	Supplementary Restraint System of air bag system – crash sensor, seat belt tightening.
	d	Cruise control, Vehicle security systems alarms, vehicle tracking system.
	e	Collision avoidance, Radar warning system.
	f	Introduction to Global Positioning Systems, Electronic Stability control system.

UNIT-III

3.	**SI Engine Management**	**No. of Lectures – 8** **Marks : 16**
	a	Feedback carburetor system, throttle body injection and multi point fuel injection system, injection system controls.
	b	Advantage of electronic ignition systems, three way catalytic converter,

		conversion efficiency versus lambda.
	c	Layout and working of SI engine management systems like Bosch Monojetronic, L-Jetronic and LHJetronic.
	d	Group and sequential injection techniques. Working of the fuel system components. Advantages of electronic ignition systems.
	e	Types of solid state ignition systems and their principle of operation.

UNIT-IV

4.	**CI Engine Management** **No. of Lectures - 8** **Marks : 16**	
	a	Fuel injection system, parameters affecting combustion,
	b	Noise and emissions in CI engines.
	c	Pilot, main, advanced, post injection and retarded post injection.
	d	Electronically controlled Unit Injection system. Layout of the common rail fuel injection system.
	e	Working of components like fuel injector, fuel pump, rail pressure limiter, flow limiter,
	f	EGR valve control in electronically controlled systems.

UNIT-V

5.	**Automotive Electrical** **No. of Lectures - 8** **Marks : 16**	
	a	D.C. generator and alternator.
	b	Regulation for charging.
	c	Lighting design
	d	Dashboard instruments
	e	Horn, warning system, wiring,
	f	Safety devices and testing equipment.

References

1 Diesel Engine Management by Robert Bosch, SAE Publications, 3rd Edition, 2004

2 Gasoline Engine Management by Robert Bosch, SAE Publications, 2nd Edition,

3 William Harry Crouse, “Automotive Electronics and Electrical Equipment”, Edition 10, Gregg Division, McGraw-Hill, 1986, ISBN 0070148953, 9780070148956

4 William Harry Crouse, Donald L. Anglin, “Automotive Tune up”, Automotive Technology Series, Publisher McGraw-Hill Gregg Division, 1977, ISBN 0070148104, 9780070148109

5 Ken Layne, “Automobile Electronics and Basic Electrical Systems”, Volume 1, Wiley, 1989 ISBN 0471617636, 9780471617631

Course Outline

Automobile Systems **AS**

Course Title Short Title Course Code

Branch - Automobile Engineering **Year – Third Year**

Course Description: This course introduces undergraduate students to imparting knowledge of various automobile systems like starting, ignition & steering. The course aims provide knowledge of the basic structural layouts, electrical & air-conditioning operations of a vehicle which the automotive engineer must take into consideration.

Course Objectives

6. To provide a basic knowledge regarding the various systems of automobile.
7. To introduce about the components of various systems.

Course Outcome

At the end of the course the students are able to

3. Understand the various systems with their applications.
4. Understand the working of automobile systems.

Teaching Scheme:

	Hours Per Week	No. of Weeks	Total Hours	Semester Credits
Lectures	3	14	40	3
Tutorials	--	--	--	--

Examination scheme:

End semester scheme (ESE)	80 marks	Duration: 03 Hrs.
Internal Sessional Examination (ISE)	20 marks	

Purpose of Course: Degree Requirement

Prerequisite Course(s): Fundamental knowledge about automobile engineering.

Outline of Content: This course contains:

UNIT-I

1.		**No. of Lectures - 8 Marks : 16**
	Vehicle layouts and specification	
	a	Vehicle specification, vehicle layouts, types of vehicles and their applications,
	b	Two and four wheelers, cars, Light commercial vehicles, Trucks, buses, earth moving machinery, high way vehicles, agricultural tractors,
	c	Construction of automobile and various systems Of automobiles
	Chassis and frames	
	d	Frame, sub frame, integral construction, frame alignment.
	e	Body bumpers, doors, hood, articulated vehicles, trailers and safety consideration.

UNIT-II

2.	**Battery**	**No. of Lectures - 8 Marks : 16**
	a	Introduction, Principles of battery operation, battery construction.
	b	Recharging of battery, Battery rating, battery capacity andbatteryefficiency.
	c	Checking specificgravityof battery,batterytest.
	d	Battery charging, battery failure and battery troubles shooting.

UNIT-III

3.		**No. of Lectures - 8 Marks : 16**
	a	**Ignition systems** Conventional Ignition systems: Function, typesof Ignition systems, components, Battery Ignition systems, Magneto Ignition systems, Testing of Ignition circuits, Ignition systems trouble shooting.
	b	**Electronic Ignition systems** Introduction, principles of Electronic Ignition systems, pulse generator, distributor less ignition system.
	c	**Starting systems:** Starting motors, starting devices, bendix drive, overrunning clutch drive, starting motor switch and control switch, starting system troubleshooting.

UNIT-IV

4.	**Design of Gears**	**No. of Lectures - 8 Marks : 16**
	Wheels , Tyres, and Tubes	
	a	Construction and types of wheels, wheel dimensions.
	b	Types of tyres, tyre property , tyre material, consideration in trade design, wheels and tyre trouble shooting, retrading of tyres, Tubes, Natural Rubber sand butyl flops.
	c	Rims,types,andmaintenance.
	a	Construction and types of wheels, wheel dimensions.
	Front axle and steering	

	d	Introduction, front axle, factors of wheel alignment, steering geometry.
	e	Steering mechanisms, cornering force, understeer and oversteer, steering linkages, steering gears, steering ratio.
	f	Special steering colums, power steering, advanced steering systems.

UNIT-V

5.	**Air conditioning systems**	**No. of Lectures - 8 Marks : 16**
	a	Definition of basic terms of psychometry such as DBT, WBT, RH, etc. Human comfort conditions.
	b	Temperature control system, Insulation methods in auto air conditioner, Study of typical auto air conditioner, location of window air conditioner.
	c	Study of typical air conditioner systems, various parts of systems, compressor performance and its effect on overall engine performance.

References

1 Dr. Kripal Singh," Automobile Engineering" vol-I&II

2 R.B. Gupta, "Automobile Engineering" ;Satya prakashan, New Delhi

3 Newton, steed and Garret, "Motor vehicle", Butterworth, London

4 Narang G. B. S, "Automobile Engineering", Khanna publication, New Delhi

5 A.W. Judge ," Modern Transmission" Chapmen and Hall std 1989

6 Nakara C. P., "Basic Automobile Engineering", Dhanpat Rai Publishing co.

Course Outline

Metrology and Quality Control **MQC**
Course Title: Short Title Course Code

Branch – Mechanical/Automobile Engineering **Year**
Third Year

Course Description: This course introduces undergraduate students to Metrology and Quality Control. The background required includes a sound knowledge to Measurements, (calculus), applied thermodynamics, Industrial management at second year level.

Course Objective: The course aims at imparting knowledge of metrology and quality control. The course aims at to familiarize to understand the principles metrology of screw threads, gear measurement, study of measuring machines, recent trends in engineering metrology. To learn to use standard practices and standard data, learn to use statistical concept, control chart for variables, control chart for attributes, acceptance sampling

Teaching Scheme

	Hours Per Week	**No. of Week**	**Total Hours**	**Semester Credits**
Lecture	03	14	42	3
Practical	02	14	28	

Examination scheme:
End semester exam (ESE) 80 Marks Duration: 03 hours
Internal Sectional exam (ISE) 20 Marks
Internal Continues Assessment (ICA) 25 Marks
End Semester Exam (ESE) 25 Marks
Practical Examination

Purpose of Course: Degree Requirement

1.	**Metrology**	**No. of Lectures – 08, Marks: 16**
	a	Definition: Measurement, precision, accuracy, sensitivity, Classification of method of measurement
	b	Linear Measurement:-Standards, line standards, end standards, classification of standards, precision measurement, precision measuring instruments and their characteristics, slip gauge
	c	Straightness, flatness and squareness:-Surface plates, measurement of straightness, flatness testing, squareness testing, roundness testing, machine tool metrology, Measurement by light wave interference:- Basic principle, sources of light, optical flats, fringe patterns and their interpretation, testing of flat, convex and concave and irregular surface, checking of slip gauges.

UNIT:-II

2.	Design of gauges &Metrology	No. of Lectures – 08, Marks: 16
	a	Design of gauges:- Types of gauges, limits, fits, tolerences, Taylor's principle
	b	Comparators:-Characteristics, application, types, construction and working of different mechanical, optical, electrical, pneumatic comparators
	c	Angle measurement:-Sine bars, Sine centers, Use of sine bar, angle gauges, autocollimator angle dekkor, constant deviation prism, Measurement of surface finish:-Types of Surface texure, elements of surface texture, measuring surface finish by stylus probe, Tomlinson & Taly-surf

UNIT: - III

3.	Metrology of Screw thread, Gear & recent trend in metrology. No. of Lectures – 08, Marks: 16	
	a	Metrology of screw threads:-Terminology, errors and their effects, thread gauges, measurement of elements of external and internal threads, Gear measurement:-calipers measurements, involute testing, roller measurements, tool makers microscope, profile projectors
	b	Study of measuring machines:-Universal measuring machine, coordinate measuring machine, Errors in CMM, electronic inspection and measuring machine, Recent trend in engineering metrology:-precision instrument based on laser, probes, telemetric systems, Isometric viewing of surface defects, Machine vision

UNIT:-IV

4.	Quality control	No. of Lectures – 08, Marks: 16
	a	Introduction to quality :- factors controlling quality of design and conformance, balance between cost of quality and value of quality, Introduction to quality tools: Demings PDCA,PDSA cycles & Juran triology approach, Seven quality tools, Pareto analysis, cause &effect diagram, brainstorming, concurrent engineering
	b	Total quality management:, zero defect concept 5S,Kaizen,Kanban,,Poka yoke, TPM ,ISO 9000&TQM, Quality assurance ;-QFD, difference between inspection, quality control and quality assurance, quality survey

UNIT: - V

5.	Statistical Quality Control	No. of Lectures – 08, Marks: 16
	a	Statistic concept:-Concept of variation, variable & attribute data, the frequency distribution, quantitative description of distribution, normal curve, concept of six sigma, Control chart for variables:-definition of control chart, objective of control chart chart, R chart, Problems on X & R chart
	b	Control chart for attributes:-practical limitations of the control charts for variables charting chart chart, Problems on P & C chart
	c	Acceptance sampling:-Sampling inspection Vs hundred percent inspection, basic concept of sampling inspection, OC Curve, conflicting interests of consumer and producer, producer's and consumer's risk, AQL LTPD, Sampling plans

Recommended Books :

[1] R.K.Jain: Engineering Metrology: Khanna Publishers.
[2] Handbook to industrial metrology: ASTME: Printice Hall Pub
[3] G.M.Juran: Handbook of quality control, McGraw Hill Pub.
[4] M.Mahajan: Statistical quality control
[5] K.C.Jain:TQM & ISO 9000;Khanna publishers
[6] I.C.Gupta: A textbook of Engg Metrology: Khanna Publishers.
[7] M.Mahajan : A textbook of metrology :Dhanpat rai & co.

Lab - Course Outline

Metrology and Quality Control	**MQC**	
Course Title	Short Title	Course Code
Branch- Mechanical/Automobile Engineering	**Year**	**Third Year**

Course Description:
This lab includes performance practical and study practical related to metrology and quality control

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Evaluation Scheme:

Internal Continuous Assessment (ICA) 25 Marks

End Semester Exam (ESE) (Oral) 25Marks
Prerequisite Course(s): General mathematics, 11t^{h} Physics & 12th physics
Outline of content:

This practical contains following experiments

1 Determination of linear/angular dimensions of part using precision & non precision instrument.

2 Machine tool alignment tests on any machine tool like Lathe,Drilling,Milling.

3 Interferometer-Study of surfaces using optical flat.

4 Surface finish measurement.

5 Measurement of roundness/circularity using mechanical comparator.

6 Measurement of screw parameters

7 Measurement of Gear parameters i) gear tooth thickness ii)constant chord iii)PCD

8Study and applications of tool makers microscope

9 Use of profile projector

10 Study and use of control charts

Note: Any EIGHT practical from Mechanical Measurement and Metrology Lab shall be conducted during 14 weeks available during semester.

ESE (Practical Examination)
• The Practical Examination will comprise of performing the experiment and viva on the practical's.

Lab - Course Outline

COMPUTER PROGRAMMING IN C / C++ **C/C++**

Course Title Short title Course code

Branch - Mechanical / Automobile Engineering **Year – Third Year**

Course Description:

This course provides students with a comprehensive study of the C /C++ programming language. Introduction to program design and problem solving using the C /C++ programming language. Programming topics include control structures, functions, arrays, pointers, and file I/O.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Prerequisite Course(s): Algebra and Trigonometry

Outline of Content: This course contains

a) One assignment on introduction to computer

b) To develop and Run "C/C++" programs for machine elements like

(Any two on C and two on C++)

a) Design of knuckle joint or turnbuckle joint

b) Design of power screw

c) Design of helical spring

d) Design of splines

e) Design of muff coupling

f) Theories of failure etc.

Recommended Books:

1) Balgurusamy, "Programming in C" Tata McGraw Hill Publication Co. Ltd.

2) Y. Kanitkar, "Let us C" BPB Publications.

3) M. P. Grover and Zimmer, "CAD/CAM" PHI Pvt. Ltd.

4) Shigley J.E. and Mischke C.R. "Mechanical Engineering Design" McGraw Hill Publication Co. Ltd.

5) Spotts M.F. and Shoup T.E. "Design of Machine Elements" Prentice Hall International.

6) Bhandari V.B. “Design of Machine Elements” Tata McGraw Hill Publication Co. Ltd.

7) Balgurusamy, “Object Oriented Programming with C++” Tata McGraw Hill, New Delhi

8) Ravi Chandran, “Programming in C++” Tata McGraw Hill Publication Co. Ltd.

Course Outline

Project and Business Management **PBM**

Course Title Short title Course Code

Branch: Mechanical /Automobile Engineering **Year** **Third Year**

Course Description: This course introduces undergraduate students to imparting knowledge of project & business management. The background required a sound knowledge of network technique, organization structure, Financial and material management.

Course Objectives

1. To provide about project and its management.
2. To develop knowledge about organization and impart knowledge about functioning of management.
3. To develop knowledge about financial management techniques.

Course Outcome

At the end of the course the students are able to-

1. Develop knowledge of project management and statistical tools used in its.
2. Helped to understand the various functions of management along with its types.
3. Develop knowledge about Capital cost and cost control.

Teaching Scheme

	Hrs per week	No. of weeks	Total hour	Semester Credits
Lecture	03	14	40	03

Examination Scheme:

End semester scheme(ESE)	**80 marks**	**Duration : 03 Hrs.**
Internal Sessional Examination (ISE)	**20 marks**	

Purpose of Course: Degree Requirement

Prerequisite Courses: Fundamental knowledge about the mathematics.

Outline of the content: This course contains:

Unit- I

1.	Title: **Project Management**	**No. of Lecture:08 ,Marks: 16**
	a	Introduction to project management, Concept of project management, Managerial function at different organizational levels, Types of projects,
	b	Project identification, scheduling, Monitoring, Control, Basic tool & techniques for projects scheduling Bar chart, Project life cycle curves, Line balancing, Problems on Line balancing.

Unit- II

2.	Title: **Project statistic technique**	**No. of Lecture:08 ,Marks: 16**
	a	Introduction of Network technique, Fundamental concept and network models, construction of network diagrams,
	b	Application of network analysis, definition of PERT and CPM, comparison between CPM and PERT, Critical path method with problem, programme evaluation and review techniques with problem, time cost problem (crash) with PERT.

Unit- III

3	**Business management**	**No. of Lecture:08 ,Marks: 16**
	a	Introduction to management, Concept of management, The function of management, importance of management Forms of business organsation, Concept of Ownership Organization, Types of ownership, Individual Ownership, Partnership organization, joint stock companies, types of stock companies,
	b	Co-operative Organisations, various types of co-operative societies, Public sector organization,State ownership, public cooperation, choice of form of organisation, comparative evaluation of different forms of business ownership.

Unit- IV

4.	Title: **Financial Management**	**No. of Lecture:08 ,Marks: 16**
	a	Introduction, Definition of financial management, functions of financial management, Sources of Funds, Capital, classification of capital, working capital, need for working capital, assessment of working capital, Factors affecting working capital, Sources of finance (Shares, debentures, loans from banks, trade credit public deposits financial institutions).
	b	Cost and cost control: Elements of cost, direct cost, indirect cost, variable and fixed cost, cost control technique, marginal costing, break even analysis.

Unit- V

5	Title: **Material & Purchase Management** **No. of Lecture:08 ,Marks: 16**	
	a	Scope of material management, function of material management, objectives of scientific purchasing, functions of purchase department, , 5R's Of Buying, Methods of buying, source selection (vendor),vendor rating, just in time purchasing
	b	Inventory management, Objective of inventory management, types of inventory, selective inventory technique (ABC,VED), Inventory model (Economic lot size with fixed price, EOQ with quantity discount).

References:

1) L.C.Jhamb ,"Production(Operation)Management", Everest publishing house
2) Chary," Theory And Problems in Production and Operations Management",2nd Reprint, Tata McGraw Hill Publishing Co. New Delhi., 1996.
3) Nair,N.G.,"Production & Operations Management",Tata McGraw Hill Publishing Co. New Delhi.,1997.
4) Chadra Presanna,"Fundamentals of Financial Management" Tata McGraw Hill New Delhi.,1994.
5) Kolter Philip,"Marketing Management",Prentice-hall of India,1988.
6) Vyuptakesh Sharan.,"Fundamental of Financial Management", Pearson Education
7) Martand telsang,"industiral engineering and production management",1st Edition reprint 2013- S.chand & company ltd. New Delhi.2013
8) S.M.Inamdar, "Cost and Management Acounting"
9) M.K.Khan &P.K.Jain,"Financial Management", Tata McGraw Hill Publishing Co. New Delhi.
10) J.P.Bose, S.Talukdar, "Business Management", New Central Agencies (P) Ltd.

COURSE CONTENT

Minor Project **MIP**
Course Title Short Title Course Code

Semester-VI

Laboratory	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	2	**10**	**20**	**2**

Examination Scheme **Internal Continuous Assessment (ICA): 50 Marks**

- Every student shall undertake the Minor Project in semester VI.
- Each student shall work on an approved project, a group of **05 students (maximum)** shall be allotted for the each minor project.
- Minor project may involve fabrication, design or investigation of a technical problem that may take design, experimental or analytical character or combine element of these areas. The project work shall involve sufficient work so that students get acquainted with different aspects of fabrication, design or analysis.
- Each student is required to maintain separate log book for documenting various activities of minor project.
- The three-member committee appointed by Head of the department shall be constituted for finalizing the topics of minor project. Maximum four minor project groups shall be assigned to one teaching staff.
- Assessment of the project for award of ICA marks shall be done jointly by the guide and departmental committee as per the guidelines given in **Table-A.**
- Before the end of semester, student shall deliver a seminar and submit the seminar report (paper bound copy)in following format:
    - Size of report shall be of minimum 25 pages.
    - Student should preferably refer minimum five reference books / magazines/standard research papers.
    - Format of report
        - Introduction.
        - Literature survey.
        - Theory (Implementation, Methodology, Applications, Advantages, Disadvantages. etc)
        - Future scope.
        - Conclusion.

Assessment of Minor Project

Name of the Project: _____

Name of the Guide: _____

Table-A

SN	Exam Seat No	Name of Student	Project Selection	Documentation	Design /Simulation/Logic	PCB/hardware/programming	Result Verification	Presentation	Total
			5	10	10	10	10	5	50

COURSE CONTENT

Seminar-I **S-I**

Course Title Short Title Course Code

Semester-VI

Laboratory	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	2	**10**	**20**	**2**

Examination Scheme **Internal Continuous Assessment (ICA): 25 Marks**

1. For Seminar-I every student will individually study a topic assigned to him / her and submit a report and shall deliver a short lecture / Seminar on the topic during the term.
2. The three-member committee appointed by Head of the department shall be constituted for finalizing the topics of Seminar-I. Seminar shall be related state of the art topic of his choice approved by the committee.
3. Seminar topic should not be repeated and registration of the same shall be done on first come first serve basis.
4. Topic of Seminar shall be registered within a two week from commencement of VI Semester and shall be approved by the committee.
5. Maximum six seminar supervision shall be allotted to each teacher.
6. Before the end of semester, student shall deliver a seminar and submit the seminar report (paper bound copy).

ASSESSMENT OF SEMINAR-I

Assessment of the Seminar-I for award of ICA marks shall be done by the guide and a departmental committee jointly, as per the guidelines given in **Table- B**

Title of Seminar: _____

Name of Guide: _____

Table-B

SN	Exam Seat No	Name of Student	Topic Selection	Literature survey	Report writing	Depth of understanding	Presentation	Total
			5	5	5	5	5	25

NORTH MAHARASHTRA UNIVERSITY, JALGAON (M.S.)

Syllabus for

Final Year Mechanical Engineering

Faculty of Engineering and Technology

Course Outline

SEMESTER – VII and VIII

W.E.F 2015 – 2016

North Maharashtra University, Jalgaon
Syllabus Structure for Final Year Mechanical Engineering w.e.f year 2015-16
Semester –VII

Course Code	Name of the Course	Group	Teaching Scheme				Evaluation Scheme				Total	Credits
							Theory		Practical			
			Theory Hrs /week	Tutorial Hrs /week	Practical Hrs /week	Total	ISE	ESE	ICA	ESE		
	Refrigeration and Air Conditioning	D	3	---	---	3	20	80	---	---	100	3
	Computer Aided Design and Computer Aided Manufacturing	D	3	---	---	3	20	80	---	---	100	3
	Interdisciplinary Elective	E	3	---	---	3	20	80	---	---	100	3
	Elective-I	E	3	---	---	3	20	80	---	---	100	3
	Operation Research	D	3	---	---	3	20	80	---	---	100	3
	CAD/CAM	D	---	---	2	2	---	---	25	25	50	1
	RAC	D	---	---	2	2	---	---	25	25 PR	50	1
	Elective-I	E	---	---	2	2	---	---	25	25	50	1
	Project–I	D	---	---	2	2	---	---	25	25	50	2
	Seminar-II	D	---	---	2	2	---	---	25	---	25	2
	Industrial Visit	D	---	---	---	---	---	---	25	---	25	1
	Total		15	---	10	25	100	400	150	100	750	23

ISE: Internal Sessional Examination ESE: End Semester Examination ICA: Internal Continuous Assessment

	Interdisciplinary Elective		**Elective – I**
1	Operation Research Techniques	1	Mechatronics
2	Energy Resources and Technology	2	Advanced Machine Design
		3	Machine Tool Design
		4	Automobile Engineering – I

North Maharashtra University, Jalgaon
Syllabus Structure For Final Year Electrical Engineering w.e.f year 2015-16
Semester –VIII

Course Code	Name of the Course	Group	Teaching Scheme				Evaluation Scheme				Total	Credits
							Theory		Practical			
			Theory Hrs /week	Tutorial Hrs /week	Practical Hrs /week	Total	ISE	ESE	ICA	ESE		
	Mechanical Vibration	D	3	---	---	3	20	80	---	---	100	3
	Finite Element Analysis and Simulation Techniques	D	3	---	---	3	20	80	---	---	100	3
	Elective-II	E	3	---	---	3	20	80	---	---	100	3
	Elective-III	E	3	---	---	3	20	80	---	---	100	3
	Mechanical Vibration	D	---	---	2	2	---	---	25	25	50	1
	Finite Element Analysis and Simulation Techniques	D	---	---	2	2	---	---	25	25 PR	50	1
	Elective-II	D	---	---	2	2	---	---	25	25	50	1
	Industrial Lecture*	E	---	---	1*	1	---	---	50	---	50	2
	Project–II	D	---	---	4	4	---	---	75	75	150	6
	Total		12	---	11	23	80	320	200	150	750	23

ISE: Internal Sessional Examination ESE: End Semester Examination ICA: Internal Continuous Assessment

	Elective-II		**Elective – III**
1	Tribology	1	Introduction to Robotics
2	Power Plant Engineering	2	Advanced Welding Technology
3	Process Equipment Design	3	Energy Conservation and Management
		4	Automobile Engineering – II
		5	Thermal Equipment design

Course Outline

Refrigeration and Air Conditioning **RAC**

Course Title: Short Title Course Code

Branch- Mechanical Engineering **Year–Fourth Year**

Course Description: This course Familiarize under graduate students with the terminologies associated with refrigeration & air conditioning, basic principles of psychrometry and applied psychometrics, refrigerants; vapor compression refrigeration and multi-stage vapor compression systems, components of vapor compression systems and other types of cooling systems.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lectures	03	14	42	03
Practical	02	14	28	01

Examination scheme:

End semester exam (ESE) 80 Marks Duration: 03 hours

Internal Sessional exam (ISE) 20 Marks

Purpose of Course: Degree Requirement

Prerequisite Course(s): Fundamental knowledge of Engineering Thermodynamics, Applied Thermodynamic, and Heat Transfer

Outline of Content: This course contains:

UNIT-I

1.	**Refrigeration systems**	**No. of Lectures –9, Marks : 16**
	a	Introduction, standard rating of refrigerating machine, coefficient of performance of refrigerator and heat pump.
	b	Reversed Carnot cycle and its limitations, reversed Brayton cycle, application to air craft refrigeration, Bootstrap refrigeration cycle, reduced ambient air cooling system, regenerative air cycle system.
	c	Designation of refrigerant, selection of refrigerant, chemical, physical and thermodynamic requirements of refrigerants, lubricant in refrigerating system, secondary refrigerant, azeotropes and its uses.

UNIT-II

2.	Vapour compression refrigeration system	No. of Lectures–9, Marks : 16
	a	Vapour compression refrigeration system study of theoretical and actual vapour compression cycle, use of p-h & T-s charts, effect of evaporator and condenser pressure and temperature on the performance of the refrigeration cycle, effect of sub cooling and super heating.
	b	Compound vapour compression system with inter cooling, flash chamber, multi compressor and multi evaporators systems.
	c	Cascade refrigeration system, production of dry ice.

UNIT - III

3.	Vapour absorption refrigeration systems	No. of Lectures–8, Marks : 16
	a	Vapour absorption refrigeration simple & modified vapour absorption refrigeration systems, Electrolux refrigerator.
	b	Desirable properties of soIVent, absorbent & refrigerant combinations, aqua ammonia & lithium bromide refrigeration system use of enthalpy concentration charts.

UNIT - IV

4.	Basic of Psychometric	No. of Lectures –8, Marks : 16
	a	Psychometric- properties of moist air, psychometric chart and process, mixing of air stream, bypass factor, sensible heat factor, room sensible heat factor, Gross sensible heat factor, humidifying efficiency, air washer.
	b	Study of various types of psychometers, sling, aspirating, and industrial type.

UNIT-V

5.	Air Conditioning System	No. of Lectures –8, Marks : 16
	a	Introduction to industrial and comfort air conditioning, human requirements of comfort, effective temperature and comfort chart.
	b	Air conditioning load calculations, inside and outside design conditions, Building cooling & heating load calculation, Effective sensible heat factor advanced psychrometry.
	c	Window and central air conditioning systems year round air conditioning.

Text Book and Reference Books

1. Arora C. P., "Refrigeration and air conditioning", TMH, New Delhi.
2. Monohar Prasad, "Refrigeration and air conditioning", New Age Publishers, New Delhi.
3. Ananthnarayanan, "Basics of Refrigeration", TMH, and New Delhi.
4. Stocker W. F. and Jones, "Refrigeration and air conditioning", McGraw Hill.
5. Dossat, "Principles of Refrigeration", John Wiley Inc.
6. Arora and Domkundawar, "Refrigeration and air conditioning", Dhanpatrai and sons, New Delhi.
7. Faye C McQuistom, "Heating Ventilatgingnad Air conditioning", Wiley India Pvt. Ltd. New Delhi

Course Outline

Computer Aided Design and Computer Aided Manufacturing CAD/CAM

Course Title: Short Title Course Code

Branch- Mechanical Engineering Year–Fourth Year

Course Description: The course presents the elements of solid modeling, creation of parts of increasing complexity and the assembly of parts to form a final design, along with mechanism simulation. The operation and programming of CNC machines is covered.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lectures	03	14	42	03
Practical	02	14	28	01

Examination scheme:

End semester exam (ESE) 80 Marks Duration: 03 hours

Internal Sessional exam (ISE) 20 Marks

Purpose of Course: Degree Requirement

Prerequisite Course(s): Fundamental knowledge about the Design and Automation of Manufacturing Process, Strength of Materials, Engineering Mechanics, etc

Outline of Content: This course contains:

UNIT-I

1.	**Introduction To CAD/CAM And Networking No. of Lectures–9, Marks : 16**	
	a	Define CAD/CAM, Product Life Cycle & CAD/CAM, and Application of Computers for Design Process, Selection of a CAD system, Desirable relationship of CAD/CAM database, Benefits & Application of CAD.
	b	Hardware in CAD, Introduction, The Design Work Station, The graphics terminal, Operator input/output devices,
	c	Computer communication, Principle of networking, Classification of network, Transmission media & interface, LAN system.

UNIT - II

2.	Computer Aided Graphics No. of Lectures –9, Marks : 16	
	a	Introduction, Graphic Primitives, Point plotting, Drawing of lines, Co ordinate system used in graphic element, Transformation in graphics,
	b	2D transformation, Homogeneous transformation, Concatenate co ordinate transformation, Translation, Rotation, Scaling, Mirror, Reflection, Inverse co ordinate transformation, clipping,
	c	3D transformation, View Port, Windowing, Standardization in graphics IGES files.

UNIT - III

3.	Computer Aided Modeling & Automation No. of Lectures–8, Marks : 16	
	a	Requirement of Geometric Modeling, Geometric Model, Geometric Model Construction Method: Wire Frame Modeling, Surface Modeling, Solid Modeling, Representation of Curve & Surfaces, Design of curve shape, Cubic Spline, Bezier curve, B-spline curve
	b	AUTOMATION: Concept of Automation, Types of Automation, Advantages & limitations of Automation, Levels of Automation, Advanced Automation Function.

UNIT - IV

4.	Computer Aided Manufacturing No. of Lectures –8, Marks : 16	
	a	INDUSTRIAL CONTROL SYSTEM Continuous control system, Discrete control system, Computer process control, Forms of CPC, Computer process Monitoring, Direct Digital Control, Numerical Control & Robotics, Programmable logic controller, Supervisory control, Distributed Control & Personnel Computers
	b	CNC PROGRAMMING Axis of CNC Machines, Manual Part Programming using G and M codes Adoptable to Fanuc Controller for Lathe.

UNIT-V

5.	Introduction to FMS, GT and Robotics No. of Lectures–8, Marks : 16	
	a	FMS – Introduction, Components of FMS, Types of FMS, Application & Benefits, Planning & implementation issue, Typical FMS layout.
	b	GT – Part families, Part classification & coding, optic coding system, Multiclass coding system, Application of GT.
	c	Robotics – Robot Anatomy, Robot Control System, End effectors, Sensors, Industrial Robot, Application and its selection.

Text Book and Reference Books

Text Book and References Books

1. Ibrahim Zeid and R. Sivasubramanian - CAD/CAM – Theory and Practice Tata McGraw Hill Publishing Co. 2009
2. Ibraim Zeid, "Mastering CAD/CAM" – Tata McGraw Hill Publishing Co. 2000

3. Chandrupatla T.R. And Belegunda A.D. -Introduction to Finite Elements in Engineering" -Prentice Hall India
4. Segerling L.J. - Applied Finite Elements Analysis" John Wiley and Sons.
5. Rao P.N., Introduction to CAD/CAM Tata McGraw Hill Publishing Co.
6. Groover M.P.-Automation, production systems and computer integrated manufacturing" -Prentice Hall of India
7. Yoram Koren - Robotics McGraw Hill Publishing Co.
8. James G. Keramas, Robot Technology Fundamentals, Delmar Publishers.
9. S.R.Deb, Robotics Technology and Flexible Automation, Tata McGraw Hill.
10. Lakshiminarayana H. V. Finite Element Analysis (Procedures in Engineering), University Press, 2004.
11. Chandrupatla T. R., Finite Element Analysis for Engineering and Technology, University Press, 2009.
12. Seshu P. Text book of Finite Element Analysis, PHI Learning Private Ltd. New Delhi, 2010.
13. P. Radhkrishnan, S. Subramanyam, V. Raju ,"CAD/CAM/CIM" , New Age Publication.
14. Mikell P. Grover, Emory W. Zimmers ,"Computer Aided Design and Manufacturing", P.H.I.
15. Zeid ,"CAD/CAM" ,T.M.H.
16. B.S.Pabla, M.Adithan ,"CNC Machine ", New Age International(P) Ltd.
17. Rao, Tiwari, Kundra ,"Computer Aided Manufacturing" ,T.M.H.
18. CAD/CAM & AUTOMATION by FarazdakHaidri

Interdisciplinary Elective
Course Outline

Operation Research Techniques **ORT**

Course Title: Short Title Course Code

Branch- Mechanical Engineering **Year–Fourth Year**

Course Description: This course introduces under graduate students to imparting knowledge of various decision making techniques.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lectures	03	14	42	03

Examination scheme:

End semester exam (ESE) 80 Marks Duration: 03 hours

Internal Sessional exam (ISE) 20 Marks

Purpose of Course: Degree Requirement

Prerequisite Course(s): Fundamental knowledge about mathematics & statics.

Outline of Content: This course contains:

UNIT-I

1.	**Linear Programming No. of Lectures –9, Marks : 16**	
	a	**Operation Research – An Introductions** The history of OR, Definition, Features, of OR, models and modeling in OR, OR approach to problem soIVing, methods for soIVing OR models, phases of OR, Advantages of OR study, Shortcomings of OR approach, OR Models in Practice, Applications of OR.
	b	**Linear Programming**- Introduction, general Stricture of LP model, Assumption of an LP model, Advantages and Limitations of Linear programming, Applications areas of LP, steps of LP Model formulation, Graphical solution methods of LP problem, maximization, minimization, feasible, infeasible and unbounded solution.

UNIT - II

2.	**Linear Programming No. of Lectures –9, Marks : 16**	
	a	Linear programming – The simplex method Introduction, standard form of an LP problem, simplex algorithm (maximization, minimization case) Degeneracy in simplex problem, unbounded Infeasible solution.
	b	Duality in Linear programming, formulation of dual LPP, Advantages of duality, rules for constructing the Dual from primal, sensitivity Analysis in LP

UNIT - III

3.	Transportation Theory No. of Lectures –8, Marks : 16	
	a	Transportation problem introduction, mathematical model of transportation problem, Algorithm, methods for finding initial solution northwest corner method ,Least cost method, vogels Approximation method, test for optimality steps of MODI method, maximization problem, unbalanced, degeneracy, prohibited transportation Routes problem.
	b	Assignment problem- introduction, mathematical models of assignment problem, solution method of assignment problem, Hungarian method, maximization case, unbalanced Restrictions on assignment, travelling salesman, problem

UNIT - IV

4.	Decision Making Theory No. of Lectures –8, Marks : 16	
	a	Decision Theory- Introduction, steps in decision making process types of decision making Environments, Decision tree
	b	Theory of games- introduction ,Two person Zero sum game, pure strategies, maximin, minimax principles, game with saddle point, mixed strategy games, The principles of dominance ,games without saddle point,algebraic method, arithmetic method, sub game method, Graphical method.

UNIT-V

5.	Sequencing No. of Lectures –8, Marks : 16	
	a	Replacement and maintenance method- Introduction, types of failure- gradual failure ,sudden failure Replacement of items whose efficiency deteriorates with time, Replacement of items that completely fail, individual replacement policy, Group replacement policy, staffing problem ,failure trees.
	b	Sequencing problem- Introduction notations, Terminology, and assumptions of sequencing problem, Processing n jobs through two machines, Processing n jobs through three machines, Processing n jobs through four machines, Processing n jobs through five machines

Text Book and Reference Books

1. Hira , Gupta ,"Operation Research
2. Taha ,"Operation Research"
3. S.D. Sharma, "Operation Research", Khanna Publication
4. Manohar Mahajan, "Operation Research.
5. J. K. Sharma ,"Operation Research, Problem and Solution" , Macmillan
6. N. D. Vohra ,"Quantitative Techniques in Management" ,TATA McGraw Hill
7. Ravindran," Operation Research Principles and Practice ",Wiley India Pvt.Ltd. New Delhi

Interdisciplinary Elective

Course Outline

Energy Resources and Technology **ERT**

Course Title: Short Title Course Code

Branch- Mechanical Engineering **Year–Fourth Year**

Course Description: This course provides an introduction to energy systems, renewable energy resources, with a scientific examination of the energy field and an emphasis on alternate energy sources and their technological applications. The course will explore society's present needs and future energy demands and also focus on renewable energy sources and technological aspects of solar, biomass, wind power, geothermal, and nuclear energy conservation methods.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lectures	03	14	42	03

Examination scheme:

End semester exam (ESE) 80 Marks Duration: 03 hours

Internal Sessional exam (ISE) 20 Marks

Purpose of Course: Degree Requirement

Prerequisite Course(s): Fundamental knowledge of Thermodynamics.

Outline of Content: This course contains:

UNIT-I

1.	**Energy Overview and Thermal Power Plants**	**No. of Lectures–9, Marks : 16**
	A	Energy Overview: Basics of energy – Types of energy and its utilization – Energy Characteristics – Energy Measures – global energy scenario – India energy scenario – Types of energy and its utilization, Environmental aspects of energy utilization – Public health issues related to environmental Pollution
	B	Overview of Thermal Power Plants, Types of fuels – Coal quality, By products of combustion, Thermal power plant cycle, General layout of modern thermal power plants, Environmental aspects of thermal power plants

UNIT - II

2.	Solar Photovoltaic Energy Conversion No. of Lectures–9, Marks : 16	
	a	Photovoltaic Conversion, Silicon Solar Cells, Photovoltaic Modules, Module efficiency, PV panels and arrays, Solar Photovoltaic Systems(SPS), Solar PV lighting systems, PV Lanterns, Solar water Pumping, PV Roof top technology, Life cycle cost estimates.

UNIT - III

3.	Solar Thermal Energy Conversion No. of Lectures –8, Marks : 16	
	a	Liquid Plat Plate collectors, transmissivity, heat losses and heat loss coefficients, thermal analysis, Concentrating collectors, types, performance analysis of cylindrical parabolic collector.
	b	Solar water heating system, solar cookers, Solar Distillation, Solar Cooling, Solar Ponds, Solar power plants, Concentrated Solar Power Plants.

UNIT - IV

4.	Wind and Nuclear Energy Conversion No. of Lectures–8, Marks : 16	
	a	Wind Energy Conversion-Principles of wind energy conversion, Site selection considerations, Wind, Power plant design, Types of wind power conversion systems, Operation, maintenance and economics.
	b	Nuclear Energy Conversion - Chemical and nuclear equations, Nuclear reactions, Fission and fusion , Energy from fission and fuel burn-up , Radioactivity , Neutron energies , Fission reactor types ,Nuclear power plants , Fast breeder reactor and power plants , Production of nuclear fuels.

UNIT-V

5.	Biomass, Geothermal and Ocean Thermal Energy Conversion No. of Lectures –8, Marks : 16	
	A	Energy from biomass - Sources of biomass ,Different species, Conversion of biomass into fuels, Energy through fermentation, Pyrolysis, gasification and combustion, Aerobic and anaerobic bio-conversion, Properties of biomass, Biogas plants, Types of plants, Design and operation, Properties and characteristics of biogas.
	B	Geothermal energy – Availability, system development and limitations Ocean thermal energy conversion – Wave and tidal energy – Scope and economics

Text Book and Reference Books

1. K.M. Mittal: Non-conventional Energy Systems-Principles, Progress and Prospects, Wheeler Publications, 1997.
2. Kothari: Renewable Energy Sources and Emerging Technologies, PHI, Eastern Economy Edition, 2012
3. G.N. Tiwari: Solar Energy-Fundamentals, Design, Modelling and Applications, Narosa Publishers, 2002.
4. M.M. E1- Wakil; Power Plant Technology, McGraw Hill, 1985.
5. M.M. E1-Wakil: Nuclear Power Engineering, McGraw Hill, 1962.
6. Mukherjee and Chakrabarti, Fundamentals of Renewable Energy systems, New age International Publishers, 2004.
7. S.P. Sukhatme, Solar Energy: Principles of Thermal Collection and Storage,Tata McGraw Hill,2003.

Elective-I

Course Outline

Mechatronics **MTX**

Course Title: Short Title Course Code

Branch- Mechanical Engineering **Year–Fourth Year**

Course Description: This course introduces to graduate students the basic mechatronics system components, and the design principles of using mechatronics to meet functionality requirements of products, processes and systems.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lectures	03	14	42	03
Practical	02	14	28	01

Examination scheme:

End semester exam (ESE) 80 Marks Duration: 03 hours

Internal Sessional exam (ISE) 20 Marks

Prerequisite Course(s): Fundamental knowledge of Electrical and Electronic systems and Drives.

Outline of Content: This course contains:

UNIT-I

1.	**Introduction to Mechatronics system**	**No. of Lectures–9, Marks : 16**
	a	Mechatronics system, Modeling and Design, Design concept evolution, Application areas.
	b	Dynamic Models, Model types, Model Development, Lumped model of a distributed system, Kinetic energy equivalence, Natural frequency equivalence, Analogies to mechanical, electrical, thermal and fluid elements

UNIT - II

2.	**Component Interconnection and Signal Conditioning**	**No. of Lectures –9, Marks : 16**
	a	Introduction to Basic components, need of interconnections, impedance characteristics, resistance, inductors, capacitors, amplifiers.
	b	Introduction to Analog and digital filters, Analog to Digital and Digital to Analog converters, Bridge circuits (Wheatstone, Maxwell), Signal Analyzers and Display devices.

UNIT - III

3.	Sensors and Transducers	No. of Lectures –8, Marks : 16
	a	Motion transducers, potentiometer, variable inductance transducers, Permanent magnet transducers, variable capacitance transducers, Piezoelectric Sensors, Effort Sensors, strain gauges, torque sensors, tactile
	b	Optical sensor and Lasers, Thermo-Fluid Sensors, shaft encoders, optical encoders, Digital tachometer, Hall effect Sensors, Linear encoders, Digital resolvers

UNIT - IV

4.	Electrical Actuators	No. of Lectures –8, Marks : 16
	a	Stepper motors, construction and Principle of operation, torque motion characteristics, damping, control, selection and applications of stepper motors
	b	D.C. motors, construction and operations, static torque characteristic, brushless D. C. Motors, control and selection of D.C. Motor
	C	Induction Motors, construction, working, characteristic, torque speed relationship, Consecution, working and control of synchronous motors.

UNIT-V

5.	Mechanical Actuators	No. of Lectures –8, Marks : 16
	a	Linear Actuators, Hydraulic and Pneumatic actuators, components of Hydraulic control system
	b	Pumps, motors, valves, feedback control, constant flow systems, pump controlled hydraulic actuators, pneumatic control system, Flapper valves, and hydraulic circuits.

Text Book and Reference Books

1. Clarence W de SiIva, Mechatronics: An Integrated Approach, CRC Press ISBN 0849312744
2. W Bolton, Mechatronics: A multi-disciplinary approach, Fourth edition, Pearson education ISBN 9788131732533.
3. Boucher, T. O., Computer automation in manufacturing - an Introduction, Chapman and Hall, 1996.
4. HMT ltd. Mechatronics, Tata McGraw-Hill, New Delhi, 1988.
5. Deb, S. R., Robotics technology and flexible automation, Tata McGraw-Hill, New Delhi, 1994.
6. Bolton, W., Mechatronics: electronic control systems in mechanical and electrical engineering, Longman, Singapore, 1999.

Elective-I

Course Outline

Advanced Machine Design **AMD**

Course Title: Short Title Course Code

Branch- Mechanical Engineering **Year–Fourth Year**

Course Description: This course provides a broad treatment of stress, strain, and strength with reference to engineering design and analysis. Major emphasis is placed on the analytical and experimental methods of determination of stresses in relationship to the strength properties of machine elements under various loading conditions. Also considered are deflection, post-yield behavior, residual stresses, thermal stresses, creep, and extreme temperature effects as applied to the design of fasteners, shafts, power trains, and rotational machinery.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lectures	03	14	42	03
Practical	02	14	28	01

Examination scheme:

End semester exam (ESE) 80 Marks Duration: 03 hours

Internal Sessional exam (ISE) 20 Marks

Purpose of Course: Degree Requirement

Prerequisite Course(s): Fundamental knowledge of Theory of Machine, Machine Design.

Outline of Content: This course contains:

UNIT-I

1.	**CAMS**	**No. of Lectures –9, Marks : 16**
	a	Advanced curves: 2-3 polynomial, 3-4-5 polynomial, 4-5-6-7 polynomial & higher order polynomial.
	b	Polydyne cams: 3-4-5 cam, cycloidal cam.
	c	Pressure angle, radius of curvature, force on follower and cam, cam design with elasticity of part is considered, ramps.

UNIT - II

2.	Springs	No. of Lectures –9, Marks : 16
	a	Helical springs under static and fatigue or variable loading, buckling of helical compression spring, vibration and surging of helical springs, Optimum design of helical spring.
	b	Design analysis of Belleville springs, ring spring, volute spring, rubber springs and mountings.

UNIT - III

3.	Design Against Fatigue	No. of Lectures –8, Marks : 16
	a	Fatigue Damage theories, Cycle counting Techniques, Stress based fatigue Analysis & design: one dimensional analysis, multiaxial analysis, and Cumulative damage.
	b	Strain based fatigue Analysis & design: one dimensional analysis, multiaxial analysis .Surface integrity & fatigue life improvement.

UNIT - IV

4.	System Approach	No. of Lectures –8, Marks : 16
	a	Introduction, System approach to design mathematical model, Dynamic response to a distributed system, Dynamic response to a lumped system
	b	Modeling the elasticity's, Modeling the masses, Modeling the inertia, Modeling friction and damping
	C	Mathematical model for shock analysis, Cam system, Value engineering approach to design problem.

UNIT-V

5.	Optimum Design	No. of Lectures –8, Marks : 16
	a	Introduction to optimum design, Adequate design, Johnson's method of optimum design.
	b	Case of normal specifications, Case of redundant specifications, Case of incompatible specifications.

Text Book and Reference Books

1. Dr. Rajendra Karwa ," A text book of Machine Design", Laxmi Publications (P) Ltd, New Delhi.
2. J. Uicker, "Theory of Machines and Mechanism", 3ed., Oxford University Press, New Delhi.
3. FarazdakHaideri ," Machine Design", Nirali Prakashan.
4. M.F. Spotts," Design of Machine Elements", Pearson Education.
5. N. C. Pandya ," Element of Machine Design", Charotar book stall, Anand.
6. Norton ," Dynamics of Machinery", Tata Mc-Graw Hill, New Delhi.
7. P. C. Sharma ,"Machine Design", S K Katuria & Sons.
8. R. S. Khurmi ," A text book of Machine Design", Eurasis Publishing House Pvt. Ltd, Delhi.
9. R. B. Patil ,"Design of Machine Elements", Tech- Max Publications, Pune

Elective-I

Course Outline

Machine Tool Design **MTD**

Course Title: Short Title Course Code

Branch- Mechanical Engineering **Year–Fourth Year**

Course Description: The course aim of imparting the knowledge of Machine tool Design the background required include a knowledge of Mathematics, Engineering materials, Theory of Machines, Engineering Mechanics.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lectures	03	14	42	03
Practical	02	14	28	01

Examination scheme:

End semester exam (ESE) 80 Marks Duration: 03 hours

Internal Sessional exam (ISE) 20 Marks

Purpose of Course: Degree Requirement

Prerequisite Course(s): Fundamental knowledge of Workshop Practice, Manufacturing Process.

Outline of Content: This course contains:

UNIT-I

1.	**Principles of Machine Tool Design and Drives**	**No. of Lectures–9, Marks : 16**
	a	Introduction – Machine tools, classification. Working and auxiliary motion in machine tools.
	b	Mechanical and Hydraulic transmission elements.
	c	Devices for Intermittent motion. Reversing and differential mechanism.
	d	General requirement of machine tool design. Engineering Design process applied to machine tools.
	e	Machine tool drive – Types of speed and feed regulation, classification of speed and feed boxes.
	f	Design of speed box - Stepped regulation of speed, selection of range ratio, geometric progression, structural diagram.
	g	Design of feed box in details.
	h	Development of gearing diagram.

UNIT - II

2.	Design of machine tool structure	No. of Lectures–9, Marks : 16
	a	Function of machine tool, structure and their requirements, design criteria for machine tool structure.
	b	Materials and its properties, dynamic and static stiffness.
	c	Profile of machine tool structure, factors affecting on the stiffness of machine tool structures.
	d	Basic design procedure machine tool structure.
	e	Design of beds and columns.
	f	Design of Housing, Design of bases and tables.
	g	Design of Cross rails, arms, saddle and carriages.
	h	Design of Rams.

UNIT - III

3.	Design of Guide ways and power Screws	No. of Lectures–8, Marks : 16
	a	Function and types of Guide ways, types of slide ways and types of anti friction ways.
	b	Design of slide ways – Shapes, materials, method of adjusting clearance in slide ways.
	c	Design criteria and calculation for slide ways – (i) for wear (ii) for stiffness
	d	Guide ways operating under liquid friction conditions – (i) hydrodynamic slide ways (ii) Hydrostatic slide ways
	e	Design of Aerostatic and anti-friction guide ways.
	f	Combination guide ways and protecting devices for slide ways.
	g	Design of Power screw – (i) Design of sliding friction power screw
	h	(ii) Design of rolling friction power screw.

UNIT - IV

4.	Design of Spindles and Spindle supports.	No. of Lectures–8, Marks :
	a	Function of spindle unit and requirement, material of spindle
	b	Effect of machine tool compliance on machinery accuracy.
	c	Design calculation of spindles – Deflection of spindle axes due to bending and compliance of spindle support. Optimum spacing between spindle support.
	d	Deflection due to compliance of tapered joint permissible deflection and design for stiffness.
	e	Anti-friction bearings and sliding bearings.
	f	Dynamics of machine tools – Forced vibration in machine tools.

	g	Dynamic characteristics of machine elements
	h	Stability analysis – Static and dynamic cutting processes, characteristics. Regenerative chatter.

UNIT-V

5.	**Control System in Machine tools and Industrial Robots. No. of Lectures–8, Marks : 16**	
	a	Function, requirements and classification, control system for changing speeds and feed with simple centralized control
	b	Control system for changing speeds and feed with pre-selective control Control system for changing speeds and feed with Selective control
	c	Control system for executing and forming auxiliary motion. Manual control system.
	d	Automatic control system and adaptive control system.
	e	Industrial robot and its application.- Introduction and basic function of robotic elements, mobility of robot.
	f	Reliability in operation and various control system in robots.
	g	Robot language – Robot language outline, general description of programming language. Real time, geometric modeling, movements.
	h	Sensors, tools, programming ARL, HARL, AL, VAL, AML, IRL, LM and MCL.

Text Book and Reference Books

1. D. K Pal, S. K. Basu, "Design of Machine Tool", 4th Edition. Oxford IBH 2005, ISBN 81-204-0968.
2. F. Koenigsberger, "Design Principles of Metal Cutting Machine Tools", The Macmillan Company New York 1964.
3. Bhattacharya and S. G. Sen., "Principles of Machine Tool", New central book agency Calcutta, ISBN 81-7381-1555.
4. N. S. Acherkan, "Machine Tool", Vol. I, II, III and IV, MIR publications.
5. N.K. Mehta, "Machine Tool Design", Tata McGraw Hill, ISBN 0-07-451775-9.
6. DR. V. P. Singh, "Mechanical Vibration", S. Chand &Sons., New Delhi.

Elective-I

Course Outline

Automobile Engineering I **AE-I**

Course Title: Short Title Course Code

Branch- Mechanical Engineering **Year–Fourth Year**

Course Description: The course aim of imparting the knowledge of different parts uses in automobile, the background required include knowledge of Engineering materials, IC engine.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lectures	03	14	42	03
Practical	02	14	28	01

Examination scheme:

End semester exam (ESE) 80 Marks Duration: 03 hours

Internal Sessional exam (ISE) 20 Marks

Purpose of Course: Degree Requirement

Prerequisite Course(s): Fundamental knowledge of IC engine, Theory of Machine.

Outline of Content: This course contains:

UNIT-I

1.	**Introduction to Automobile No. of Lectures –9, Marks : 16**	
	a	Introduction to Automobile, History of Automobile, Types of Automobile, Automobile Industry
	b	Special Purpose Vehicle, Chassis, Classification of Chassis, Integral and Chassis less Construction
	c	Frame, Function s of the frame, Types of the Frame, Defects in Frame, Sub Frame, Body
	d	Introduction to Safety System, Seat Belt System, Power Seats, Air Bag System, Electric Mirrors, Central Locking and Electric Window, Electric Horns, Windscreen Wiper System, Analog and Digital Speedometer

UNIT - II

2.	Automobile Suspension	No. of Lectures –9, Marks : 16
	a	Introduction, Function of Suspension system, Requirements of a Suspension System, Torque Rod
	b	Stabilizer Bar, Air Suspension, Hydraulic Suspension
	c	Types of Suspension Spring, Plastic springs for motor cars, Shackle, Shock Absorber
	d	Front Axle Suspension System, Rear Suspension System, Spring and Suspension trouble shooting chart

UNIT - III

3.	Automobile Steering	No. of Lectures –8, Marks : 16
	a	Introduction, Principle of Correct Steering, Requirements of steering system, Steering system functions
	b	General arrangement of steering system, Steering gears and linkages
	c	Power steering, Reversible and irreversible steering, Factor Affecting under-steering and over-steering
	d	Steering Gear, Steering gear ratio, Turning radius, Wheel alignment, Caster and Camber angle, Toe-in Toe-out, Steering Trouble and Causes, Factor Affecting the Steering Operation

UNIT - IV

4.	Automobile Wheels, Tyres and Tubes	No. of Lectures–8, Marks :
	a	Introduction, Wheel Assembly, Wheel and Tyre Sizes, Types of wheels, Wheels balance, Rims
	b	Tyres, Types of tyres, Tyres Construction and Constituents, Tyres thread Patterns, Load Ratings
	c	Tyres Selections and Tyre Properties, Tyres Pressure and wear, Causes of Tyre Wear, Tyre size, Tyres maintenance, Factors increase life of tyres
	d	Tubes , Types of Tubes, Wheels and tyre troubles

UNIT-V

5.	Automobile Transmission (Gear Box & Clutch)	No. of Lectures–8, Marks : 16
	a	Introduction, Purpose of Transmission, Types of Transmission, Gear-boxes with different speed gear, Three speed and Four speed Gear-box, Gear shifting, Gear box troubles Lubrication of gear box
	b	Introduction., Clutch and its functions, Principles of Operations, Requirement of Clutch, Main Parts of clutch, Types of friction materials, Properties of good clutch lining, Types of clutches, Clutch Maintenance, Clutch troubles and their causes Factors Affecting the Power Transmitted by the Clutch, Propeller Shaft, Universal Joint, Rear Axle

Text Book and Reference Books

1. Automobile Engineering Vol. 1 & 2 by Dr. Kripal Singh, (Standard Publishers Distributors)
2. A textbook of Automobile Engineering I & II by P. S. Gill, (S. K. Kataria& Son's).
3. Automobile Engineering by R. B. Gupta, (SatyaPrakashan).
4. Automobile Engineering by Dr. V. M. Domkundwar, (DhanpatRai&Company).
5. A textbook of Automobile Engineering by R. K. Rajput, (Laxmi Publication Pvt. Ltd.).
6. Automobile Engineering by K. M. Moeed, (S. K. Kataria& Son's).
7. Automobile Engineering by Dr. A. K. Basu, (S. Chand Company Pvt. Ltd.).

Course Outline

Operation Research **OR**

Course Title: Short Title Course Code

Branch- Mechanical Engineering **Year–Fourth Year**

Course Description: This course introduces under graduate students to imparting knowledge of various decision making techniques.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lectures	03	14	42	03

Examination scheme:

End semester exam (ESE) 80 Marks Duration: 03 hours

Internal Sessional exam (ISE) 20 Marks

Purpose of Course: Degree Requirement

Prerequisite Course(s): Fundamental knowledge about mathematics & statics.

Outline of Content: This course contains:

UNIT-I

1.	**Linear Programming**	**No. of Lectures –9, Marks : 16**
	a	**Operation Research – An Introductions** The history of OR, Definition, Features, of OR, models and modeling in OR, OR approach to problem solving, methods for solving OR models, phases of OR, Advantages of OR study, Shortcomings of OR approach, OR Models in Practice, Applications of OR.
	b	**Linear Programming**- Applications and model formulation, Introduction, general Stricture of LP model, Assumption of an LP model, Advantages and Limitations of Linear programming, Applications areas of LP, steps of LP Model formulation, Graphical solution methods of LP problem, maximization, minimization, feasible, infeasible and unbounded solution.

UNIT - II

2.	Linear Programming	No. of Lectures –9, Marks : 16
	a	Linear programming – The simplex method Introduction, standard form of an LP problem, simplex algorithm (maximization, minimisation case) Degeneracy in simplex problem, unbounded Infeasible solution.
	b	Duality in Linear programming, formulation of dual LPP, Advantages of duality, rules for constructing the Dual from primal, sensitivity Analysis in LP

UNIT - III

3.	Transportation Theory	No. of Lectures –8, Marks : 16
	a	Transportation problem introduction, mathematical model of transportation problem, Algorithm, methods for finding initial solution northwest corner method ,Least cost method, vogels Approximation method, test for optimality steps of MODI method, maximization problem, unbalanced, degeneracy, prohibited transportation Routes problem.
	b	Assignment problem- introduction, mathematical models of assignment problem, solution method of assignment problem, Hungarian method, maximization case, unbalanced Restrictions on assignment, travelling salesman, problem

UNIT - IV

4.	Decision Making Theory	No. of Lectures –8, Marks : 16
	a	Decision Theory- Introduction, steps in decision making process types of decision making Environments, Decision tree
	b	Theory of games- introduction ,Two person Zero sum game, pure strategies, maximin, minimax principles, game with saddle point, mixed strategy games, The principles of dominance ,games without saddle point,algebraic method, arithmetic method, sub game method, Graphical method.

UNIT-V

5.	Sequencing	No. of Lectures –8, Marks : 16
	a	Replacement and maintenance method- Introduction, types of failure- gradual failure ,sudden failure Replacement of items whose efficiency deteriorates with time, Replacement of items that completely fail, individual replacement policy, Group replacement policy, staffing problem ,failure trees.
	b	Sequencing problem- Introduction notations, Terminology, and assumptions of sequencing problem, Processing n jobs through two machines, Processing n jobs through three machines, Processing n jobs through four machines, Processing n jobs through five machines

Text Book and Reference Books

1. L.C. Jhamb ,"Quantities Techniques" Vol I and II, Everest Publication
2. Hira , Gupta ,"Operation Research
3. Taha ,"Operation Research".
4. S.D. Sharma, "Operation Research", Khanna Publication.
5. ManoharMahajan, "Operation Research.
6. J. K. Sharma ,"Operation Research, Problem and Solution" , Macmillan
7. N. D. Vohra ,"Quantitative Techniques in Management" ,TATA McGraw Hill.
8. Ravindran," Operation Research Principles and Practice ",Wiley India Pvt. Ltd. New Delhi

Lab Course Outline

Computer Aided Design & Computer Aided Manufacturing CAD/CAM LAB

Course Title : Short Title Course Code

Branch- Mechanical Engineering Year–Fourth Year

Course Description: The course presents the elements of solid modeling, creation of parts of increasing complexity and the assembly of parts to form a final design, along with mechanism simulation.

Teaching Scheme:

	Hours Per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Evaluation scheme:

Internal Continuous Assessment (ICA) 25Marks 50Marks

End Semester exam (ESE) (OR) 25Marks

Prerequisite Course(s): Basic knowledge about of Engineering Drawing, Computer Graphics, SOM, Design & Manufacturing.

Outline of Content: This course contains:

A. Introduction to Modeling (Using any CAD software).

1. 2D drawing using sketcher- 2 Drawings 2 Hrs.
2. 3D modeling using 3D features (Modeling of Screw jack, Brake Pedal, Clutch, Steering linkages, Carburetor, F.I.P., *any four components*)
3. Assembling and drafting (Any 2 above mentioned assemblies) with proper mating conditions and interference checking.
4. Surface Modeling (Any 2 of the above assemblies). 4 Hrs.

B. Computer Aided Manufacturing

1. Manual Part programming on CNC Lathe and CNC Milling to generate tool Path, NC Code and optimization of tool path (to reduce machining time) Using any cam software. 4 Hrs.

Note : Oral will be based on the prescribed term-work presented in the form of certified journal.

Lab Course Outline

Refrigeration and Air Conditioning **RAC LAB**

Course Title : Short Title Course Code

Branch- Mechanical Engineering **Year–Fourth Year**

Course Description: This course Familiarize under graduate students with the terminologies associated with refrigeration & air conditioning, basic principles of psychrometry and applied psychometrics, refrigerants; vapor compression refrigeration and multi-stage vapor compression systems, components of vapor compression systems and other types of cooling systems.

Teaching Scheme:

	Hours Per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Evaluation scheme:

Internal Continuous Assessment (ICA)	25Marks	50Marks
End Semester exam (ESE) (Practical)	25Marks	

Prerequisite Course(s): Basic knowledge of Engineering Thermodynamics, Applied Thermodynamic, and Heat Transfer.

Outline of Content: This course contains:

1.Trial on vapour compression refrigeration system.

2.Trial on ice plant/domestic refrigeration system.

3.Study and trial on vapour absorption refrigeration system.

4.Study and trial on window/central air conditioner.

5.Study and trial on heat pump test rig.

6.Study of construction of hermetically sealed compressor and actual viewing of a cut model of the same (reciprocating, rotary and car A/C compressor).

7.Study of evacuation and charging of refrigeration system.

8.Study and trial on cooling towers.

9.Study of expansion devices, solenoid vaIVe and safety devices used in vapor compression system.

10.Study of thermostat and humidistat, dryer, oil separator.

11.Study of measuring instruments and various tools used in refrigeration and air-conditioning systems.

12.Visit to cold storage/ice plant/ central air conditioning system.

13. Cooling load calculation of any laboratory / class room in the institute & suggest the requirement of Air conditioner unit in terms of capacity.

Note : Lab file should contain any eight experiments out of the above to be performed with minimum three trials.

ESE (Practical Examination)

ThePracticalExaminationwillcompriseofperformingtheexperimentandvivaonthe Practical's.

Instructions for practical Exam.:-

1.FourexperimentsshouldbeselectedforPracticalExamination.

2.TheNumberofStudentsforeachPracticalsetupshouldnotbemorethan5Students.

3.OralwillbebasedonthePracticalPerformedintheexaminationandtheexperimentsincludedintheJournal

Lab Course Outline
Elective- I

Course Title :	Short Title	Course Code
Mechatronics	**MTX LAB**	

Branch- Mechanical Engineering Year–Fourth Year

Course Description: This course introduces to graduate students the basic mechatronics system components, and the design principles of using mechatronics to meet functionality requirements of products, processes and systems.

Teaching Scheme:

	Hours Per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Evaluation scheme:

Internal Continuous Assessment (ICA)	25Marks	50Marks
End Semester exam (ESE) (OR)	25Marks	

Prerequisite Course(s): Basic knowledge of Electrical and Electronic systems and Drives.

Outline of Content: This course contains any five experiments and three assignments.

1) Study of Basic block diagram of mechatronics system components.
2) Study and demonstration of motion / force transducers.
3) Study and demonstration of temperature / pressure transducers.
4) Study and demonstration of AD / DA converter
5) Study and demonstration of hydraulic actuator / pneumatic actuator.
6) Study and demonstration of graphic / magnetic tape recorders.
7) Study of Microprocessors and Microcontrollers
8) Study of Robot / Autonomous guided vehicle

Note : Oral will be based on the prescribed certified journal.

Lab Course Outline
Elective- I

Course Title :	Short Title	Course Code
Advanced Machine Design	**AMD LAB**	

Branch- Mechanical Engineering Year–Fourth Year

Course Description: This course provides a broad treatment of stress, strain, and strength with reference to engineering design and analysis. It consist study of deflection, post-yield behavior, residual stresses, thermal stresses, creep, and extreme temperature effects as applied to the design of fasteners, shafts, and rotational machinery.

Teaching Scheme:

	Hours Per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Evaluation scheme:

Internal Continuous Assessment (ICA) 25Marks 50Marks

End Semester exam (ESE) (OR) 25Marks

Prerequisite Course(s): Fundamental knowledge of Theory of Machine, Machine Design.

Outline of Content: This course contains:

Term work shall consist of two assignments, two drawing sheets and two design software based problems based on above syllabus.

Lab Course Outline
Elective- I

Course Title :	Short Title	Course Code
Machine Tool Design	**MTD LAB**	

Branch- Mechanical Engineering Year–Fourth Year

Course Description: The course aim of imparting the knowledge of Machine tool Design the background required include a knowledge of Mathematics, Engineering materials, Theory of Machines, Engineering Mechanics.

Teaching Scheme:

	Hours Per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Evaluation scheme:

Internal Continuous Assessment (ICA) 25Marks 50Marks

End Semester exam (ESE) (OR) 25Marks

Prerequisite Course(s): Basic knowledge of Workshop Practice, Manufacturing Process, Gear Design.

Outline of Content: This course contains:

Term work shall consist of minimum five assignments and drawing sheet based on above syllabus covering all units.

Lab Course Outline
Elective- I

Course Title :	Short Title	Course Code
Automobile Engineering – I	**AE-I LAB**	

Branch- Mechanical Engineering Year- Fourth Year

Course Description: The course aim of imparting the knowledge of different parts uses in automobile, the background required include knowledge of Engineering materials, IC engine.

Teaching Scheme:

	Hours Per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Evaluation scheme:

Internal Continuous Assessment (ICA)	25Marks	50Marks
End Semester exam (ESE) (OR)	25Marks	

Prerequisite Course(s): Basic Knowledge of Engines, Working of Brakes and Clutches**.**

Outline of Content: This course contains:

1. Study of layout of a chassis and its different components of a vehicle.
2. To study model trends in automobile.
3. Study of trouble shooting in various suspension systems.
4. Study of trouble shooting in power steering.
5. Measurement of steering geometry angle for wheels alignment.
6. Study of impact on steering geometry angle of vehicle.
7. Study of different types of tyres, tubes and their defects.
8. Visit to wheel balancing and alignment center.

Term work consists of minimum six practical's from above list.

Course Title	Short Title	Course Code
Project-I	**P-I**	

Course Description:
The course explores the knowledge of design, experiment and analysis of data. The course develops ability to work on multidisciplinary teams, Identify, formulate, and soIVe engineering problems in view of economic, environmental and societal context.

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Laboratory	**2**	**14**	**28**	**2**

Prerequisite Course(s): Knowledge of science, mathematics, computer programming and core subject of engineering.
General Objectives: The objectives of project are to develop ability to work in group. The scope of work is design and conduct experiments, as well as to analyze and interpret data within realistic constrain such as economic, environmental, social, safety and manufacturability. The project work provides plate form for planning, material procurement, preparing specification and execution of work. The project also develop to work on multidisciplinary teams, communicate effectively and Knowledge of contemporary issues.
Course Outcomes:
Upon successful completion of this course the students will be able to:

1. Apply knowledge of mathematics, science, and engineering.
2. Design and conduct experiments, as well as to analyze and interpret data.
3. Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
4. Function on multidisciplinary teams, communicate effectively and Knowledge of contemporary issues.
5. Identify, formulate, and soIVe engineering problems by understanding professional and ethical responsibility.
6. Understand the impact of engineering solutions in a global, economic, environmental, and societal context.
7. Recognition of the need for, and an ability to engage in life-long learning.
8. Use the techniques, skills, modern engineering tools and software necessary for engineering practice.

Project-I

(Lab Course Contents)

Semester-VII **Examination Scheme:**

Teaching Scheme: **(ICA) Internal Continuous Assessment: 25 Marks**

Practical: 2 Hrs/Week **(ESE) End Semester Examination (OR): 25Marks**

- It is expected that the broad area of Project-I shall be finalized by the student in the beginning of the VII semester / extension of Minor project undertaken may be Project-I.
- A group of Minimum 3 and Maximum 5 students shall be allotted for Project-I and same project group for Project-II.
- Exhaustive survey of literature based on a clear definition of the scope and focus of the topic should be carried out by the students. The **Synopsis/Abstract** on the selected topic, after detail literature survey should be submitted to the Project coordinator appointed by Head of the department.
- Project-I may invoIVe literature survey, problem identification, work methodology preparing specification and material procurement, collection of data, conduction of experiments and analysis. The project work shall invoIVe sufficient work so that students get acquainted with different aspects of fabrication, design or analysis.
- Approximately more than 50% work should be completed by the end of VII semester.
- Each student group is required to maintain log book for documenting various activities of Project-I and submit group project report in the form of thermal bound at the end of semester –VII. Submit the progress report in following format:
    a. *Title*
    b. *Abstract*
    c. *Introduction*
    d. *Problem identification and project objectives*
    e. *Literature survey*
    f. *Case study/Analysis/Design Methodology*
    g. *Work to be completed (Progress status)*
    h. *Expected result and conclusion*
    i. *References.*

- Evaluation Committee comprising of the Guide, Project Coordinator and Expert appointed by the Head of the department will award the marks based on the work completed by the end of semester and the presentation based on the project work.

Guide lines for ICA : The Internal Continuous Assessment shall be based on the active participation of the students in the Project work and knowledge / skill acquired. Assessment of the project-I for award of ICA marks shall be done jointly by the guide and departmental committee as per the guidelines given in **Table-A.**

Guide lines for ESE: The End Semester Examination for Project shall consist of demonstration if any, presentation and oral examinations based on the project report**.**

Assessment of Project-I

Name of the Project: _____
Name of the Guide: _____

Table-A

SN	Name of Student	Problem Identification and project objectives	Literature Survey	Project Methodology/Design/PCB/ hardware/ simulation/ programming	Progress Status	Presentation	Total
		5	5	5	5	5	25

Course Title Short Title Course Code

Seminar-II

Course Description: The course explores the knowledge of presentation and effective communication. The course develops ability to work on multidisciplinary teams, Identify, formulate, and solve engineering problems in view of economic, environmental and societal context.

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Practical	**2**	**14**	**28**	**2**

Prerequisite Course(s): Knowledge of science, mathematics, computer programming and core subject of engineering.

General Objectives: The objectives of Seminar –II are to develop ability express our view, presentation and effective communication. The scope of seminar-II is study various national and international journal for design, experiments conduct, as well as to analyze and interpret data within realistic constrain such as economic, environmental, social, safety and manufacturability.

Course Outcomes:

Upon successful completion of this course the students will be able to:

1. Understand literature survey for selection of seminar topics.
2. Apply knowledge of mathematics, science, and engineering for effective presentation of selected topic.
3. Function on multidisciplinary teams, communicate effectively and Knowledge of contemporary issues.
4. Identify, formulate, and solve engineering problems by understanding professional and ethical responsibility.
5. Understand the impact of engineering solutions in a global, economic, environmental, and societal context.
6. Practice the use of various resources to locate and extract information using offline & online tools, journals.
7. Practice the preparation and presentation of scientific papers and seminars in an exhaustive manner.

Seminar-II

(Course Contents)

Semester-VII **Examination Scheme:**

Teaching Scheme: **(ICA) Internal Continuous Assessment: 25 Marks**

Practical: 2 Hrs/Week

1. Each Student shall select a topic for seminar which is not covered in curriculum. Seminar topic should not be repeated and registration of the same shall be done on first come first serve basis.
2. Topic of Seminar shall be registered within a three weeks from commencement of VII Semester and shall be approved by the committee.
3. The three-member committee appointed by Head of the department shall be constituted for finalizing the topics of Seminar-II. Seminar shall be related state of the art topic of his choice approved by the committee.
4. Each student should deliver a seminar in scheduled period (Specified in time table or time framed by department) and submit the seminar report (paper bound copy/Thermal bound)in following format:
    a. *Title*
    b. *Abstract*
    c. *Introduction*
    d. *Literature survey*
    e. *Concept*
    f. *Functional and Technical Details*
    g. *Applications*
    h. Comparison with similar topics / methods
    i. *Future scope*
    j. *References*

ASSESSMENT OF SEMINAR-II

Guide lines for ICA: ICA shall be based on topic selection, presentation and Seminar-II report submitted by the student in the form of thermal bound. Assessment of the Seminar-II for award of ICA marks shall be done jointly by the guide and a departmental committee, as per the guidelines given in **Table- B**

Name of Guide: _____

Table-B

SN	Name of Student	Seminar Topic	Topic Selection	Literature survey	Report writing	Depth of under-standing	Presentation	Total
			5	5	5	5	5	25

Course Title	Short Title	Course Code
Industrial Visit	**IV**	

Course Description: The course explores the knowledge industry organization, new trends in manufacturing, maintenance and safety. The industrial visit provides the practical visualization of theoretical study of various engineering subject.

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Practical	**-**	**-**	**-**	**1**

General Objectives: The main objective behind these visits is to explain the working of industrial equipments in running conditions to the students and tell them about the expectations of the industrialists from the fresh engineers.

Course Outcomes:

Upon successful completion of this course the students will be able to:

1. Understand organizational set up of an industry.
2. Develop our self for expectations of the industrialists from the fresh engineers.
3. Understand manufacturing, material handling, maintenance, safety standard and environmental consideration in industry.
4. Function on multidisciplinary teams, communicate effectively and Knowledge of contemporary issues.
5. Identify, formulate, and solve engineering problems by understanding professional and ethical responsibility.
6. Understand the impact of engineering solutions in a global, economic, environmental, and societal context.

Industrial Visit
(Course Contents)

Semester-VII **Examination Scheme:**
Teaching Scheme: **(ICA) Internal Continuous Assessment: 25 Marks**

1. Industry visits to minimum two industries shall be carried out by each student preferably or college shall arrange the industrial visit during the vacation period otherwise during the regular VII semester.
2. The student should obtain appropriate certificates of visit from the concerned organizations just after the visits.
3. Every Student should submit Industrial Visit report individually at the end of Semester-VII(First Term of Final Year)
4. The report(Thermal Bound) should contain information about the following points:
   a. *The organization - activities of organization and administrative setup technical personnel and their main duties.*
   b. *The project / industry brief description with sketches and salient technical information.*
   c. *The work / processes observed with specification of materials, products, equipments etc. and role of engineers in that organization.*
   d. *Suggestions (if any) for improvement in the working of those organizations.*
5. The evaluation of the report of technical visits will be made by panel of three teachers appointed by Head of the department based on following points:

Guide lines for ICA : ICA shall be based on knowledge gain by student and Industrial Visit Report submitted by the student in the form of Thermal bound. Assessment of the Industrial Visit for award of ICA marks shall be done jointly by industrial visit coordinators departmental committee based on viva - voce as per the guidelines given in **Table- C**

Table-C

SN	Name of Student	Name of Industry	Report writing	Depth of Under-standing	Total
			15	**10**	**25**

NORTH MAHARASHTRA UNIVERSITY,

JALGAON (M.S.)

Syllabus for

Final Year Mechanical Engineering

Faculty of Engineering and Technology

Course Outline

SEMESTER –VIII

W.E.F 2015 – 2016

Course Outline

Mechanical Vibration **MV**

Course Title: Short Title Course Code

Branch- Mechanical Engineering **Year–Fourth Year**

Course Description: This course introduces undergraduate students to Mechanical Vibration. The background required includes a sound knowledge of Mathematics (Calculus), Engineering Mechanics, Strength of materials and Theory of mechanics of second year and Third year Level. The course aims at imparting knowledge of Mechanical vibration.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lectures	03	14	42	03
Practical	02	14	28	01

Examination scheme:

End semester exam (ESE) 80 Marks Duration: 03 hours

Internal Sessional exam (ISE) 20 Marks

Purpose of Course: Degree Requirement

Prerequisite Course(s): Mathematics (Calculus) at First year level and strength of Materials, Theory of Machines at Second year Level.

Outline of Content: This course contains:

UNIT-I

1.		**Fundamental of Vibrations & Undamped Free Vibrations** **No. of Lectures– 9, Marks : 16**
	a	**Fundamental of Vibrations :-** Introduction, Definitions, Vector method of representing harmonic motions, Addition of two simple harmonic motions of the same frequency, Beat phenomenon.
	b	Complex method of representing harmonic vibrations, Work done by a harmonic force on a harmonic motion.
	c	**Undamped Free Vibrations of Single Degree of Freedom Systems**: - Introduction, Derivation of differential equation, Solution of differential equation, Torsional vibrations, Equivalent stiffness of spring combinations, Energy method.

UNIT-II

2.		**Damped Free &Forced Vibrations of Single Degree of Freedom Systems No. of Lectures– 9, Marks : 16**
	a	**Damped Free Vibrations of Single Degree of Freedom Systems: -** Introduction, Different types of dampings, Free vibrations with viscous damping, Logarithmic decrement.
	b	Viscous dampers, Dry friction or coulomb damping, Solid or structural damping, Slip or interfacial damping.
	c	**Forced Vibrations of Single Degree of Freedom Systems:-** Introduction, Forced vibrations with constant harmonic excitation, Forced vibrations with rotating and reciprocating unbalance, Forced vibrations due to excitation of support.
	d	Energy dissipated by damping, Forced vibrations with coulomb damping, Forced vibrations with structural damping, Vibration isolation and transmissibility.

UNIT-III

3.		**Two Degree of Freedom Systems No. of Lectures–8, Marks : 16**
	a	Introduction, Principal modes of vibration, Other cases of simple two degree of freedom systems, Combined rectilinear and angular modes.
	b	Undamped forced vibrations with harmonic excitation, Vibration absorbers.
	c	Critical speed of shaft- Introduction, critical speed of light shaft having single disc without damping, critical speed of light shaft having single disc with damping

UNIT-IV

4.		**Multi Degree of Freedom Systems Exact Analysis& Numerical Methods No. of Lectures – 8, Marks : 16**
	a	**Multi Degree of Freedom Systems Exact Analysis**: - Introduction, Free vibrations equations of motion, Influence coefficients, Generalized coordinates and coordinate coupling.
	b	Natural frequencies and mode shapes, Forced vibrations by Newtons second law of motion, Torsion vibrations of multi-rotor systems.
	c	**Multi Degree of Freedom Systems Numerical Methods: -** Introduction, Rayleigh's method, Dunkerley's method, Stodola's method.

UNIT-V

5.		**Continuous Systems & Non-Linear Vibrations. No. of Lectures– 8, Marks : 16**
	a	**Continuous Systems: -** Vibrations of strings, Longitudinal vibrations of bars, Torsional vibrations of circular shafts, Lateral vibrations of beams.
	b	**Non-Linear Vibrations: -** Introduction, Examples of non-linear systems, Phase plane, Undamped free vibration with nonlinear spring forces.
	c	Pertubation method, Forced vibration with non-linear spring forces, Self excited vibrations.

Text Book and Reference Books

1. Dilip Kumar Adhwarjee "Theory and Applications of Mechanical Vibrations" Laxmi Publications (p) Ltd., New Delhi.
2. G.K. Grover "Mechanical Vibrations" New Chand & Bros Roorkee (U.P.)
3. Leonard Meirovitch "Element of Vibration Analysis" Tata McGraw-Hill Publishing Company Limited, New Delhi
4. Singiresu S. Rao "Mechanical Vibrations "Pearson Education Ptd. Ltd., Delhi.

5. S. Graham Kelly " Schaum'sOut lines Mechanical Vibrations " Tata McGraw-Hill Publishing Company Limited, New Delhi.
6. Thompson," Theory of Vibration with Application", Pearson Education.
7. V. P. Singh "Mechanical Vibrations " Dhanpat Rai & Co. (P) Ltd., Delhi.
8. B. H. Tongue," Principles of Vibration", 2/ed. Oxford University Press, New Delhi.
9. Sadhu singh" Mechanical vibration & Noise control" published by Khanna Publisher New delhi.

Course Outline

Finite Element Analysis and Simulation Techniques **FEAST**

Course Title: Short Title Course Code

Branch- Mechanical Engineering **Year–Fourth Year**

Course Description: This course introduces undergraduate students to Finite Element Analysis and Simulation Technique. The background required includes a sound knowledge of Mathematics, Strength of materials and Machine Design. The course aims at imparting knowledge of Finite Element Analysis and Simulation Technique.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lectures	03	14	42	03
Practical	02	14	28	01

Examination scheme:

End semester exam (ESE) 80 Marks Duration: 03 hours

Internal Sessional exam (ISE) 20 Marks

Purpose of Course: Degree Requirement

Prerequisite Course(s): Mathematics, Computational Methods, Design, Vibration, SOM etc.

Outline of Content: This course contains:

UNIT-I

1.		**Introduction to FEA No. of Lectures –9, Marks : 16**
	a	Introductory Concepts: Introduction to FEM , Discritization going from part to whole approach, Physical problem, mathematical models and finite element solution, FEA as a integral part of CAD. FEM Software's - Preprocessing, processing and post processing. Advantages and disadvantages of FEM.
	b	Conventional Numerical Methods- Finite difference method, weighted residual techniques, method of Least squares, Galerkin methods, Rayleigh-Ritz method, and Boundary Value problems, Displacement methods, equilibrium method.
	c	Finite Elements Types: One dimensional element such as two nodded & three nodded Spar or truss element. Two and three dimensional elements, triangular, rectangular quadrilateral.

UNIT-II

2.		**One-Dimensional Analysis No. of Lectures –9, Marks : 16**
	a	Discritization. Derivation of Shape functions, interpolation function, Stiffness matrices, global stiffness matrix, application of boundary, and force vectors.
	b	Assembly of Matrices - solution of problems in one dimensional structural analysis, Stepped and Taper Bars, Torsion of circular shaft, thin vaIVe tubes steady state heat conduction& convection, laminar pipe flow.
	c	FEM direct approach elements stiffness, potential energy approach, treatment of boundary conditions, temperature effects.
	d	Analysis of Plane Trusses, Analysis of Beams.

UNIT-III

3.		**Two-Dimensional Analysis No. of Lectures – 8, Marks : 16**
	a	Introduction. Finite element analysis for two dimensional problems.
	b	Natural coordinates and coordinates transformations, Derivation of shape functions for triangular element.
	c	Application of heat transfer, analysis of structural vibration. Finite element formation of beams.

UNIT-IV

4.		**Two Dimensional Vector analysis No. of Lectures– 8, Marks : 16**
	a	Equations of elasticity – Plane stress, plane strain problems.
	b	Automatic mesh generation and imposition, Eigen value problems.
	c	Jacobian matrix, stress analysis of CST element.
	d	Applications to free vibration problems of rod and beam. Lumped and consistent mass matrices.

UNIT-V

5.		**Simulation Theory and Application No. of Lectures– 8, Marks : 16**
	a	**System models and studies:** - concepts of a system, system environment, stochastic activities, continuous and discrete systems, system modeling, types of models, principles used in modeling, types of system studies.
	b	**System simulation:-**The techniques of simulation, Monte Carlo method, comparison of simulation and analytical methods, analog computers and methods, hybrid computer, simulators, continuous system simulation languages, system dynamics, growth models, logistic curves, multi segments models, probability concepts in simulation, system simulation, events, representation of time, arrival pattern.

Text Book and Reference Books

1. J.N. Reddy, an Introduction to Nonlinear Finite Element Analysis, OUP.
2. C.S. Krishnamoorthy., Finite element analysis TMH.
3. J.N. Reddy, Finite element methods, McGraw hill publication ltd.
4. Robert Cook, Concept an application of Finite element analysis .
5. Klaus-Jurgen Bhate, finite element analysis, PHI .
6. C.S. Desai and J.F. Abel, Introduction to finite element methods ,CBS.
7. Tirapati R. Chandrupatla, Finite element analysis by, PHI.
8. Geoffery Gordon ,System simulation .
9. Narsingh Deo ,System simulation with digital computers .
10. Kenneth Lt. Huebner," The FEM for Engineers", Wiley India Pvt. Ltd. New Delhi

Elective- II
Course Outline

Tribology **TRB**

Course Title: Short Title Course Code

Branch- Mechanical Engineering **Year–Fourth Year**

Course Description: The course aim of imparting the knowledge of Tribology. The background required includes knowledge of mathematics, chemistry, engineering materials, fluid mechanics. The objective of the course is to understand the tribilogical concept, bearing design and its application, lubrication practices.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lectures	03	14	42	03
Practical	02	14	28	01

Examination scheme:

End semester exam (ESE) 80 Marks Duration: 03 hours

Internal Sessional exam (ISE) 20 Marks

Purpose of Course: Degree Requirement

Prerequisite Course(s): Fundamental Knowledge of Physics, Chemistry, Engineering Maths, Fluid Mechanics, Machine Design and Engineering materials.

Outline of Content: This course contains:

UNIT-I

1.	**Introduction to Tribology and friction and Wear No. of Lectures–9, Marks : 16**	
	a	Introduction and scope, Tribology in design
	b	Tribology in Industry, Economical considerations.
	c	Friction of metals, kinds and measurements of frictions, stick slip oscillation (Vibration) and its elimination
	d	Theories of friction, frictional heating.
	e	Wear- Mechanism of wear, types of wear, measurement of wear (wear testing and wear debris analysis)
	f	Theory of wear, factor affecting on wear rate.

UNIT - II

2.	Lubrication and Hydrostatic bearings	No. of Lectures–9, Marks : 16
	a	Construction, operation, Advantages, Limitations and Application of Hydrostatic Bearing (Circular Step bearing)
	b	Flow rate and pressure distribution, Load carrying capacity and film thickness, Power losses and temperature rises in Hydrostatic Step bearing.
	c	Optimum design of hydrostatic step bearing,

UNIT - III

3.	Hydrodynamic Journal Bearing	No. of Lectures–8, Marks : 16
	a	Theory of hydrodynamic lubrication, Mechanism of Pressure development in oil film.
	b	Two dimensional Reynold Equation, (i) By Direct method (ii) By Navier's Stokes equation
	c	Infinitely long Journal Bearing, Infinitely short Journal bearing
	d	Finite length Journal bearing. Design consideration in hydrodynamic Journal bearing.
	e	Relations of variable (Raimondi & Boyd). Dimensionless parameters. Temperature rises and Heat Balance, Pettrof equation.
	f	Selection of bearing design parameters. Numerical on infinitely long bearing.

UNIT - IV

4.	Hydrodynamic Thrust Bearing and Elastro Hydrodynamic lubrication. No. of Lectures–8, Marks : 16	
	a	Introduction and analysis of flat pad thrust bearing (tapered pad thrust bearing)
	b	Analysis of tilting pad thrust bearing and tapper land fixed pad bearing
	c	Analysis of Reyligh step thrust bearing, spring mounted thrust bearing
	d	Hydrodynamic pocket thrust bearing, quantity of oil flow with circumferential groove and hole.
	e	Elastro hydrodynamic lubrication, basic concept, hydrodynamic equation, Hertz equation for pressure and deformation.
	f	Ertel-Grubin equation. Application of Elastro hydrodynamic lubrication.

UNIT-V

5.	Hydrostatic Squeeze film and gas lubrication.	No. of Lectures–8, Marks : 16
	a	Introduction, Practical Situation of Hydrostatic squeeze film lubrication. Analysis for a circular plate approaching a plane.

	b	Analysis for a approximation of square plate by using a circular plate. Analysis for rectangular plate approaching a plane.
	c	Gas Lubrication – Introduction, requirements, merits, demerits and application, Reynold Equation for a gas lubrication.
	d	Tilting pad air bearing, magnetic recording disc with flying head, porous gas bearings.
	e	Seals – Classification, functions and application in detail.

Text Book and Reference Books

1. Stolarski T.A., "Tribology of Machine Design", Butterworth Heinemann, Oxford, 2000.
2. Bowden F.P. and Tobor D., "Friction and Lubrication of Solids", Clarendon Press, Oxford, 1986.
3. B. C. Majumdar "Introduction Tribology and Bearings", H. Wheeler and Company Pvt. Ltd.
4. Fuller D. D., "Theory and Practice of Lubrication for Engineers". John Wiley and Sons.
5. Cameron A. "Basic Lubrication Theory, Wiley Eastern Ltd.
6. Hrassan & Powel, "Gas Bearing".
7. Halling J. "Principles of Tribology", McMillan Press Ltd.
8. Bharat Bhushan and Gupta B.K., "Handbook of Tribology", McGraw Hill, New Delhi, 1991

Elective- II
Course Outline

Power Plant Engineering **PPE**

Course Title: Short Title Course Code

Branch- Mechanical Engineering **Year–Fourth Year**

Course

Description: To understand the various components, operations and applications of different types ofpower plants.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lectures	03	14	42	03
Practical	02	14	28	01

Examination scheme:

End semester exam (ESE) 80 Marks Duration: 03 hours

Internal Sessional exam (ISE) 20 Marks

Purpose of Course: Degree Requirement

Prerequisite Course(s): Fundamental knowledge of Engineering Thermodynamic, Turbo Machinery.

Outline of Content: This course contains:

UNIT-I

1.		**Thermal Power Plants No. of Lectures –9, Marks : 16**
	a	Thermal power stations. Main components and working of power stations, thermodynamics cycles, fuel handling, combustion and combustion equipment, problem of ash disposal, circulating water schemes and supply of makeup water.
	b	Choice of pressure of steam generation and steam temperature, selection of appropriate vacuum economizer, air pre-heater, feed water heaters and dust collection. Characteristics of turbo alternators, steam power plant, heat balance and efficiency.
	c	Boilers and steam generation, general classification, fire tube and water tube boilers, natural circulation and forced circulation boilers, high pressure, high temperature boilers, supercritical pressure boilers, boiler mounting and accessories, feed pumps, economizers, super heaters, air pre-heaters; boiler furnaces, heat generation rates, water walls.

UNIT-II

2.		**Diesel and Gas turbine Power Plant No. of Lectures–9, Marks : 16**
	a	Diesel power plants: Diesel engine performance and operation, plant layout, log sheets, selections of engine size.
	b	Gas turbine plants: Plant layout, methods of improving output and performance fuel and fuel systems, methods of testing, open and closed cycle plants, operating characteristics

UNIT- III

3.		**Hydroelectric and Nuclear Power Plant No. of Lectures–8, Marks : 16**
	a	Hydroelectric plants: Penstocks, water turbines, specific speed, turbine governors, hydro-plant auxiliaries, plant layout, automatic and remote control of hydroplants, pumped projects, cost of hydroelectric project.
	b	Nuclear power plants: Elements of nuclear power plants, nuclear reactor fuel moderators, coolants, control.
	c	Fusion energy: Control through fusion of hydrogen and helium. Energy release rates-present status and problems. Future possibilities.

UNIT- IV

4.		**Renewable Energy Power Plant No. of Lectures–8, Marks : 16**
	a	Basic bio-conversion mechanism; source of waste; simple digester; composition and calorific values of bio-gas.
	b	Wind energy generation; Special characteristics; Turbine parameters and optimum operation; Electrical power generation from wind/tidal energy.
	c	Ocean thermal energy conversion; Geothermal energy-hot springs and steam injection; Power plant based on OTEC and geothermal springs.

UNIT-V

5.		**Solar Energy Power Plant No. of Lectures –8, Marks : 16**
	a	Energy from the sun: Techniques of collection; Storage and utilisation; Types of solar collectors; Selective surfaces; Solar thermal processes; Heating; Cooling; Drying; Power generation, etc.
	b	Direct energy conversion methods: Photoelectric, thermoelectric, thermionic, MHD (magneto-hydrodynamics) and electro-chemical devices; Solar cells, Solar Concentrators

Text Book and Reference Books

1. Domkundwar and Arora "Power Plant Engineering", DhanpatRai and Sons, New Delhi
2. E.I. Wakil, "Power Plant Engineering", Publications, New Delhi
3. P. K. Nag, "Power Plant Engineering", Tata McGraw Hill, New Delhi
4. R. K. Rajput," Power Plant Engineering", Laxmi Publications, New Delhi.
5. R. Yadav - Steam and Gas turbines, central publishing house, Allahabad
6. G. D. RaiNon conventional energy sources,

Elective- II
Course Outline

Process Equipment Design **PED**

Course Title: Short Title Course Code

Branch- Mechanical Engineering **Year–Fourth Year**

Course Description: The student should have basic understanding of Mechanical and Process Design aspects of Process Equipment Design. Introduction to various codes (ASTM, API, Japanese, German etc.) used in chemical process industries and their application. Basic Engineering design approach and selection of pressure vessel components such as Head, closure, flanges, gasket, nozzles etc, Design of process vessel support Mechanical design of process equipment such as pressure vessel, shell & tube

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lectures	03	14	42	03
Practical	02	14	28	01

Examination scheme:

End semester exam (ESE) 80 Marks Duration: 03 hours

Internal Sessional exam (ISE) 20 Marks

Purpose of Course: Degree Requirement

Prerequisite Course(s): Fundamental knowledge of mathematics, thermodynamic, machine design.

Outline of Content: This course contains:

UNIT-I

1.	**Introduction to Process Equipment Design No. of Lectures–9, Marks : 16**	
	a	Nature of process equipments, General design procedure.
	b	Fabrication techniques, choice of materials, resistance to corrosion, Design considerations.
	c	Stress, Elastic instability, theories of failure, creep, economic consideration

UNIT-II

2.	Design of Machine Elements No. of Lectures –9, Marks : 16	
	a	Introduction, shaft, keys and pins, couplings, bearing, belt and pulley.
	b	Chain drive, gear drives, joints, fasteners, brackets, gaskets, mechanical seal.

UNIT-III

3.	Design of Pressure Vessels No. of Lectures –8, Marks : 16	
	a	Introduction, operating condition, uses, codes.
	b	Selection of material, design conditions and stress.
	c	Design of shell and its components, supports, thermal stress

UNIT-IV

4.	Design of Heat Exchangers and Evaporators No. of Lectures–8, Marks : 16	
	a	Introduction, type of heat exchangers, design of shell.
	b	Design of tube heat exchangers
	c	Evaporators:- Introduction, types, materials, design considerations.

UNIT-V

5.	Process Equipment Design and Standards No. of Lectures–8, Marks : 16	
	a	Role of process equipment designers, basic process requirements of plants/projects.
	b	Introduction of design codes and standards IS, ASME, API, BS and its application.
	c	Plant design management system.

Text Book and Reference Books

1. Joshi M.V. and Mahajan V.V., "Process Equipment Design", McMillan, India, 1996.
2. Harvey J.F., "Pressure Vessels Design", Van Nostrand Co., 1974.
3. Singh K.P. &Soler A. L., "Mechanical Design of Heat Exchangers ", Arcturus Publishers, New Jersey, 1984.
4. Moss Demis R., "Pressure Vessel Design Manual", Gulf Publishing Co., Houston, 1987.
5. "Handbook of Piping Design", CRC Press, 1992.
6. IS 2825: 1969, Code for Unfired Pressure Vessels.
7. "ASHRAE Handbook : Fundamentals", ASHRAE, 1985. 8. ASME Code, Section 8th, Divison -I, Division-II.

Elective- III
Course Outline

Introduction to Robotics **Robotics**

Course Title: Short Title Course Code

Branch- Mechanical Engineering **Year–Fourth Year**

Course Description: This course is aimed to provide exposure on the Robot anatomy, sensors, kinematics, applications and problems associated with their design.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lectures	03	14	42	03
Practical	02	14	28	01

Examination scheme:

End semester exam (ESE) 80 Marks Duration: 03 hours

Internal Sessional exam (ISE) 20 Marks

Purpose of Course: Degree Requirement

Prerequisite Course(s): Fundamental knowledge of Mathematics, Automation, Mechatronics.

Outline of Content: This course contains:

UNIT-I

1.	**Basic Concept In Robotics No. of Lectures –9, Marks : 16**	
	a	Historical perspective of robot, classification of robot, automation and robotics, robot anatomy, basic structure of robotics.
	b	resolution, accuracy and repeatability, classification and structure of robotics system, point to point and continuous past system, control loop of
	c	Robotic application Current and future.

UNIT-II

2.	**Mechanical Systems: Components, Dynamics And Modeling No. of Lectures–9, Marks : 16**	
	a	Objectives, Motivation, Review elementary concept, Motion Conversion, Modeling of Mechanical systems.
	b	Kinematics chain, Forces encountered in Moving coordinate systems, Lagrange's Analysis of Manipulator.

UNIT-III

3.	**Drives And Control System No. of Lectures –8, Marks : 16**	
	a	Hydraulic, DC servomotors, basic control system, concept and models, control system analysis.
	b	Robot activation and feedback component, positional and velocity sensors.
	c	Actuators, power transmission system, Application of robot in manufacturing.

UNIT-IV

4.	**End Effectors, Sensors And Vision Systems No. of Lectures-8Marks:16**	
	a	End Effectors Types of end effectors, mechanical grippers, vacuum, magnetic, adhesive grippers, tools as end effectors, Gripper selection and
	b	Introduction to Sensors: Need of sensors in a robotic system, selection of sensors, photo sensors, limit switches.
	c	Range sensors, proximity sensors, touch / sensors. VISION SYSTEMS: concept of low level and high-level vision in a robotic system.

UNIT-V

5.	**Robot Programming No. of Lectures –8, Marks : 16**	
	a	Methods of robot programming, lead through programming methods, a robot program as a path in space.
	b	Motion interpolation WAIT, SIGNAL, AND DELAY commands.
	c	ROBOT LANGUAGES: The textural robot languages, generation of robot programming languages, robot language structure, constant, variables and

Text Book and Reference Books

1. Richard D. Klafter, Thomas A. Chmielewski and Michael Negin, "Robotic Engineering - An Integrated Approach", Prentice Hall India, 2002.
2. Groover," Industrial Robotics", McGraw Hill Publication Co. Ltd.
3. John J. Craig, "Introduction to Robotics Mechanics and Control", Pearson Education Inc.,
4. M. P. Groover, "Industrial Robotics - Technology, Programming and Applications".
5. Niku," Introduction to Robotics: Analysis System and Application", Pearson Education

Elective- III
Course Outline

Advanced Welding Technology **AWT**

Course Title: Short Title Course Code

Branch- Mechanical Engineering **Year–Fourth Year**

Course Description: This course is aimed to provide deeper knowledge of materials technology of welding**,** quality techniques at production by welding**,** Knowledge of current computer systems and cost for welding operations**.**

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lectures	03	14	42	03
Practical	02	14	28	01

Examination scheme:

End semester exam (ESE) 80 Marks Duration: 03 hours

Internal Sessional exam (ISE) 20 Marks

Purpose of Course: Degree Requirement

Prerequisite Course(s): Fundamental knowledge of workshop technology, manufacturing process, material science.

Outline of Content: This course contains:

UNIT-I

1.		**Conventional welding Technology** **No. of Lectures–9, Marks : 16**
	a	Introduction: Importance and application of welding, classification of welding process. Selection of welding process
	b	Brief review of conventional welding process: Gas welding, Arc welding, MIG, TIG welding. Resistance welding. Electroslag welding, Friction welding etc. Welding of MS.CI, Al, and Stainless steel & Maurer/Schaefflar Diagram. Soldering & Brazing.

UNIT-II

2.		**Advanced welding Techniques** **No. of Lectures–9, Marks : 16**
	a	Principle and working and application of advanced welding techniques such as Plasma Arc welding, Laser beam welding, Electron beam welding, Ultrasonic welding etc.

UNIT- III

3.		**Advanced welding Techniques No. of Lectures–8, Marks : 16**
	a	Advanced welding Techniques (continued): Principle and working and application of advanced welding techniques such as explosive welding/ cladding, Underwater welding, Spray-welding / Metallising, Hard facing.

UNIT- IV

4.		**Metallurgy and Weld Life No. of Lectures –8, Marks : 16**
	a	Weld Design: Welding machines/equipments and its characteristics and arc-stability, Weld defects and distortion and its remedies, Inspection/testing of welds, Weld Design, Welding of pipe-lines and pressure vessels.
	b	Life predication. 4 51 Thermal and Metallurgical consideration: Thermal considerations for welding, temperature distribution, Analytical/Empirical analysis/formulae, heating & cooling curves.
	c	Metallurgical consideration of weld, HAZ and Parent metal, micro & macro structure. Solidification of weld and properties.

UNIT-V

5.		**Advance welding No. of Lectures –8, Marks : 16**
	a	Welding Under The Influence Of External Magnetic Field: Parallel Field, Transverse Magnetic Field, Longitudinal Magnetic Field, Improvement Of Weld Characteristics By The Application Of Magnetic Field, Magnetic Impelled Arc Welding.
	b	Fundamentals Of Underwater Welding- Art And Science: Comparison Of Underwater And Normal Air Welding, Welding Procedure, Types Of Underwater Welding, Underwater Wet Welding Process Development.

Text Book and Reference Books

1. Little R.L., "Welding Technology", Tata McGraw Hill, New Delhi, 1994.
2. Ghosh A. and Mallik A.K., "Manufacturing Science", East West Press, 1985.
3. Davies A.C., "The Science and Practice of Welding", Cambridge University, New York, 1989.
4. Balchin N.C., "Health and Safety in Welding and Allied Processes", Jaico Publishing House, Mumbai, 1989.
5. Rao P. N., "Manufacturing Technology", Tata McGraw Hill, 1990.
6. Mukharjee P. C., "Fundamental of Metal Casting Technology", Tata McGrew Hill, 1970.
7. Jeffus Larry “Welding Principles and Applications” Delmar Publishers, 1999.

Elective- III
Course Outline

Energy Conservation and Management **ECM**

Course Title: Short Title Course Code

Branch- Mechanical Engineering **Year–Fourth Year**

Course Description: Compare and contrast energy management practices and opportunities, including monitoring. Describe and analyse energy efficiency tools. Describe key issues in energy resource management and green building. Discuss and discern the history of energy sources and the conservation of and future of resources needed to maintain our economy. Describe and discuss a variety of world and regional energy policies. Communicate reasons for environmental protection and renewable energy implementation. Explain energy accounting and analysis and how it is used in energy assessment. Demonstrate understanding of rate of return and life cycle cost analysis.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lectures	03	14	42	03

Examination scheme:

End semester exam (ESE) 80 Marks Duration: 03 hours

Internal Sessional exam (ISE) 20 Marks

Purpose of Course: Degree Requirement

Prerequisite Course(s): Fundamental knowledge of basic thermodynamic, energy conservation systems, Applied Thermodynamics and Fluid Mechanics.

Outline of Content: This course contains:

UNIT-I

1.	**Energy Scenario**	**No. of Lectures –9, Marks : 16**
	a	Commercial and Non-commercial energy, primary energy resources, commercial energy production, final energy consumption, Indian energy
	b	2Sectoral energy consumption (domestic, industrial and other sectors), energy needs of growing economy, energy intensity, long term energy
	c	Energy security, energy conservation and its importance, energy strategy for the future, Energy Conservation Act 2001 and its features.

UNIT-II

2.	**Basics of Energy its various forms and conservation No. of Lectures–9, Marks : 16**	
	a	Electricity basics – Direct Current and Alternative Currents, electricity tariff, Thermal Basics-fuels, thermal energy contents of fuel, temperature and pressure, heat capacity, sensible and latent heat, evaporation, condensation, steam, moist air and humidity and heat transfer.
	b	Evaluation of thermal performance – calculation of heat loss – heat gain, estimation of annual heating & cooling loads, factors that influence thermal performance, analysis of existing buildings setting up an energy management programme and use management – electricity saving

UNIT-III

3.	**Energy Management & Audit No. of Lectures –8, Marks : 16**	
	a	Definition, energy audit, need, types of energy audit. Energy management (audit) approach-understanding energy costs.
	b	Bench marking, energy performance, matching energy use to requirement, maximizing system efficiencies, optimizing the input energy requirements, fuel and energy substitution.
	c	Financial Management: Investment-need, appraisal and criteria, financial analysis techniques-simple payback period, return on investment, net present value, internal rate of return, cash flows, risk and sensitivity analysis; financing options, energy performance contracts and role of Energy Service Companies (ESCOs).

UNIT-IV

4.	**Energy Monitoring and Measurement No. of Lectures–8, Marks : 16**	
	a	Defining monitoring & targeting, elements of monitoring & targeting, data and information-analysis, techniques – energy consumption, production, cumulative sum of differences (CUSUM). Energy Management Information Systems (EMIS)
	b	Basic measurements – Electrical measurements, Light, Pressure, Temperature and heat flux, Velocity and Flow rate, Vibrations, etc. Instruments Used in Energy systems: Load and power factor measuring equipments, Wattmeter, flue gas analysis, Temperature and thermal loss measurements, air quality analysis etc. Mathematical and statistical modelling and analysis.

UNIT-V

5.	**Energy Efficiency in Thermal Utilities and systems** **No. of Lectures–8, Marks : 16**	
	a	Energy efficiency in thermal utilities like boilers, furnaces, pumps and fans , compressors, cogeneration (steam and gas turbines), heat exchangers, lighting system, Motors belts and drives, refrigeration system.
	b	Heat Recovery and Co-generation:- Heat recovery from ventilation, air co-generation of heat and electricity, heat recovery and bottoming cycles.

Text Book and Reference Books

1. Energy Engineering and Management Amlan Chakrabarti Prentice hall India 2011
2. Energy Management Principles, CB Smith, Pergamon Press, New York,
3. Bureau of energy efficiency –Hand outs New Delhi .
4. Energy Management Hand Book. W. C. Turner. John Wiley and sons
5. Handbook on Energy Efficiency, TERI, New Delhi, 2009
6. Energy Auditing and Conservation; Methods, Measurements, Management & Case Study, Hamies, Hemisphere Publishing , Washington, 1980.
7. Industrial Energy Management & Utilization, Write, Larry C Hemisphere Publishers, Washington, 1998.
8. Energy Conservation In Process Industry, W. F. Kenny

Elective- III
Course Outline

Automobile Engineering – II **AE-II**

Course Title: Short Title Course Code

Branch- Mechanical Engineering **Year–Fourth Year**

Course Description: This course introduces undergraduate students to Automobile Engineering.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lectures	03	14	42	03

Examination scheme:

End semester exam (ESE) 80 Marks Duration: 03 hours

Internal Sessional exam (ISE) 20 Marks

Purpose of Course: Degree Requirement

Prerequisite Course(s): Basic knowledge of theory of machine, IC Engine, Applied Thermodynamic.

Outline of Content: This course contains:

UNIT-I

1.		**Automobile Brakes No. of Lectures –9, Marks : 16**
	a	Introduction, Braking Requirements, Function of the brakes, Classification of the brakes
	b	Hydraulic Brakes, Power Brakes, Air Brakes, Brake Efficiency & Stopping Distance, Factor Controlling the Stop of an Automobile
	c	Brake Lining, Brake Testing & Testers, Brake Service

UNIT-II

2.		**Automobile Electrical System No. of Lectures–9, Marks : 16**
	a	Introduction to Starting System, Lead-Acid Battery, Recharging of Battery, Charging procedure, Battery voltage, Battery Capacity, Battery Rating, Battery Life, Factors affecting Battery life, Battery testing, Battery troubles
	b	Introduction to Ignition System-Types, Introduction Charging System, Spark Plug Introduction To Wiring System, Standard Color coding, Tracking faults in wiring, Functioning of the Electrical system in an Automobile, Improvement in Electrical system in an Automobile

UNIT- III

3.		**Automobile Heating, Ventilation and Air Conditioning** **No. of Lectures–8, Marks : 16**
	a	Nature of Heat, Heating System, Air Conditioning System and its Operational Principle, Air Conditioning System and its Operational Principle, Air Conditioning Components, Effect of Air Conditioning on Fuel Economy
	b	Air Conditioning System Refrigerant, Conventional Heating and Ventilation, Air Distribution Parts, Automatic Climate Control, Automatic Temperature Control System, Air Conditioning Troubleshooting, Heating System Troubleshooting

UNIT- IV

4.		**Alternative Fuelled Automobiles No. of Lectures–8, Marks : 16**
	a	Introduction, Battery of Electrical Vehicle(EV), Fuel Cell-as a Source of Energy, Solar Powered Automobiles, Hybrid Drives, Drive Motors
	b	Compressed Natural Gas (CNG) Operated Automobiles, Liquefied Petroleum Gas (LPG) as a Substitute Fuel
	c	Future Alternative Fuels for IC Engine, Particular tips for getting more Mileage, How to Save Fuel, Biodiesel- Another substitute for existing fuel, Future Trends in Automobile Development

UNIT-V

5.		**Automobile Emissions and its Control No. of Lectures–8, Marks : 16**
	a	Introduction, Air Pollution- Environment & Health Impacts, Major Pollutants and their Sources of Emission, Pollutants and Mechanism of their Formation, Mechanism of Pollutants Formation in SI Engine
	b	Smoke, Causes of Smoke, Factor Affecting Diesel Smoke, Comparison of Diesel & Gasoline Engine emission, Harmful Effects of Different Pollutants, Emission Control System
	c	Regulation and Norms on Exhaust Emission, Introduction to Green House Effect and Global Warming, Noise Pollution and its Control, EURO & Indian Emission Standards

Text Book and Reference Books

1. Automobile Engineering Vol. 1 & 2 by Dr. Kripal Singh, (Standard Publishers Distributors).
2. A textbook of Automobile Engineering I & II by P. S. Gill, (S. K. Kataria& Son's)
3. Automobile Engineering by R. B. Gupta, (Satya Prakashan)
4. Automobile Engineering by Dr. V. M. Domkundwar, (Dhanpat Rai& Company)
5. A textbook of Automobile Engineering by R. K. Rajput, (Laxmi Publication Pvt. Ltd.)
6. Automobile Engineering by K. M. Moeed, (S. K. Kataria & Son's)
7. Automobile Engineering by Dr. A. K. Basu, (S. Chand Company Pvt. Ltd.)

Elective- III
Course Outline

Thermal Equipment Design **TED**

Course Title: Short Title Course Code

Branch- Mechanical Engineering **Year–Fourth Year**

Course Description: This course introduces undergraduate students to Thermal equipment design. The background required includes a sound knowledge of Mathematics, Engineering Thermodynamics, Applied Thermodynamics and Fluid Mechanics, Heat transfer and Refrigeration and Air-conditioning. The course aims at imparting knowledge of design of thermal equipments.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lectures	03	14	42	03

Examination scheme:

End semester exam (ESE) 80 Marks Duration: 03 hours

Internal Sessional exam (ISE) 20 Marks

Purpose of Course: Degree Requirement

Prerequisite Course(s): Mathematics, Engineering Thermodynamics, Applied Thermodynamics and Fluid Mechanics, Heat transfer and Refrigeration and Air-conditioning.

Outline of Content: This course contains:

UNIT-I

1.	**Engineering Design**	**No. of Lectures –9, Marks : 16**
	a	Introduction to engineering design, Decision in an Engineering undertaking, Design Vs Analysis, Synthesis for Design, Selection Vs Design.
	b	Designing a workable system: workable system design and analysis, creativity in concept selection, workable Vs. optimum system,
	c	Economics: Interest, Lump sum compounded annually and more than annually, compound amount factor, present worth factor, future and uniform series amount, Gradient factor, Shift in time, Taxes , Depreciation
	d	Decision making to design a food freezing plant
	e	Decision making to optimize thickness of insulation in refrigerated ware house
	f	Decision making to optimize of natural convection air cooled condenser

UNIT-II

2.	**Modeling of thermal equipments and simulation No. of Lectures–9, Marks : 16**	
	a	Matrices, Solution of simultaneous equation, Polynomial presentation(polynomial, one variable a function of other variable and n+1 data points),simplification.
	b	Method of Least square, the art of equation fitting,
	c	Selecting Vs simulating, (Heat exchanger), System simulation, Information flow diagrams, Successive substitution method, pitfalls in successive substitution method
	d	Newton Raphson method for multivariable and convergence characteristics, Compare successive substitution method and Newton Raphson method

UNIT-III

3.	**Optimization No. of Lectures –8, Marks : 16**	
	a	Introduction, levels of optimization, Mathematical representation of optimization problem
	b	Setting up the mathematical statement of optimization problems, Properties of objective function, Unconstrained optimization and Constrained optimization problem
	c	Mathematical proof of Lagrange multiplier method, Test of Maxima and minima, Kunhn-tuker conditions, Unimodal function and search method
	d	(Only basic introduction to all methods no numerical will be asked)Dichotomous search, Fibonacci search method, Introduction to multivariable optimization, Multivariable optimization, Conjugate gradient method

UNIT-IV

4.	**Mathematical Modeling- Thermodynamic properties No. of Lectures–8, Marks : 16**	
	a	Introduction, Criteria for fidelity of representation, Linear and non linear regression analysis.
	b	Thermodynamic properties, Internal energy, enthalpy, clayperon equation, P-T relation at saturated condition, specific heats, Maxwell relation.
	c	P-V-T equation (Vander walls equation),Building and full set of data.
	d	Introduction to steady state simulation, convergence and divergence in successive substitution, partial substitution in successive substitution, Evaluation of Newton Rapson Technique and characteristics for heat exchanger

UNIT-V

5.	Dynamic behavior of thermal system	No. of Lectures–8, Marks : 16
	a	Introduction, Significance, Scope, Approach,One dynamic element in stead state simulation for refrigeration plant etc. (Heat exchanger)
	b	Laplace Transform and Inverse of Laplace transforms, Blocks, Block Diagram and Transfer function, Feed control loop, Time constant block (Consider Temperature sensing bulb in a fluid duct)
	c	Stability analysis, Normalizing the variable for Inversion to the time (Take the case to regulate the air pressure in a reservoir)
	d	Translating the physical situation in block diagram (take example for air heating system and its control), non linearity's

Text Book and Reference Books

1. J.P. Holman 1992 "Heat Transfer" McGraw Hill VII Edition.
2. P. Kothandaraman "Fundamentals of Heat and Mass Transfer".
3. D.S. Kumar "Heat and Mass Transfer" D. S. Kumar S. K. Kataria& Sons, Delhi.
4. P. K. Nag "Heat Transfer" Tata McGraw Hill Publishing Company Ltd., New Delhi.
5. Thermal Design and Optimization, Adrian Bejan, George T satsaronis, Michael J. MoranJohn Wiley & Sons, 1996.
6. Design and Optimization of Thermal Systems, Second Edition (Mechanical Engineering)by Yogesh Jaluria.
7. Design of thermal systems, W. F. Stoecker, McGraw hill book company.

Lab Course Outline

Course Title :	Short Title	Course Code
Mechanical Vibration	**MV LAB**	

Branch- Mechanical Engineering **Year–Fourth Year**

Course Description:

This lab includes different practical of Mechanical Vibration. The course aims at imparting knowledge of natural frequency and modes of vibration.

Teaching Scheme:

	Hours Per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Evaluation scheme:

Internal Continuous Assessment (ICA)	25Marks	50Marks
End Semester exam (ESE) (OR)	25Marks	

Prerequisite Course(s): Mathematics (Calculus) at First year level and strength of Materials, Theory of Machines at Second year Level.

Outline of Content: This course contains:

1) To study the torsional vibrations of single rotor system.
2) To study the torsional vibrations of two rotor system.
3) To study damped torsional vibrations of single rotor system.
4) To study undamped free vibrations of a spring.
5) To study the natural vibrations of a spring mass system.
6) To study forced damped vibrations of a spring mass system.
7) To study the forced damped vibrations of simply supported beam.
8) To determine critical speed of a single rotor system.

Note : Lab file should contain at list five experiments from above mentioned list.

ESE (Oral Examination). The Oral Examination will comprise of viva on the above experiments.

Lab Course Outline

Finite Element Analysis and Simulation Techniques FEAST LAB

Course Title: Short Title Course Code

Branch- Mechanical Engineering **Year-Fourth Year**

Course Description: The background required includes a sound knowledge of Mathematics, Strength of materials and Machine Design. The course aims at imparting knowledge of Finite Element Analysis and Simulation Technique.

Teaching Scheme:

	Hours Per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Evaluation scheme:

Internal Continuous Assessment (ICA)	25Marks	50Marks
End Semester exam(ESE)(PR)	25Marks	

Prerequisite Course(s): Mathematics, Computational Methods, Design, Vibration, SOM etc.

Outline of Content: This course contains:

1 Analysis of I-cantilever beam.
2 Analyzing Flow in a System of Pipes.
3 Analysis of Trusses.
4 Modal Analysis of Spring-Mass System.
5 Modal Analysis of continuous System.
6 Thermal analysis of any component.
7 Stress strain analysis of any component.
8 Kinematic Analysis and simulation of slider crank Mechanism.

Note : Lab file should contain any five experiments by using any design software

ESE (Practical Examination) ThePracticalExaminationwillcompriseofperformingtheexperimentandvivaonthe Practical's.

Lab Course Outline
Elective- II

Course Title :	Short Title	Course Code
Tribology	**TRB LAB**	

Branch- Mechanical Engineering **Year-Fourth Year**

Course Description: The background required includes knowledge of mathematics, chemistry, engineering materials, fluid mechanics. The objective of the course is to understand the tribilogical concept, bearing design and its application, lubrication practices.

Teaching Scheme:

	Hours Per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Evaluation scheme:

Internal Continuous Assessment (ICA)	25Marks	50Marks
End Semester exam (ESE) (OR)	25Marks	

Prerequisite Course(s): Fundamental Knowledge of Physics, Chemistry, Engineering Maths, Fluid Mechanics, Machine Design, and Engineering materials.

Outline of Content: This course contains:

Any EIGHT of the following performance practical and Assignments.

01 Practical on Journal Bearing apparatus.
02 Practical on Tilting pad thrust bearing apparatus
03 Friction in Journal Bearing
04 Practical on Brake line friction test rig.
05 Practical using Pin on disc test rig.

Note : Any 03experiments should be performing from above list and 03assignment include in the course based on curriculum of this course.

Guidelines for ICA: ICA will be based on Practical assignments submitted by the student in the form of journal.

Lab Course Outline
Elective- II

Course Title :	Short Title	Course Code
Power Plant Engineering	**PPE LAB**	

Branch- Mechanical Engineering Year- Fourth Year

Course Description: To understand the various components, operations and applications of different types of power plants.

Teaching Scheme:

	Hours Per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Evaluation scheme:

Internal Continuous Assessment (ICA)	25Marks	50Marks
End Semester exam (ESE) (OR)	25Marks	

Prerequisite Course(s):

Outline of Content: This course contains:

1. Study of Fluidized Bed Combustor.
2. Study of Environmental Impact of Thermal Power Plant.
3. Study of Demand supply scenario of Electricity.
4. Study or visit of Co-generation Plant.
5. Study or visit of Non conventional power plant.
6. Efficiency measurement of Standalone Solar PV System.
7. Measurement of current-voltage characteristics of two solar cells connected

   a) in series and b) in parallel.

Note : Lab file should consist of any six experiments to be performed from above list

ESE (Oral Examination)

The Oral Examination will be based on the all five units of Power Plant Engineering.

Lab Course Outline
Elective- II

Process Equipment Design **PED LAB**

Course Title : Short Title Course Code

Branch- Mechanical Engineering Year- Fourth Year

Course Description: The student should have basic understanding of Mechanical and Process Design aspects of Process Equipment Design. Basic Engineering design approach and selection of pressure vessel components such as Head, closure, flanges, gasket, nozzles etc, Design of process vessel support Mechanical design of process equipment.

Teaching Scheme:

	Hours Per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Evaluation scheme:

Internal Continuous Assessment(ICA) 25Marks 50Marks

End Semester exam (ESE) (OR) 25Marks

Prerequisite Course(s): Fundamental knowledge of mathematics, thermodynamic, machine design and engineering drawing.

Outline of Content: This course contains:

1. Design and drawing of pressure vessels.
2. Design and drawing of storage vessels.
3. Assignment on safety measure in process equipment design.
4. Study of pressure relief devices.
5. Study of vessels under external pressure.
6. Study of design codes and standards.

Note : Lab file should consist of minimum **five experiments**.

Guide lines for ICA :
ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guide lines for ESE:-
In ESE the student may be asked questions on practical. Evaluation will be based on answers given by students in oral examination.

Course Title	Short Title	Course Code
Industrial Lecture	**IL**	

Course Description:

The gap between industry's needs and the academic community's aspirations appears to be considerably large. There exists a strong feeling, at least in the academic circles, that unless technology driven initiatives find a surer place in the industrial sector in this country, the academia-industry interaction is likely to remain confined to developmental activities with limited exploratory or research-based content As institutes committed primarily to creation and growth of technological knowledge, technical institutes have an important role to play in the industrial sector of the country's economy. This fact by way of encouraging mechanisms to foster interaction between the academia and industry. Typically, academic interest in the multidimensionality of a problem leads to a tendency to explore a variety of options to arrive at a solution. This industrial lecture develops ability of student for expectations of the industrialists from the fresh engineers.

	Total Hours	**Semester Credits**
Lecture	**06**	**2**

General Objectives: The domains in which interaction is possible are:

a. Placement and entrepreneurship development.
b. Industry participation in technology development involving some exploratory work.
c. Academic intervention in solving specific industry problems.
d. Laboratory utilization by industry.
e. Continuing education programme.

Course Outcomes:

Upon successful completion of this course the students will be able to:

1. Understand need, requirement and expectation of industry from fresh engineers.
2. Understand importance of laboratory practices throughout carrier of engineer. Design and conduct experiments, as well as to analyze and interpret data.
3. Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
4. Function on multidisciplinary teams, communicate effectively.
5. Identify, formulate, and soIVe engineering problems by understanding professional and ethical responsibility.
6. Recognition of the need for, and an ability to engage in life-long learning.
7. Use the techniques, skills, modern engineering tools and software necessary for engineering practice.

Industrial Lecture
(Course Contents)

Semester-VIII **Examination Scheme:**
Teaching Scheme: **(ICA) Internal Continuous Assessment: 50Marks**
Lecture: 1 Hr

1. There is a need to create avenues for a close academia and industry interaction through all the phases of technology development, starting from conceptualization down to commercialization.
2. List of renowned persons from industry shall be prepared by the committee appointed by Head of the department. After approval from the Principal, Minimum five Industrial lectures in alternate week shall be arranged, which shall be delivered by the experts/Officials from Industries/Govt. organizations/ Private Sectors/Public Sectors / R&D Labs covering the various aspects.
3. Topics of Industrial Lectures shall be Technical in nature and should not be the specific contents from the curriculum.
4. Students shall submit the report based on minimum five lectures giving summary of the lecture delivered.
5. The summary should contain brief resume of the expert, brief information of his organization and brief summary of the lecture in bullet point form.

Guide lines for ICA: Assessment of the Industrial Lecture for award of ICA marks shall be done jointly by departmental committee as per attendance in industrial lecture, report submitted by student and overall performance in semester as per the guidelines given in **Table- D**

Table-D

SN	Name of Student	Attendance (05 Marks per Lecture)	Dept of Understanding (03 Marks per Lecture)	Report Writing	Total
		25	15	10	50

Course Title	Short Title	Course Code
Project-II	**P-II**	

Course Description:
The course explores the knowledge of design, experiment and analysis of data. The course develops ability to work on multidisciplinary teams, Identify, formulate, and soIVe engineering problems in view of economic, environmental and societal context.

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Laboratory	**4**	**14**	**56**	**6**

Prerequisite Course(s): Knowledge of science, mathematics, computer programming and core subject of engineering.
General Objectives: The objectives of project are to develop ability to work in group. The scope of work is design and conduct experiments, as well as to analyze and interpret data within realistic constrain such as economic, environmental, social, safety and manufacturability. The project work provides plate form for planning, material procurement, preparing specification and execution of work. The project also develop to work on multidisciplinary teams, communicate effectively and Knowledge of contemporary issues.
Course Outcomes:
Upon successful completion of this course the students will be able to:

1. Apply knowledge of mathematics, science, and engineering.
2. Design and conduct experiments, as well as to analyze and interpret data.
3. Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
4. Function on multidisciplinary teams, communicate effectively and Knowledge of contemporary issues.
5. Identify, formulate, and soIVe engineering problems by understanding professional and ethical responsibility.
6. Understand the impact of engineering solutions in a global, economic, environmental, and societal context.
7. Recognition of the need for, and an ability to engage in life-long and self learning.
8. Use the techniques, skills, modern engineering tools and software necessary for engineering practice.

Project-II
(Lab Course Contents)

Semester-VIII **Examination Scheme:**
Teaching Scheme: **(ICA) Internal Continuous Assessment: 75Marks**
Practical: 2 Hrs/Week **(ESE) End Semester Examination OR: 75Marks**

1. Project-I work decided in VII semester shall be continued as Project-II
2. Students should complete implementation of ideas given in synopsis/Abstract, so that project work should be completed before end of semester.
3. Project-II may invoIVe fabrication, design, experimentation, data analysis within realistic constraints such as economic, environmental, social, ethical, health and safety, manufacturability, and sustainability. The stage also includes testing , possible results and report writing
4. Each student's project group is required to maintain log book for documenting various activities of Project-II and submit group project report at the end of Semester-VIII in the form of Hard bound.
    a. *Title*
    b. *Abstract*
    c. *Introduction*
    d. *Problem identification and project objectives*
    e. *Literature survey*
    f. *Case study/Analysis/Design Methodology*
    g. *Project design and implementation details*
    h. *Result and conclusion*
    i. *Future scope*
    j. *References.*

Guide lines for ICA: ICA shall be based on continuous evaluation of students' performance throughout semester in project-II and report submitted by the students' project group in the form hard bound. Assessment of the project-II for award of ICA marks shall be done jointly by the guide and departmental committee as per the guidelines given in **Table-E.**

Guide lines for ESE:-
In ESE the student may be asked for demonstration and questions on Project. Evaluation will be based on answers given by students in oral examination.

Assessment of Project - II

Name of the Project: _____
Name of the Guide: _____

Table-E

		Assessment by Guide (50 Marks)				**Assessment by Committee (25 Marks)**		
SN	**Name of Student**	**Attendance, Participation and team work**	**Material procurement/ assembling/ Designing/Programming**	**Case study/ Execution**	**Project Report**	**Dept of Understanding**	**Presentation**	**Total**
Marks		**10**	**15**	**15**	**10**	**10**	**15**	**75**

COLLEGE OF ENGINEERING AND TECHNOLOGY,
BAMBHORI POST BOX NO. 94, JALGAON – 425001. (M.S.)

(With NBA Accredited Programmes)

Website : www.sscoetjalgaon.ac.in Email : sscoetjal@gmail.com

Mandatory Disclosure

Part-III

January 2018

Shrama Sadhana Bombay Trust's
COLLEGE OF ENGINEERING AND TECHNOLOGY
BAMBHORI, POST BOX NO. 94, JALGAON – 425001 (M.S.)
Included under section 2 (f) & 12 (B) of the UGC Act, 1956
Grade B ++ (2.91) NAAC Accredited

ISO 9001:2008

Website- www.sscoetjalgaon.ac.in
Email: sscoetjal@gmail.com
Principal: Dr. K.S.Wani
M. Tech., DBM, Ph.D.

Phone No. (0257) 2258393
Fax No. (0257) 2258392

Ref. No. COET/AICTE/MD/ / 18 **Date:**

C E R T I F I C A T E

Certified that all enclosures contained in PART-I , PART-II & PART-III bearing page no. to page no. are pertaining to our institution which are being submitted in two separate above mentioned bound booklets/box file of Mandatory Disclosure. All xerox copies may be treated as original.

PRINCIPAL

NORTH MAHARASHTRA UNIVERSITY,

JALGAON (M.S.)

Third Year Engineering

(CIVIL)

Faculty of Engineering and Technology

COURSE OUTLINE

TERM – V

W.E.F 2014 – 2015

TE (Civil): Semester–V

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory		Practical		Total	
		Theory Hrs/ week	Tutorial Hrs/ week	Practical Hrs/ week	Total	ISE	ESE	ICA	ESE		
Structural Design I	D	3	---	---	3	20	80	---	---	100	3
Infrastructural Engineering I	D	3	---	---	3	20	80	---	---	100	3
Fluid Mechanics II	D	3	---	---	3	20	80	---	---	100	3
Environmental Engineering I	D	3	---	---	3	20	80	---	---	100	3
Construction Management I	C	3	---	---	3	20	80	---	---	100	3
Structural Design I lab	D	---	---	2	2	---	---	25	25	50	1
Infrastructural Engineering I lab	D	---	---	2	2	---	---	25	---	25	1
Fluid Mechanics II lab	D	---	---	2	2	---	---	25	25	50	1
Environmental Engineering I lab	D	---	---	2	2	---	---	25	25**(PR)**	50	1
Testing of Materials I lab	B	1	---	2	3	---	---	50	---	50	2
Industrial Training/EDP/Special Study	D	---	---	---	---	---	---	25	---	25	2
Total		**16**	**---**	**10**	**26**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination **ESE: End Semester Examination** **ICA: Internal Continuous Assessment**

Note 1: For branches like Chemical Engineering and Biotech Engg, two laboratory hours can be merged to form a four hour slot.

Note 2: Out of 3 practical ESE heads, at least 1 head should be practical.

TE (Civil): Semester–VI

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory		Practical		Total	
		Theory Hrs/ week	Tutorial Hrs/ week	Practical Hrs/ week	Total	ISE	ESE	ICA	ESE		
Structural Design II	D	3	--	---	3	20	80	---	---	100	3
Theory of Structures II	D	3	---	---	3	20	80	---	---	100	3
Geotechnical Engineering I	D	3	---	---	3	20	80	---	---	100	3
Infrastructural Engineering II	D	3	---	---	3	20	80	---	---	100	3
Construction Management II	C	3	---	---	3	20	80	---	---	100	3
Structural Design II lab	D	---	---	2	2	---	---	25	25	50	1
Geotechnical Engineering I lab	D	---	---	2	2	---	---	25	25	50	1
Infrastructural Engineering II lab	D	---	---	2	2	---	---	25	25	50	1
Testing of Materials II lab	B	---	---	2	2	---	---	25	---	25	1
Minor Project	D	---	---	2	2	---	---	50	---	50	2
Seminar-I	D	---	---	2	2	---	---	25	---	25	2
Total		**15**	**---**	**12**	**27**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination **ESE: End Semester Examination** **ICA: Internal Continuous Assessment**

Note 1: For branches like Chemical Engineering and Biotech Engg, two laboratory hours can be merged to form a four hour slot.

Note 2: Out of 3 practical ESE heads, at least 1 head should be practical.

STRUCTURAL DESIGN - I

Structural Design - I **SD–I**

Course Description:

The primary aim of this course is to provide an introduction to the analysis and design of reinforced concrete structures, by limit state method conforming to IS 456:2000. The course covers design of various elements viz. beams, slabs, columns, footing and the students should independently design a RCC Structure of a residential or commercial building up to 3 stories.

Lecture	**Hours / Week**	**No. of Weeks**	**Total Hours**	**Semester Credits**
	03	13	39	03
Tutorial	--	--	--	

General Objective:

The primary course objective is to equip the students with the tools necessary for designing Concrete structures and to familiarize them with the relevant national design codes such as IS 456:2000. It deals the concepts of various limit states such as limit state of collapse, serviceability and durability etc. It also covers design of various components of structure.

Learning Outcomes:

Upon successful completion of this course the student will be able to:

- Understand various design philosophies for reinforced concrete structures
- Understand the concepts of limits states of collapse, serviceability, durability, characteristics strength, characteristics load, partial safety factors for material and loads.
- Use IS 456:2000 code requirements for reinforced concrete structures.
- Design of singly, doubly and flanged reinforced concrete sections
- Design various components of structures such as beam, column, slab, footings, etc

COURSE CONTENT

Structural Design - I **Semester – V**

Teaching Scheme	**Examination Scheme**
Lecture: 3 hours / week	**End Semester Examination (ESE) : 80 Marks**
Practical: 02/week	**Paper Duration (ESE) : 04 Hours**
	Internal Sessional Exam (ISE) : 20 Marks

UNIT - I **(07 Hours, 16 Marks)**

a) Introduction: Introduction to various design philosophies of R.C structures, working stress method, ultimate load method, limit state method , limit state of collapse, limit state of serviceability, limit state of durability, characteristic strength, characteristic load, partial safety factors for material strengths and loads, structural properties of concrete.

b) Singly Reinforced section: Limit state method for flexure, Assumptions, stress & strain diagram, Balanced, under reinforced & over reinforced RC sections, Analysis and design of rectangular section.

UNIT - II **(08 Hours, 16 Marks)**

a) Doubly Reinforced section Analysis and design of doubly reinforced sections.

b) Flanged Section: Analysis and design of flanged sections.

UNIT - III **(08 Hours, 16 Marks)**

a) Design of beams for flexure, shear and bond: simply supported, cantilever beams & continuous beams using IS code coefficient method.

b) Design of slabs: One way simply supported, cantilever slab & continuous slab

UNIT - IV **(08 Hours, 16 Marks)**

a) Design of two way slabs: Two way simply supported & continuous slabs.

b) Design of staircase: Design of dog legged stair case.

UNIT - V **(08 Hours, 16 Marks)**

a) Column: Introduction, strain and stress variation diagrams, axially loaded short column with minimum eccentricity requirements, Design of short column for axial load.

b) Footings:-Design of isolated pad footing for axial load & uniaxial bending.

ICA: - shall consist of Design of G + 2 building (Residential/Commercial) covering slab, beam, column, footing & stair case.

1) A design report shall be prepared along with showing details on half imperial drawing sheets.
2) A few typical details of beam column etc. shall be shown on A4 / A3 size sheets using drafting software also.
3) A report on at least one site visit shall be submitted in ICA.
4) Design of column should be done for uniaxial and biaxial bending in ICA

RECOMMENDED BOOKS:

1) B. C. Punmia, Ashok Kr. Jain, Arun Kr. Jain, Limit State Design of Reinforced Concrete, Laxmi Publication, 1st edition 2007
2) P. C. Varghese ,Limit State Design of Reinforced Concrete, PHI, 2nd Edition 2006
3) S. Ramamrutham, R. Narayan ,Design of Reinforced Concrete Structures (conforming to IS 456), Dhanpat Rai Publication, 7th Edition 2013
4) Dr. V. L. Shah and Dr. S. R ,Limit State Theory and Design . Karve, Pune Vidharthi Gruh Publication, Pune, 6th Edition
5) P. Dayaratnram, Limit State Analysis and Design, Wheeler Publishing company, Delhi.,12th edition 2009
6) Pillai Menon ,Reinforced Concrete Design, Tata Mc Graw Hill, New Delhi., 3rd edition 2013

INFRASTRUCTURAL ENGINEERING-I

Infrastructural Engineering I **IE – I**

Course Description:

This course introduces the students about concepts in Infrastructure Engineering which includes

- Transport Sector in India, Development plans, permanent way, Material requirement for permanent way, Geometric design of track, Construction and Track maintenance, Points and crossings, Signaling and interlocking, stations & yards, Modernization of Railway.
- Airport engineering, requirements, runway, taxiway, Wind rose diagram, basic runway length & corrections, Terminal building requirements, airport drainage, heliports.
- Harbors, jetty, tides winds & waves, dry dock, wet dock, signals, light house.

	Hours/ week	No. of weeks	Total hours	Semester credit
Lectures	**03**	**13**	**39**	**3**
Tutorial	**---**	**---**	**---**	

General Objectives:

The general objective of this course is to study permanent way, its requirements, geometric design of track, Station & Yards, Basic requirements of airport & heliport, Harbors and port.

Learning Outcomes:

Upon successful completion of course the student will be able to

- Know the permanent way and its gauges.
- Identify various components of permanent way.
- Design the track geometries like gradients, alignment curve etc.
- Plan the track management systems.
- Suggest the types and extent of preliminary survey for construction and maintenance of railway track.
- Understand the basics involved in the crossing and turnout of railway track.
- Know the type of signals, principle of interlocking and their working.
- Understand the Civil Engineering aspects of airport.
- Describe working and procedures adopted in airport management systems in India.
- Know the basics of docks and harbors and its construction.

Course Content

Infrastructural Engineering I **Semester V**

Teaching Scheme **Examination Scheme**

Lectures: 3 hours / week **End Semester Examination (ESE):-80 marks**

Paper Duration (ESE): 3 hours **Internal Sessional Exam.(ISE):-20 marks**

Unit-1 (8 hours, 16 marks)

a. **Introduction:** Role of Civil Engineers in Infrastructure Development, Advantages of Railways as mode of transport, Organizational structure, Permanent Way**,** definition of track, basic components, and ideal requirements.
b. **Railway Track Gauge:** Different gauges on Indian Railways, loading gauge, construction gauge, Unigauge , Problems caused by change of gauge.
c. **Track and Track stresses:** requirements, forces acting on Track, coning of Wheels, Tilting of Rails, Rails: Functions, types of rails, rail joints, rail failure, function suitability and drainage, treatment, Defects, Standard rail sections,
d. **Sleeper:** Functions, requirements, types of sleepers; Concrete sleepers, Pre stressed, sleeper density, manufacturing and spacing of sleepers, Ballast: Function, specifications of track ballast, Track fittings: Fittings and fastening

Unit-2 (7 hours, 16 marks)

a. **Alignment of Railway lines:** Importance, Basic requirements of an ideal alignment, selection of a good alignment, Geometric design of Track: Necessity for geometric design, Gradients, Grade compensation on curves, Super elevation, equilibrium cant, cant deficiency, maximum permissible speed, negative super elevation
b. **Resistance to Traction:** Resistance to-friction, wave action, Causes of creep, Effects of creep, Measures to reduce creep. Speed, track irregularity, wind, gradient, curvature. Stress in rails, sleepers, ballast and formation,
c. **Construction and Track maintenance:** Plate laying method, operations involved Tools & common items of track maintenance.

Unit-3 (7 hours, 16 marks)

a. **Points and crossings:** Important terms, types of track layouts and sketches of turn out, diamond crossing, triangle, double junction, scissors cross over, Single slip, Double slip, Gathering line, Signaling and interlocking: objectives of signaling, classification of signals, CTC and ATC system, Interlocking & it's Principles.
b. **Railway Stations and yards:** Classification of Railway stations, Purpose, facilities required at railway stations, Requirements of station yard, Types of Yards,
c. **Modernization in railways:** Types of railways, high speeds, improvements in track structure: components, Automation, Safety aspects, Introduction to Skybus, Monorail & Metro rails.

Unit-4 (7 hours, 16 marks)

a. **Basic definition & terms:** Runway, Taxiway, Apron, Hanger, Airport obstruction, Airport Classification (ICAO), selection of site for airport.
b. **Wind Rose Diagram**, characteristics of aircraft, corrections to basic length of runway, Runway Geometrics, Taxiway Geometrics
c. **Terminal Building requirements**, Airport Drainage, Heliports, Main characteristics of Helicopters, nature of helicopters transport, site selection for helicopters

Unit-5 (7 hours, 16 marks)

a. **Introduction**: Classification of harbors, selection of site for harbor. Definitions/ methods of Breakwater, Quay walls, Bulkhead, Wharves, Jetty, Dolphins, Dock fenders, piers, slips, moles, berths , pier heads, Jetties, , mooring accessories- function
b. **Natural Phenomena**: Inland water transport in India, tide winds and waves erosion, littoral drift, coast protection,
c. **Other Facilities**: Dry Dock, Wet docks-purpose, Lift docks, repair docks, graving docks, floating docks, marine railway, signals, buoys, beacons, light house, ware house and Transit sheds.

RECOMMENDED BOOKS:

1) Saxena S.C. & Arora S. P. A course of Railway Engineering, Dhanpat Rai & Sons, New Delhi.,7th edition,2010
2) Agarwal M. M. – Indian Railway Track, Sachdeva Press, Mayapuri, New Delhi.,5th edition 2013
3) Khanna & Arora, Airport planning & design, Nemchand Bros, Roorkee, Delhi.,3rd edition 2005
4) Rangwala, Airport Engineering, 13th edition,2013
5) G. Venkatappa Rao, Airport Engineering,1st edition,1992.
6) Rao G. V., Airport Engineering, Tata Mc Graw Hill
7) Bindra S. P., Docks & Harbour Engineering, Dhanpat Rai & Sons,1992
8) R. Shrinivasan, Harbour dock & tunnel Engineering, New Delhi.,26th edition,2013
9) Rangwala, Docks and Harbour ,3rd editon,2004
10) K. L. Bhanot & S. B. Sehgal, Highway Engineering & Airport.,3rd edition 1996
11) S. Ponnuswamy, Bridge Harbour.2nd edition,2012

FLUID MECHANICS-II

Fluid Mechanics II **FM II**

Course Description:

This course provides the elementary level knowledge of Fluid mechanics which includes:-

- Study of boundary layer and fluid flow around submerged bodies.
- Analysis of turbulent flow in pipes and pipe flow systems.
- Analysis of open channel flows: Uniform, critical, gradually and rapidly varied flows.
- Study of impact of jet and hydraulic turbines and centrifugal pumps.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lectures	**3**	**13**	**39**	**3**
Practical	**2**	**13**	**26**	**1**

Prerequisite Course(s):

Knowledge of fluid properties and fluid statics. Ability to solve simple fluid flow problems using fluid kinematics and dynamics. Concepts of dimensional analysis.

General Objective:

The general objective of course is to teach elementary concepts of boundary layer and to analyze and solve turbulent pipe flow and open channel flow problems. Also it aims to explain impact of jet and introduce hydraulic turbines and centrifugal pumps to students.

Learning Outcomes:

Upon successful completion of this course the student will be able to:

- Identify various thicknesses of boundary layer.
- Analyze laminar and turbulent boundary layers (B.L.) and compute local and overall skin friction drags in laminar and turbulent B.L. on flat plate using approximate empirical formulae.
- Compute drag and lift forces on moving submerged bodies in fluid such as cylinder, airfoil etc.
- Analyze turbulent flow and compute velocity distributions in smooth and rough pipes.
- Explain Moody's diagram and solve pipe flow problems for pipes in series and parallel.
- Analyze uniform and critical flows in open channels.
- Determine the most economical sections of open channels using Manning's and / or Chezy's equations.
- Analyze Gradually Varied Flow in open channels for various applications.
- Assess and compute hydraulic jump in open channels.

- Discuss impact of fluid jet on stationary and moving, flat and curved plates using momentum principle.
- Explain hydraulic turbines such as Pelton, Francis and Kaplan turbines and working and various efficiencies of these turbines.
- Identify centrifugal pump; its classification, working and various efficiencies.
- Discuss performance of hydraulic turbines and centrifugal pumps in terms of unit and specific quantities and demonstrate their characteristics curves.

COURSE CONTENT

FLUID MECHANICS II **FM II**

Teaching Scheme:-
Lectures:- 03 hours / week
Credits:- 03
Practical:- 02 hours / week

Examination Scheme:-
ESE (Theory paper):- 80 marks
Paper duration:- 03 hours
ISE (Class tests):- 20 marks
ICA (Term work):- 25 marks
ESE (Oral):- 25 marks

Unit I **No. of lectures: 09, Marks: 16**

a. **Boundary Layer Theory**: Concept of boundary layer, various thicknesses of boundary layer, applications of Von Karman momentum equation (no derivation of the equation), boundary layer over a flat plate, laminar and turbulent boundary layers, local and average drag coefficients, separation of boundary layer and control of separation.

b. **Fluid Flow around submerged Bodies**: Practical problems involving fluid flow around submerged objects, definitions and expressions of drag & lift, drag & lift coefficients, types of drags, drag on cylinder. Circulation, Magnus effect and lift on cylinder and airfoil, polar diagram.

Unit II **No. of lectures: 08, Marks: 16**

a. **Turbulence Flow Theory**: Turbulence phenomenon, instantaneous & temporal mean velocities, Reynolds's expression for turbulent shear stress, introduction to Prandtl's mixing length theory, Karman-Prandtl equation (no derivation), hydro-dynamically smooth and rough boundaries and mentions of equations for velocity distributions; (no derivations of equations of velocity distributions).

b. Darcy-Weisbach equation (no derivation), only mention of different equations (no derivations) for friction factors for smooth, rough & transition boundaries, Moody's diagram.

c. **Pipe flow systems**: major and minor losses, pipes in series & parallel and their equivalent pipes, siphon.

Unit III **No. of lectures: 08, Marks: 16**

a. **Open Channel flow** – Classification of open channels, geometric elements, steady and unsteady, uniform and non uniform flows, continuity and energy equations, kinetic energy correction factor.
b. **Uniform flow**: Chezy's and Manning's equations, concept of normal depth, calculation of normal depth for triangular & wide rectangular channels. Hydraulically efficient sections.
c. **Critical flow**: Specific energy, specific energy diagrams, fundamental equation of critical flow, calculation of critical depth in rectangular and triangular channels.

Unit IV **No. of lectures: 07, Marks: 16**

a. **Gradually varied flow:** Types of non-uniform flows, differential equation of gradually varies flow (GVF) - alternate forms, introduction to different types of GVF profiles and practical examples of their occurrence, control sections; (no mathematical treatment for gradually varied flow).

b. **Hydraulic Jump :** Phenomenon of hydraulic jump, application of momentum equation to hydraulic jump in horizontal, frictionless, rectangular channel, specific force, conjugate depths & relation between conjugate depths, energy loss in hydraulic jump, length of jump, classification & practical uses of hydraulic jump.

Unit V **No. of lectures: 07, Marks: 16**

a. **Impact of Jet**: Impact of jet on stationary & moving, flat & curved plates using linear momentum principle, work done, introduction to principle of angular momentum, mention of Euler's momentum equation for turbine & pumps (no derivation).

b. **Hydraulic Turbines:** Elements of hydro electric power plant, unit & specific quantities, classification of hydraulic turbines, introduction to work done, heads & efficiencies of turbines, (no mathematical treatment for hydraulic turbines).

c. **Centrifugal Pumps:** Classification of centrifugal pumps, specific speed, priming, introduction to work done by impeller, heads & efficiencies. Characteristics of hydraulic turbines and centrifugal pumps (no mathematical treatment for centrifugal pumps).

RECOMMENDED BOOKS:-

1. Dr. A. K. Jain, Fluid Mechanics, Khanna Publishers, Delhi, Edition – 2011.
2. Dr. K. Subramanya, Flow in Open Channels, Tata McGraw-Hill Education Pvt., Ltd., New Delhi, 3rd Edition-2012.
3. Dr. K. Subramanya, FM & HM-Problems & Solutions, Tata McGraw-Hill Education Pvt. Ltd. New Delhi, 6th reprint-2013.
4. Dr. Jagdish Lal, Hydraulic Machines, Metropolitan Book Co. Pvt. Ltd., New Delhi.
5. Dr. P.N.Modi , Dr. S.M. Seth, Hydraulic and Fluid Mechanics, Standard Publications, Delhi, Edition – 2011.
6. Dr. R.K.Bansal, A Textbook of Fluid Mechanics & Hydraulic Machines, Laxmi Publications (P) Limited, 9th Edition, 2012.
7. Streeter V.L. & Wylie E.B., Fluid Mechanics, Tata McGraw-Hill Education Pvt., Ltd., New Delhi, 6th reprint - 2012.
8. Dr.Garde and Mirajgaokar. - Fluid Mechanics.---
9. Rajput -Hydraulic Machines
10. Som S K and Biswas G – Introduction to Fluid Mechanics and Fluid Machines, Tata McGraw-Hill Publishing Company Ltd., New Delhi.
11. John M. Cimbala, Yunus A. Cengel – Fluid Mechanics : Fundamentals and Applications, McGraw-Hill Higher Education. Second Edition 2010.

ENVIRONMENTAL ENGINEERING-I

Environmental Engineering I **EE I**

Course description:

The course is designed to develop awareness about water quality and its impact on public health, and to appraise of the water treatment technologies. It deals with estimation of water requirements of a community, identification of appropriate sources of water, collection of water from source, transportation of water, examination of water as per standard methods, purification of water to meet the standard norms, and to supply the water to the community, including municipalities and industrial zones.

Lectures	Hours/week	No. of weeks	Total hours	Semester credit
	03	13	39	03

General Objective:

The basic objective of this course is to make students aware about importance of water& its purification and know the methods used for purifying the water to make it fit for drinking purpose as per the standards. Students should also be aware about principles related to public health engineering .

Learning Outcomes:

- An ability to apply scientific and engineering principles as well as contemporary technology to the discipline.
- An ability to analyze and interpret data in several areas which include resources like air, water and land .and energy systems and environmental and human health impacts.
- An ability to identify, formulate and solve engineering problems and to design a system, component, or process to meet desired needs.
- An ability to convey technical material through oral presentations and written communications.
- A knowledge of contemporary and emerging environmental issues and a recognition of the need for, and an ability to engage in, life-long learning.
- An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice with an integrated understanding of professional, societal, and ethical responsibilities and the importance of, and role for, multidisciplinary teams in professional practice.

COURSE CONTENT

Environmental Engineering I **EE I**

Lecture: 3 hours / week **End Semester Examination (ESE) : 80 Marks**

Practical: 2 Hour/Week **Paper Duration (ESE) : 03 Hours**

Internal Sessional Exam (ISE): 20 Marks

ICA: 25 Marks **Oral: 25 Marks**

UNIT-I **(7 Hours 16 marks)**

A: Introduction to water supply schemes: data collection for water supply scheme, components and layout, design period, factors affecting design period.

B: Water intake structures: General design considerations, intake structures, such as river intake, canal and reservoir intake, conveyance of raw water, hydraulic design of pumping station.,

C: Water demand, rate of water consumption for various purposes, like domestic, industrial and institutional and commercial. Fire demand. Water system losses. Factors affecting the rate of demand. Population forecasting: arithmetical increase method geometrical increases method, incremental increase method logistic curve methods.

UNIT-II **(7 Hours 16 marks)**

A: Water quality: impurities in water, physical, chemical and biological characteristics, water quality standards as per IS 10500-1991, USEPA and WHO.

B: Water treatment processes: introduction to different water treatment processes, flow sheets, aeration- principle, concept, necessity, methods and design of aeration fountains (Stepped aerators), Flash mixer, function, design and power requirements.

C: Flocculation and sedimentation: coagulation, flocculation theory, zeta potential and its significance, mean velocity gradient G, power consumption, common coagulants, coagulant aids, principle of sedimentation, efficiency of ideal settling basin, types of settling and related theory. Design of settling tanks, clariflocculators, tube settlers.

UNIT-III **(7 Hours 16 marks)**

A: Filtration: theory of filtration, mechanism of filtration, filter materials, types of filters, rapid Sand Filter, Slow Sand Filter, multimedia and dual media filters, components- under drainage system, working and cleaning of filters. Operational troubles, design of filters-RSF and SSF. Design of under drainage system.

B: Disinfection- objectives, theory, types of disinfection, chlorination, free and combined chlorine, effect of pH, types of chlorination, pre and post chlorination, break point chlorination, de-chlorination bleaching powder estimation.

UNIT-IV **(7 Hours 16 marks)**

A: water softening- theory, methods, lime soda, zeolite, and ion exchange processes, quantity estimation of lime soda process, re-carbonization. Demineralization-methods like reverse osmosis, electro-dialysis

B: Miscellaneous methods- adsorption: theory, Frendlich isotherms design. effect of fluoride, fluoridation and de-fluoridation.

C: Water treatment of swimming pool.

UNIT-V **(7 Hours 16 marks)**

A: Water distribution system, types of distribution system, continuous and intermittent system, gravity, pumping and combined system. Wastage of water-detection and prevention. Lay out of distribution system. Design of hydraulic network. Residual pressure, Hardy-Cross method, design of ESR capacity.

B: Service reservoir, ESR, GSR, balancing reservoir- necessity, location, capacity calculation by arithmetic and mass curve method. types of pipes. types of valves, Functions and locations.

C: presence of heavy metals in water, their effects and remedy. Presence of non-biodegradable organics in water, their effects, halide formations. Their removal methods including osmosis, ultra-filtration, and adsorption Basic idea of photo-catalysis technology from removal of non-degradable organics.

RECOMMENDED BOOKS:-

1. E W Steel and Terence J McGhee : Water supply and Sewerage" Tata McGraw Hill Publishing Co.
2. Water supply and Sanitary Engineering by J S Birdie, Dhanpat Rai and Sons Publication, New Delhi
3. Physici-chemical processes for water quality control by Walter J Weber, Wiley Inter-science Publications.
4. Garg S.K., "Water Supply Engineering", Khanna Publisher, New Delhi
5. Punamia, Jain & Jain, "Water Supply Engineering", Laxmi Publications, New Delhi
6. Manual on Water Supply & Treatment, Central Public Health & Environmental Engineering, Organization, Ministry of Urban Affairs, Government of India
7. Therous, Eldridge & Mallmann, "Laboratory Manual for Chemical & Bacteriological Analysis of Water & Sewage", Agro Botanic Publisher, India
8. Benergee & Jain, "Handbook of Technical Analysis", Jain Brothers New Delhi.
9. Laboratory Manual for Environmental Quality Testing, Environmental Protection Research Foundation, Sangli

CONSTRUCTION MANAGEMENT-I

Construction Management – I **CM – I**

Course Description: The subject deals with principles of management in construction industry which will enable the students to become familiar with organizational structures, modern techniques to complete the project, cost analysis, application of economics in engineering and various equipments.

Lectures	Hours / Week	No. of weeks	Total hours	Semester credit
	03	13	39	03
Tutorial	--	--	--	--

General Objective:

The general objective of course is to understand concepts in construction industry and analyze activities involved using CPM & PERT methods with respect to cost, Engineering economics etc. Also it aims to explain various excavating and hauling equipments.

Learning Outcomes:

Upon successful completion of this course the student will be able to:

- To indentify construction activities.
- To indentify organization chart of various construction industries with their forms.
- Analyze network techniques by using PERT, Bar charts, etc.
- To analyses Optimization and crashing of networks.
- Discuss Engineering economics, banking systems, profit and loss accounts concepts.
- Discuss the various Excavating & Hauling Equipments like power shovel, Dragline, etc

Course Content

Construction Management – I **C M-I**

Teaching Scheme **Examination scheme**

Lectures: 3 hours / week **End Semester Examination (ESE) : 80 marks**

Paper Duration (ESE): 3 hours

Internal Session Exam. (ESE) : 20 marks

UNIT–I (07 Hours, 16 marks)

Construction industry, construction team, Construction activities, classification of construction, stages in construction, Need of management in construction, Job layout and value engineering.

Leadership and its quality, Organization, meaning and function, forms of organization - line, line and staff, functional, Type A, Type B and Type C

UNIT–II (10 Hours, 16 marks)

Network Technique: - History, Advantages, Bar charts, S –Curve etc. various terms used in network technique, activity, event, critical path, duration etc Development of networks, network scheduling, to find various times and float, EST, EFT, TF etc Monitoring of Network, Three phases of network technique.

PERT - its concept and PERT Time.

UNIT–III (08 Hours, 16 marks)

Cost analysis, Cost Curve, Optimization and crashing of networks. Updating of network During monitoring, resource leveling, allocation, leveling and smoothening.

Line of balance- Concept and uses. (no problems on crashing of network)

UNIT – IV (07 Hours, 16 marks)

Engineering economics, its definition and importance, demand and supply, factors affecting demand and supply, cost concept.

Bank, its type, uses and functions, banking systems, profit and loss account, appreciation and depreciation of money.

UNIT – V (07 Hours, 16 marks)

Excavating & Hauling Equipments:-

a) Power shovels; size, basic parts, selection ,factors affecting output.

b) Draglines: - types, size, basic parts.

c) Bulldozers-types, moving earth with bull dozers.

d) Clamshells – Clamshell buckets.

BOOKS RECOMMENDED:-

1) Mahesh Varma - Construction planning and management,6th edition,2002.
2) S.V.Deodhar - Construction equipment and job planning,Khanna publishers,4th edition 2010 reprint2012.
3) U.K.Shrivastava - Construction Management, 3rd edition 2005 reprint 2013.
4) Gehlot and Dhir - Construction Management.,2nd edition 1992 reprint 2002.
5) L.S.Srinath - CPM and PERT,PHI, 3rd edition,2012.
6) Peurifoy - Construction Planning and Management,McGraw-Hill,2002
7) Tarachand - Engineering Economics,14th edition 2007
8) Chitkara - Construction Project Management, TMH,NewDelhi,2009
9) R.L.Peurifoy - Construction planning ,Equipments and Methods.
10) Mahesh Verma - Construction equipments and its planning and application, vikas publication

STRUCTURAL DESIGN -I

LAB COURSE OUTLINE

Structural Design – I **SD-I**

ICA (Term Work): 25 Marks

ESE (Oral) : 25 Marks

Course Description:-

In this Laboratory course emphasis is given on analysis & design of different RCC structural members such as beam, slab, column, footing etc. using Indian Standard (IS 456:2000) design code and to prepare detailed drawings of the same

	Hours/ Week	No. Of weeks	Total Hours	Semester Credits
Lectures	2	13	26	1

General Objective:

The primary lab course objective is to analyze and design G+2 building with all the details and relevant drawings for various components of the structure.

Learning Outcomes:

Upon successful completion of this course the student will be able to:

- Calculate various load on the given building structure
- Analyze internal forces in the components of the structure
- Design individual components of structures
- Use IS 456:2000 code requirements for reinforced concrete structures.
- Prepare details and drawing of the given project.

Lab course content:-

1) Structural Layout

a) To prepare a plan of G+2 building (Residential/ Commercial).

b) To draw layout of Ground beam, plinth bean, floor beam, column, slabs etc.

2) Analysis and design of various beams and slabs

a) To calculate of loads and internal forces on beams and slabs.

b) To decide the sections and calculate steel reinforcement.

c) Detailing & drawing of beams, slab.

3) Analysis and design of column and footing

a) To calculate loads and internal forces on columns and footings.

b) To decide the sections and calculate steel reinforcement.

c) Detailing & drawing of column, footings.

4) Analysis and design of dog-legged staircase

a) To calculate loads and internal forces.

b) To calculate steel reinforcement.

c) Detailing & drawing of staircase.

5) A report on at least one site visit.

a) A report on at least one site visit shall be submitted in ICA.

Note-

a) A design report shall be prepared along with showing details on half imperial drawing sheets.
b) A few typical details of beam column etc. shall be shown on A4 / A3 size sheets using drafting software also.

Guidelines for ICA:

ICA shall be based on continuous evaluation of students performance throughout the semester and ICA drawing sheets submitted by the students.

Guide lines for ESE:

ESE will be based on drawing sheets submitted by the student. In ESE the student may be asked to answer questions based on ICA. Evaluation will be based on performance in **oral** examination.

RECOMMENDED BOOKS:

1) B. C. Punmia, Ashok Kr. Jain, Arun Kr. Jain, Limit State Design of Reinforced Concrete, Laxmi Publication, 1st edition 2007
2) P. C. Varghese ,Limit State Design of Reinforced Concrete, PHI, 2nd Edition 2006
3) S. Ramamrutham, R. Narayan ,Design of Reinforced Concrete Structures (conforming to IS 456), Dhanpat Rai Publication, 7th Edition 2013
4) Dr. V. L. Shah and Dr. S. R ,Limit State Theory and Design . Karve, Pune Vidharthi Gruh Publication, Pune, 6th Edition
5) P. Dayaratnram, Limit State Analysis and Design, Wheeler Publishing company, Delhi.,12th edition 2009
6) Pillai Menon ,Reinforced Concrete Design, Tata Mc Graw Hill, New Delhi., 3rd edition 2013

INFRASTRUCTURAL ENGINEERING-I LAB

Lab course outline

Infrastructural Engineering I Lab **I. E. I Lab**

ICA (Term Work) : 25 Marks

Course Description:

This lab course covers the assignments related to theory units about

- Permanent way, track gauges in India, sleepers, ballast & track fittings
- Alignment & geometric design, construction & maintenance of track
- Points & crossings, Stations & yards
- Airport, planning, runway taxiway, heliports
- Harbors, Dry & wet docks, facilities

Practical	**Hours/week**	**No. of weeks**	**Total hours**	**Semester credit**
	02	**13**	**26**	**1**

General Objective:

In this laboratory work student will be introduced to railway Engineering, Airport Engineering & Docks and harbors.

Learning outcomes

Upon successful completion of course the student will be able to

- Understand the permanent way and its gauges.
- Identify various components of permanent way.
- Design of track geometries like gradients type, alignment curve etc.
- Plan the track management systems.
- Suggest type and extent of preliminary survey for construction and maintenance of railway track.
- Know basics involved in the crossing and turnout of railway track.
- Describe the type of signals, principle of interlocking and their working.
- Understand the Civil Engineering aspects of airport.
- Realize working principles and procedures adopted in airport management systems .
- Know basics of docks and harbors and familiar with its construction.

Lab Course Content

Infrastructural Engineering I lab

1. Draw neat labeled sketches of railway track in cutting and in embankment

2. Draw neat labeled sketches of left hand turnout, right hand turnout and different type of crossings.

3. Draw neat labeled plans of different types of railway stations

4. Numerical on geometric design of railway tracks

5. Wind rose diagrams: types and their uses

6. Planning of a terminal building showing all the accessories and spaces

7. Numerical on basic runway length & corrections
8. A Visit to Railway/Airport/ port site& preparation of report

Guide line for ICA:

ICA shall be based on continuous evaluation of student performance throughout the semester and ICA submitted by the student.

RECOMMENDED BOOKS:

1) Saxena S.C. & Arora S. P. A course of Railway Engineering, Dhanpat Rai & Sons, New Delhi.,7th edition,2010
2) Agarwal M. M. – Indian Railway Track, Sachdeva Press, Mayapuri, New Delhi.,5th edition 2013
3) Khanna & Arora, Airport planning & design, Nemchand Bros, Roorkee, Delhi.,3rd edition 2005
4) Rangwala, Airport Engineering, 13th edition,2013
5) G. Venkatappa Rao, Airport Engineering,1st edition,1992.
6) Rao G. V., Airport Engineering, Tata Mc Graw Hill
7) Bindra S. P., Docks & Harbour Engineering, Dhanpat Rai & Sons,1992
8) R. Shrinivasan, Harbour dock & tunnel Engineering, New Delhi.,26th edition,2013
9) Rangwala, Docks and Harbour New Delhi.,3rd editon,2004
10) K. L. Bhanot & S. B. Sehgal, Highway Engineering & Airport.,3rd edition 1996
11) S. P. Bindra, Bridge Engineering, latest edition
12) S. Ponnuswamy, Bridge Harbour.2nd edition,2012

FLUID MECHANICS II

LAB COURSE OUTLINE

FLUID MECHANICS II LAB **FM II LAB**

ICA (Term Work): 25 Marks
ESE (Oral) : 25 Marks

Course Description:

This laboratory covers experiments related to measurement of drag and lift, flow properties in pipes and open channels and also characteristics of hydraulic turbines and centrifugal pump. These include:-

- Study of boundary layer on a flat plate.
- Measurement of drag and lift on airfoil and cylinder.
- Determination of friction factor in pipe flow.
- Study of uniform flow formulae in open channel (Chezy's & Manning's formulae).
- Measurement of Velocity distribution, specific energy, specific force and parameters of hydraulic jump in open channel flow.
- Calibration of Venturi flume / standing wave flume.
- Characteristics of hydraulic turbines and centrifugal pump.

Laboratory	Hours/week	No. of weeks	Total hours	Semester credit
	02	13	26	1

ESE Pattern: Oral

General Objective:

In this laboratory students will be introduced to the applications of viscous property of fluid to measure drag and lift. Also students are introduced to pipe and open channel flows and characteristics of hydraulic turbines and centrifugal pump.

Objective to develop following Intellectual skills:

1. To understand basic laws of fluid friction and to apply the same to solve pipe and open channel flow problems.
2. To learn working of hydraulic turbines and centrifugal pump.
3. To identify principles and working of different apparatus in laboratories.

Objective to develop following Motor skills:

1. Ability to draw diagrams of equipments and characteristics curves of machines on graphs.
2. Ability to perform the experiments and record the observations of pressure, forces, velocity, rotational speed, volume, time, discharge etc.
3. Ability to apply various discharges and measure the corresponding effects.
4. Ability to apply the basic principles in various field conditions.

Learning Outcomes: Upon successful completion of these experiments the student will be able to

- Plot velocity profiles and hence analyze development of boundary layer on flat plate.
- Measure drag and lift forces on airfoil and explain their variation with angle of attack.
- Measure and assess pressure variation over surface of circular cylinder and hence analyze development of drag and lift on cylinder.
- Determine friction factor and hence to develop calibration equation for pipe.
- Measure average velocity, depth in open channel flow and hence to explain uniform flow formulae, specific energy, specific force and hydraulic jump.
- Explain venturiflume and its calibration for discharge measurement in open channel.
- Plot and identify velocity distribution in open channel flow.
- Measure discharge, head, input and output power for different hydraulic turbines and centrifugal pump and hence analyze their various characteristics.

Outline of Content: These experiments contain

1. **Study of boundary layer on flat plate.**
   a. To measure velocities of flow by Pitot tube at various points along the length over a flat plate at various depths (in wind tunnel).
   b. To plot velocity profiles at various points along the length and hence analyze development of boundary layer on flat plate.
2. **Measurement of drag and lift on airfoil.**
   a. To measure drag and lift forces on an airfoil at various angles of attack in wind tunnel with the help of digital force measuring transducer.
   b. To calculate coefficients of drag and lift at various angles of attack and plot polar diagram for studying characteristics of the airfoil.
3. **Determination and analysis of Pressure distribution over circular cylinder.**
   a. To measure pressure at various points on surface of circular cylinder in wind tunnel by multi-limbed manometer.
   b. To calculate coefficients of pressure at these points and plot pressure distribution diagram for analyzing development of drag and lift on cylinder.
4. **Determination of friction factor and calibration equation for given pipe**
   a. To measure pressure difference between two points on a horizontal pipe.
   b. To calculate discharge experimentally through the pipe by measuring volume of water and the required time and hence to calculate the average velocity.

c. To compute friction factor by using Darcy-Weisbach equation.
d. To develop the calibration equation for given pipe by plotting graph of log h_f versus log Q and also compute the graphical value of friction factor.

5. **Study of uniform flow formulae in open channel (Manning's and Chezy's formulae).**
   a. To measure depths of flow at two sections by pointer gauge in an open channel.
   b. To calculate discharge experimentally through the open channel by measuring volume of water and the required time and hence to calculate the average velocity.
   c. To compute Manning's and Chezy's coefficients by knowing the bed slope of the channel.
6. **Study of specific energy and specific force in open channel flow.**
   a. To measure depths of flow at two sections by pointer gauge for a given discharge and for various bed slopes of an open channel.
   b. To calculate discharge experimentally through the open channel by measuring volume of water and the required time and hence to calculate the average velocity.
   c. To calculate specific energies and specific forces and plot these diagrams on graph papers.
7. **Determination of velocity distribution in open channel flow.**
   a. To measure velocity of flow by pitot tube at various points in a cross section.
   b. To plot velocities at these points and draw contours of equal velocities, i.e. isovels.
   c. To calculate discharge experimentally through the open channel by measuring volume of water and the required time and hence to calculate the average velocity.
8. **Calibration of venturiflume.**
   a. To measure depths of flow at inlet and throat of venturiflume by pointer gauge in an open channel.
   b. To calculate discharge experimentally through the open channel by measuring volume of water and the required time.
   c. To compute the discharge analytically by knowing the depths of flow at inlet and throat.
   d. To calculate the coefficient of discharge of the venturiflume.
9. **Measurement of different parameters of hydraulic jump in laboratory or on site.**
   a. To calculate discharge experimentally through the open channel by measuring volume of water and the required time.
   b. To measure conjugate depths of the hydraulic jump.
   c. To compute velocities, Froude numbers, energy loss, length and height of the jump.

10. Study of operating characteristics of Pelton wheel

a. To measure (i) discharge (Q) supplied to the turbine with the help of venturimeter or any other equipment, (ii) pressure by pressure gauge at inlet to turbine, (iii) load on turbine by spring balance and attached loads on brake drum and (iv) speed of the turbine by tachometer.
b. To compute head on turbine, input power (P_a) and output power ($P_{t)}$, specific speed and overall efficiency ($\eta_{t)}$ of the turbine.
c. To plot the operating characteristics (i.e. constant speed) curves for the Pelton wheel, i.e. graphs of (i) P_t and η_t versus Q and (ii) η_t versus P_t.

11. Study of main characteristics of Kaplan turbine.

a. To measure (i) discharge (Q) supplied to the turbine with the help of orificemeter or any other equipment, (ii) pressures by pressure gauge at inlet of turbine and by vacuum gauge at outlet of runner, (iii) load on turbine by spring balance and attached loads on brake drum and (iv) speed of the turbine by tachometer.
b. To compute net head across turbine, input power (P_a) and output power ($P_{t)}$, specific speed (N_S) and overall efficiency ($\eta_{t)}$ of the turbine.
c. To plot the main characteristics (i.e. constant head) curves for the Kaplan turbine, i.e. graphs of (i) unit discharge, unit output power and overall efficiency versus unit speed and (ii) overall efficiency versus specific speed.

12. Study of operating characteristics of Francis turbine.

a. To measure (i) discharge (Q) supplied to the turbine with the help of triangular notch installed in the sump or any other equipment, (ii) pressures by pressure gauge at inlet of turbine and by vacuum gauge at outlet of runner, (iii) load on turbine by spring balance and attached loads on brake drum and (iv) speed of the turbine by tachometer.
b. To compute net head across turbine, input power (P_a) and output power ($P_{t)}$, specific speed (N_S) and overall efficiency ($\eta_{t)}$ of the turbine.
c. To plot the operating characteristics (i.e. constant speed) curves for the Francis turbine, i.e. graphs of (i) P_t and η_t versus Q and (ii) η_t versus P_t.

13. Study of performance of centrifugal pump

a. To measure (i) discharge (Q) supplied to the pump with the help of triangular notch installed in the sump or any other equipment, (ii) pressures by pressure gauge installed on delivery pipe at outlet of pump and by vacuum gauge installed on suction pipe at inlet of pump, (iii) time for one revolution of the energy meter for calculating input power to the pump.
b. To compute manomerric head (H_m) developed by the pump, input power (P_a) to the pump and output power (P_t), specific speed (N_S) and overall efficiency (η_o) of the pump.
c. To plot the operating characteristics (i.e. constant speed) curves for the centrifugal pump, i.e. graphs of manometeric head (H_m), overall efficiency

(η_o) and output power (P_t) versus discharge (Q) and hence to find the discharge, manometeric head and the output power corresponding to the maximum efficiency.

14. **Visit to any hydropower plant.**
    a. The students should study layout of the hydropower plant, type of the turbines installed and their salient features and submit a detailed report of the visit.

    Note: The necessary permission and proof of the visit should be obtained from the concerned authorities and should be available with the head of the department of Civil Engineering.

Note: (i) The ICA will consist of a laboratory journal consisting of seven experiments/assignment. At least seven out of 13 experiments/assignment should be performed. At least one site visit compulsory.

(ii) In the experiments of hydraulic turbines (no. 10, 11 and 12) any characteristics of the turbine, i. e. either main or operating characteristics can be carried out.

Guidelines for ICA:

ICA shall be based on continuous evaluation of students' performance throughout the semester and practical assignments submitted by the students in the form of journal.

Guide lines for ESE:-

ESE will be based on laboratory journal submitted by the student. In ESE the student may be asked to answer questions based on experiments/assignments. Evaluation will be based on performance in **oral** examination.

RECOMMENDED BOOKS:-

2. Dr. A. K. Jain, Fluid Mechanics, Khanna Publishers, Delhi, Edition – 2011.
3. Dr. K. Subramanya, Flow in Open Channels, Tata McGraw-Hill Education Pvt., Ltd., New Delhi, 3rd Edition-2012.
4. Dr. Jagdish Lal, Hydraulic Machines, Metropolitan Book Co. Pvt. Ltd., New Delhi.
5. Dr. P.N.Modi , Dr. S.M. Seth, Hydraulic and Fluid Mechanics, Standard Publications, Delhi, Edition – 2011.
6. Dr. R.K.Bansal, A Textbook of Fluid Mechanics & Hydraulic Machines, Laxmi Publications (P) Limited, 9th Edition, 2012.
7. Som S K and Biswas G – Introduction to Fluid Mechanics and Fluid Machines, Tata McGraw-Hill Publishing Company Ltd., New Delhi.
8. John M. Cimbala, Yunus A. Cengel – Fluid Mechanics : Fundamentals and Applications, McGraw-Hill Higher Education. Second Edition 2010.

ENVIRONMENTAL ENGINEERING I

LAB COURSE OUTLINE

Environmental Engineering Lab. I **EE-I lab**

ICA (Term Work): - 25 Marks

ESE(Practical):- 25 Marks

Course description:-

In this Laboratory the emphasis is given on determining various properties and characteristics of water, design of water supply scheme, design of water distribution scheme and to prepare report on site visit to water treatment plant.

	Hours/week	No. of weeks	Total hours	Semester credit
Practical	**02**	**13**	**26**	**1**

General Objectives:-

To determine various properties & characteristics of water the laboratory & to design water supply scheme.

Learning outcome:-

Upon successful completion of this course the student will be able to

1 Determine various properties of water such as pH value, Acidity, Alkalinity, DO content, Residual Cl_2 etc.

2 Design water supply scheme for various townships.

Lab course content:-

Environmental Engineering I Lab:

ICA consists of

(A) Experiments (minimum eight)

List of Experiments

1. Determination of pH in given water samples
2. Determination of turbidity and optimum dose of coagulant
3. Determination of total solids, dissolved, volatile and fixed solids
4. Determination of alkalinity and acidity of given sample
5. Determination of carbonate and non-carbonate hardness of water
6. Determination of chlorine demand and residual chlorine of water
7. Determination of dissolved oxygen present in the given water samples
8. Determination of Fluoride//iron content in given water sample
9. Determination of Sodium/Potassium/Calcium using flame photometer
10. Most probable number(MPN) Test
11. Determination of conductivity/salinity of water

(B) Assignments (minimum two).

1. Design of water treatment scheme for medium size township
2. Design of water distribution scheme for medium size township.
3. A complete report on site visit to a Municipal Water Treatment Plant.

RECOMMENDED BOOKS:-

1. Physici-chemical processes for water quality control by Walter J Weber, Wiley Inter-science Publications.
2. Garg S.K., "Water Supply Engineering", Khanna Publisher, New Delhi
3. Manual on Water Supply & Treatment, Central Public Health & Environmental Engineering, Organization, Ministry of Urban Affairs, Government of India
4. Therous, Eldridge & Mallmann, "Laboratory Manual for Chemical & Bacteriological Analysis of Water & Sewage", Agro Botanic Publisher, India
5. Laboratory Manual for Environmental Quality Testing, Environmental Protection Research Foundation, Sangli.

TESTING OF MATERIAL I LAB

Lab course outline

Course Title / Subject Title **Short Title**

Testing of Material I Lab **TOM- I Lab**

ICA (Term Work) : 50Marks

Course Description:

This laboratory course introduces students to various types of concrete and alternative construction materials, related laboratory tests and non destructive tests.

	Hours/ week	No. of weeks	Total hours	Semester credit
Theory	**1**	**13**	**13**	**2**
Practical	**02**	**13**	**26**	

Lab Course Content

Prerequisite Course: Concrete Technology.

General Objective: - In this laboratory work students will be introduced to concrete mix design by IS & IRC codes. They will also know various alternative construction materials and their applications**.**

Learning Outcomes:-

Upon successful completion of this course the student will be able to:

- Perform laboratory testing of civil engineering materials.
- Plan and execute testing schedule for Civil Engineering project.
- Know the provisions of Indian standard codes for related civil engineering materials
- Understand different Non Destructive tests and their applications.

COURSE CONTENT

Unit – I **No. of Lect. – 5, Marks: 10**

Concrete Mix Design by IS and IRC/Road Note No.4 Method

Unit – II **No. of Lect. – 2, Marks: 10**

Concept & use of non destructive testing such as Ultrasonic pulse velocity, rebound hammer, half cell potential, carbonation depth, and core test etc.

Unit – III **No. of Lect. – 2, Marks: 10**

Study of Precast and Pre stressed Concrete – Precast concrete and its uses, introduction to Pre stressed concrete, types of pre stressing methods.

Unit – IV **No. of Lect. – 2, Marks: 10**

Fiber Reinforced Concrete – Introduction, classification, mechanism, role of fiber size, and its application

Unit – V **No. of Lect. – 2, Marks: 10**

Alternative materials (Fly ash,stabilized soil , construction and demolition waste, Fibre Reinforced Polymer, Glass Fibre Reinforced Plastics, Bamboo as construction material: uses and suitability, ferro-cement etc.)

Lab Course Content

Group A) It will contain of any **Five** experiments out of following set-

1) Concrete Mix Design (M15/M20/M25) by IS Method and compressive strength at 7days and 28days.
2) Concrete Mix Design (M15/M20/M25) by IRC Method and compressive strength at 7days and 28days.
3) Rebound hammer test on concrete.
4) Ultrasonic Pulse velocity test.
5) Determination of Modulus of Elasticity of Concrete by extensometer.
6) Effect of admixtures on concrete strength
7) Experimental investigation of effect of aggregate gradation and fineness on concrete properties.
8) Compressive strength of Paver blocks
9) Compressive strength of Solid/ Hollow blocks

Group B) At least one site visit to civil engineering project/ready mix concrete plant should be arranged.

Guide line for ICA:
ICA shall be based on continuous evaluation of student performance throughout the semester and ICA submitted by the student.

RECOMMENDED BOOKS:

1. M L Gambhir Neha Jamwal : Building & construction materials lab manual : McGraw Hill Education (India) Pvt. Ltd.
2. Dr. Janardan, Jha, Engineering Materials, Khanna Publishers
3. R. K Rajput, Engineering Materials, S. Chand
4. Parbin Singh, Civil Engineering Materials, S. K.Kataria & Sos New Delhi.
5. Dr. A. V. Narasimha Rao, Fundamentals of Soil Mechanics, University Science press.
6. S.K. Duggal, Building Materials, New Age International Publishers.
7. M. S. Shetty, Concrete Technology, S Chand Publication.
8. M. L. Gambhir, Concrete Technology, TMH Publication.

9. S. V. Deodhar, Concrete Technology, Central Techno Publication
10. N.V. Nayak & A.K. Jain, Concrete Technology, Narosa Publishing House Pvt. Ltd.
11. Kulkarni P.D. Ghosh, R.K. Phull Y.R., Concrete Technology, New Age International.
12. M.L. Gambhir, Concrete Manual, Dhanpat Rai & Co.

Industrial Training/EDP/Special Study

COURSE CONTENT

Course Title	Short Title	Course Code
Industrial Training / EDP / Special Study	**IT/EDP/SS**	

Semester-V **Examination Scheme**

Total Semester Credits: 02 **Internal Continuous Assessment (ICA): 25 Marks**

Teacher should facilitate learning of following real life working environment, new knowledge, skills, and current technologies.

Industrial Training	• Student shall undergo industrial training for a minimum period of **two weeks** during summer vacations between fourth semester and fifth semester. • The industry in which industrial training is taken should be a medium or large scale industry • The paper bound report on training must be submitted by the student in the beginning of Fifth semester along with a certificate from the company where the student took training. • Every student should write the report separately. • Institute / Department/T&P Cell have to assist the students for finding Industries for the training. • Students must take prior permission from Department before joining for Industrial Training.
EDP (Entrepreneurship Development Program)	• Student has to participate in Entrepreneurship Development Program for a minimum period of **One week** during summer vacations between fourth semester and fifth semester. • Every student must submit the paper bound report based on the program in the beginning of Fifth semester along with a certificate (Course / Program completion) from the program organizers. • Every student should write the report separately. • Institute / Department may arrange Entrepreneurship Development Program at their campus. • Students must take prior permission from Department before attending any Entrepreneurship Development Program.
Special Study	• Student has to submit name of three topics of his interest to the department. • Special study in a group shall not be allowed. • The three-member committee appointed by Head of Department shall allot one topic out of the three topics submitted by the student. • Every student must submit the paper bound report based on special study at the end of Fifth semester.

	• Department should allot guide to all such students, for monitoring their progress and guide them for literature survey / report writing etc. • Evaluation of special study shall be done based on presentation made by student, followed by brief question answer session.

Guide lines for ICA:

Assessment shall be based on the active participation of the students in the Industrial Training / EDP / Special study and based on knowledge / skill acquired by the student. The three-member committee appointed by Head of Department in consultation with the Principal shall assess the reports and award marks based on following:

(a) Report	10 marks.
(b) Presentation	10 marks.
(c) Viva-voce at the time of presentation	05 marks.
Total:	**25 marks.**

NORTH MAHARASHTRA UNIVERSITY,

JALGAON (M.S.)

Third Year Engineering

(CIVIL)

Faculty of Engineering and Technology

COURSE OUTLINE

TERM – VI

W.E.F 2014 – 2015

STRUCTURAL DESIGN – II

COURSE OUTLINE

Structural Design – II **SD – II**

Course Description:

This course aims to provide an introduction to design of steel structures through the use of the Indian Standard (IS 800:2007) design code. It deals with the design of individual members and connections, such as, the design of riveted/bolted and welded connections, design of tension members, compression members, beams, and beam columns; plate girders, also to equip the students with the tools necessary for designing steel structures and to familiarize them with the relevant national design code.

Lecture	Hours / Week	No. of Weeks	Total Hours	Semester Credits
	03	13	39	03
Tutorial	--	--	--	

General Objective:

This course is to serve as an introduction to the concepts in structural steel design through the use of the Indian Standard IS 800:2007 design code. It deals with analysis and design of individual members and connections such as the design of tension members, compression members, beams, and beam columns; plate girders and bolted and welded connections, etc. The primary course objective is to equip the students with the tools necessary for designing steel structures and to familiarize them with the relevant national design codes.

Learning Outcomes:

Upon successful completion of this course the student will be able to:

- Understand types of steel structures, grades of structural steel, various rolled steel sections, relevant IS specifications.
- Understand types of Connections, bolted & welded Connections.
- Analyze & design axially loaded tension, compression members.
- Analyze & design built-up compression members.
- Analyze & design roof truss.
- Analyze & design flexural members and column bases.
- Analyze & design of compound beams.
- Analyze & design welded plate girder.

COURSE CONTENT

Structural Design – II **SD-II**

Lecture: 03 hours / week **End Semester Examination (ESE): 80 Marks**
Practical: 02 hrs/week **Paper Duration (ESE) : 04 Hours**
Internal Sessional Exam (ISE) : 20 Marks

Design should be based on IS 800-2007

UNIT – I **(07 Hours 16 marks)**

a) Introduction: Types of steel structures, grades of structural steel, various rolled steel sections, relevant IS specifications such as IS 800-2007, IS:808-1989, IS:875 part I to III & V, SP: 6(1), SP: 6(6), IS:4000-1992, codes for welded connections. Limit state method of design for strength and serviceability, partial safety factor for load and resistance, various design load combinations.

b) Types of Connections: Strength of bolted & welded Connections, Design of connections subjected to Axial Forces & Moments. Beam to beam & beam to column connection (framed connections)

UNIT – II **(08 Hours 16 marks)**

a) Tension member: Behaviour, Modes of failure – Yielding of cross-section, Rupture, block shear. Design of single and double angle sections with gusset plate with bolted and welded end connections.

b) Compression member: Behaviour – effective length, slenderness ratio, Modes of failure- failure with full strength, local buckling, torsional buckling. Classification of cross sections, Buckling curves, Design of compression members with bolted and welded connection using single and double angle sections.

UNIT – III **(08 Hours 16 marks)**

a) Design of built-up column: Built up Column. Design of lacing. Introduction to battened column, design of connections.

b) Roof truss: Design of members for DL, LL and WL, detailing of typical joints and supports.

UNIT – IV **(08 Hours 16 marks)**

a) Flexural member- Laterally supported beams using single rolled steel section with and without flange plate, strength in flexure, low and high shear, check for deflection. Secondary and main beam arrangement for floor of a building, design of beam to beam and beam to column connections using bolt / weld. Design of purlin.

b) Column bases: Column bases under axial load: design of slab base, gusseted base

UNIT – V **(08 Hours 16 marks)**

a) Compound beams: Design of compound beams.

b) Design of welded plate girder: design of cross section, curtailment of flange plates, stiffeners and connections

RECOMMENDED BOOKS:-

1. Subramanian N.,Design of Steel Structures., Oxford University Press, New Delhi, 2008
2. Shah V. L. & Gore ,Limit state design of Steel Structure, Structures Publication, Pune, 5th Edition.
3. Duggal S. K.,Limit State Design of Steel Structures, Tata Mc Graw Hill publishing company Ltd., New Delhi, 3rd Edition, 2009
4. Bhavikatti S. S ,Design of Steel Structure by Limit State Method as per IS: 800-2007., I K International Publishing House, New Delhi, 3rd Edition
5. Ram Chandra, Design of Steel Structures Vol.I & Vol.II, Standard Book House, New Delhi, 10th Edition, 2011

THEORY OF STRUCTURE - II

Theory of Structure - II **TOS – II**

Course Description:

This course covers the introduction to the analysis of statically indeterminate beams and rigid frames. Methods taught include slope deflection, moment distribution, approximate analysis of frames, matrix analysis and plastic analysis.

Lecture	Hours / Week	No. of Weeks	Total Hours	Semester Credits
	03	13	39	03
Tutorial	--	--	--	

General Objective:

The primary course objective is to equip the students with the methods necessary for analyzing various types of structures such as trusses, continuous beams and frames. It deals with the fundamental concepts of flexibility and stiffness method of structural analysis. The course also covers introduction to plastic analysis for steel structures

Learning Outcomes:

Upon successful completion of this course the student will be able to:

- Know basic concepts and principles for analysis of structures
- Understand the basic methods of analysis in structural engineering.
- Determine internal forces in various structures such as trusses, continuous beams and frames
- Solve statically indeterminate structures using flexibility and stiffness method
- Understand various concepts in plastic analysis such as shape factor, plastic hinge, collapse mechanism and applications of plastic theory to beams and single story rectangular frames

COURSE CONTENT

Theory of Structure - II **Semester – VI**

Teaching Scheme	**Examination Scheme**
Lecture: 3 hours / week	**End Semester Examination (ESE) : 80 Marks**
	Paper Duration (ESE) : 03 Hours
	Internal Sessional Exam (ISE) : 20 Marks

UNIT – I **(08 Hours 16 marks)**

a) Basic concepts of Structural Analysis:- Types of skeletal structures, static and kinematics indeterminacy, equilibrium and compatibility conditions, stress-strain relations, force-displacement relations, concept of linear/non-linear structures. Energy theorem, Miller Breslau principle, Concept of complementary energy, Fundamental concept of Force and the displacement method of analysis.

b) Slope deflection method:- Applied to continuous and rigid jointed frames, transverse and rotational yielding of supports.(up to three unknown).

UNIT – II **(08 Hours 16 marks)**

a) Moment distribution method: - Applied to continuous beams and rigid jointed rectangular frames, transnational and rotational yielding of supports.

b) Approximate Analysis of Multistory Frames: - Vertical and lateral loads, substitute frame, portal frame and cantilever method.

UNIT – III **(08 Hours 16 marks)**

Fundamental concept of flexibility: - Method for structural analysis , flexibility coefficient, matrix formulation for flexibility methods, degree of freedom. Influence coefficients, physical significance, choice of basic determinate structure and redundant forces, compatibility equations, effect of settlement and rotation of supports, temperature and lack of fit, hand solution of simple problems on beams, pin jointed plane truss and rigid jointed frames (Involving not more than three unknown)

UNIT – IV **(07 Hours 16 marks)**

Fundamental concept of Stiffness: - Method of structural analysis, stiffness coefficient, matrix formulation for stiffness methods, Degree of freedom.

Influence coefficients, physical significance, effect of settlement and rotation of trusses and rigid jointed plane frames (involving less than three unknown)

UNIT – V **(08 Hours 16 marks)**

Plastic Analysis of Steel Structures :- Introduction, Shape factor, plastic hinge, collapse mechanism, upper bound and lower bound theories, application to continuous, fixed and single bay single storey rectangular frames.

Assignments

It shall consist of at least one assignments based on each unit.

RECOMMENDED BOOKS

1. Punmia B. C. – Theory of Structure, Laxmi Publication.
2. Bavikatti S. S. - Structural Analysis, New Age Publicatio.
3. Ramamruthum S. Theory of Structure, Dhanpat Rai & Sons Publication.
4. Pandit & Gupta -Structural Analysis,TataMcGrawHill,Pub. Co.Ltd ., New Delhi
5. Wang C.K.-Intermediate structural analysis, McGraw Hill, New York.
6. Kinney- Streling J. Indeterminate structural Analysis, Addition Wesley.
7. Reddy C.S.-Basic Structural Analysis, Tata McGraw Hill Pub. Co. New Delhi.
8. Weaver W & Gere J.M-Matrix Method of framed Structures CBS Publishers & Distributors, Delhi.
9. Ghali A & Neville M. Structural Analysis- A Unified classical and matrix Approach, Chapman and Hall, New York.
10. Vaidyanathan & Perumal – Theory of Structure Vol. I & II, Laxmi Publication.
11. Negi L. S. & Jangid - Theory of Structures, Tata McGraw Hill Pub. Co. New Delhi.

GEOTECHNICAL ENGINEERING – I

Geotechnical Engineering-I **GTE-I**

Course Description

The aim of this course is to equip the students about the principles of mechanics and hydraulics needed to understand soil behavior such that they can apply those abilities to solve more complex problems in practice.

Teaching Scheme
Lecture: 3 hours / week
Credits: 3
Practical: 2 hours / week

Examination Scheme
ESE (Theory Paper) : 80 Marks
Paper Duration (ESE) : 03 Hours
ISE (Class Test) : 20 Marks
ICA (Term work): 25 marks
ESE (Oral): 25 marks

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lectures	3	13	39	3
Practical	2	13	26	1

General Objective:

The primary objectives of this course is to

- Introduce the subjects of soil mechanics, basic terms and relationship between them.
- Classify soils based on soil classification systems in the lab and on the field.
- Define various properties of soil
- Define soil permeability, carry out seepage analysis and understand the characteristics of flow nets.
- Describe compaction and consolidation of soils and difference between them
- Introduce to effective stress principle and describe shear strength of soil, types of shear tests, principal stresses and relation between them

Learning Outcomes:

Upon successful completion of this course the student will be able to:

- Know the basic principles of soil mechanics,
- Describe various index / engineering properties of soil and measurements of the same.
- Predict soil behavior under the application of loads.
- Solve problems in practice.

Course Content

Geotechnical Engineering I **Semester-VI**

Teaching Scheme

Lecture: 3 hours / week
Credits : 3
Practical: 2 hours / week

Examination Scheme

ESE(Theory Paper) : 80 Marks
Paper Duration (ESE) : 03 Hours
ISE (Class Test) : 20 Marks
ICA (Term work) : 25 marks
ESE (Oral) : 25 marks

Unit – I **No. of Lect. – 8, Marks: 16**

a) Soil as Engg. Material: Origin and formation of soil, geotechnical problems, volume-weight relationships, three phase system, definitions, functional relationships.

b) Geotechnical Properties: Index properties, engineering properties, Atterberg's limits, sieve analysis and its classification systems, and identification of soil.

Unit – II **No. of Lect. – 8, Marks: 16**

a) Stresses in Soil: Geostatic stresses, Boussinesq's Theory, point load, circular load, pressure bulb and its significance, Introduction to Westergaard's theory and Newmark's chart, stress strain relationship soil modulus, elastic settlement.

b) **Soil Compaction and Stabilization:** Methods of Compaction, M.D.D. and O.M.C., standard proctors test, heavy compaction test, Concept of stabilization and its methods.

Unit – III **No. of Lect. – 9, Marks: 16**

a) Consolidation Theory: Terzaghi's theory, consolidation test, rate of settlements, Normal consolidated and over consolidated deposits, Pre consolidation pressure.

b) Flow of water through soils: soil water, capillarity, Darcy's law, laboratory measurement of permeability, simple field measurement, flow net, its construction and uses, seepage force, quick sand, critical gradient.

Unit – IV **No. of Lect. – 7, Marks: 16**

a) Shear resistance in soil: Pore pressure and effective stresses failure theories, Mohr stress circle, Mohr's Coulomb's failure theory, law of shear strength,

b) Measurement of Shear Strength: Direct shear test, Tri-axial test, Unconfined compression test, Vane shear test, factors affecting the shear strength, effect of drainage conditions.

Unit – V **No. of Lect. – 7, Marks: 16**

a) Introduction to Earth Pressure: Introduction, Rankine's state of Plastic Equilibrium in soils, Active and Passive states due to wall movement, Earth Pressure at rest.

b) Earth Pressure determination: Rankine's Theory- Earth pressure on Retaining wall due to submerged backfill, Backfill with uniform surcharge, backfill with sloping surface, layered backfill. Coulomb's Wedge theory, Rebhann's and Culmann's graphical method of determination of earth pressure.

RECOMMENDED BOOKS:

1) Dr. B.C.Punmia, Soil Mechanics and Foundation Engineering, Laxmi Publications,16th Edition 2005.
2) Gulhati and Datta , GeoTechnical Engineering, 2000 4th Edition,Tata McGraw Hill.
3) Dr. Alam Singh, Soil Engineering in Theory and Practice (Vol.II), CBS Publication,2006 2nd Edition Delhi.
4) Dr. Alam Singh, Modern Geotechnical Engineering & Foundation, CBS Publication, Delhi.
5) Ramamurthy T.N. and Sitharam T.G., GeoTechnical Engineering,5th Edition,S.CHAND publication.
6) Venkatramaiah C., Geotechnical Engineering,2013 4th Edition.
7) V. N. S. Murthy, Soil Mechanics and Foundation Engineering, Saitech Publications.2004 1st Edition.
8) K. R. Arora, Soil Mechanics and Foundation Engineering, Standard Publishers and Distributors, New Delhi.2010 7th Edition.
9) Taylor, D. W., Fundamentals of Soil Engineering, John Wiley & Sons
10) K. Terzaghi, Soil Mechanics in Engg. Pracice, John Wiley & Sons
11) Relevant Indian Standard Specifications & Codes, BSI Publications, New Delhi.

INFRASTRURAL ENGINEERING II

Infrastructural Engineering II **IE – II**

Course Description

This course introduces the students to various concepts in highway, bridge & traffic engineering and advanced urban technologies. Also it deals with techniques of tunneling in soft and hard rocks and alignment of tunnel.

Lectures	**Hours/ week**	**No. of weeks**	**Total hours**	**Semester credit**
	03	**13**	**39**	**3**
Tutorial	**---**	**---**	**---**	

General Objectives:

The basic objective of this course is to introduce the students about

- Highway planning for rural and urban road.
- Various types of field surveys.
- Highway geometric deign
- Construction of roads and suitability of various materials.
- Traffic engineering and advanced urban transport technologies.
- Types of bridges and suitability of each type.
- Tunneling in soft and hard rocks and alignment of tunnel.

Learning Outcomes:

Upon successful completion of this course the student will be able to

- Understand developments, classification of roads and highway planning in India.
- Select the material for use in different road layers.
- Know the construction techniques for rural and urban roads.
- Recognize traffic studies, traffic control devices and traffic operation.
- Design road geometries as per IRC conditions.
- Provide effective suggestions for construction and maintenance of any type of road.
- Know classification, construction and maintenance of bridges.
- Understand basics of tunneling and its construction.

Course Content

Infrastructural Engineering II **Semester VI**

Teaching Scheme **Examination Scheme**

Lectures: 3 hours / week **End Semester Examination (ESE):-80 marks**

Paper Duration (ESE): 3 hours **Internal Sessional Exam.(ESE):-20 marks**

Unit-1 (8 hours, 16 marks)

a. **Highway Planning and Development:**
   Highway planning in India, development, rural and urban roads, road, departments in India, road classification, road authorities i.e. IRC, CRRI, NHAI, etc., Financing of road projects, road safety audit.
b. **Field Surveys:** Reconnaissance, aerial surveys, location surveys, location of bridges.
   Highway alignment: Basic requirements of an ideal alignment and factors controlling it, special requirements for hill roads.
c. **Highway Geometric Design:** Topography and physical features, cross section elements like carriageway width, formation width, right of way, etc., friction, Light reflecting characteristics, roughness, camber, sight distances, horizontal alignment, design speed, super-elevation, transition curve, gradients.

Unit-2 (8 hours, 16 marks)

a. **Road Materials:** Aggregates and their types, physical and engineering properties, Fillers, bitumen, characteristics, emulsions and cutbacks, basic tests on all materials, soil investigation, test on soil; CBR, plate load test.
b. **Construction of Roads:** Stabilized earth, gravel roads, W.B.M. roads, high cost Roads: bituminous roads, cement concrete roads.
   Highway Drainage: Surface and sub-surface drainage arrangements,
c. **Highway Pavements:** Design of Flexible (G.I. method and CBR method using IRC recommendations) and rigid pavements (Westergaurd wheel load analysis), Maintenance & Strengthening of pavements.

Unit-3 (8 hours, 16 marks)

a. **Traffic Engineering:** Road user characteristics, vehicular characteristics, traffic flow characteristics, speed, traffic volume studies, parking studies - definition, purpose, types, survey methods. Accident studies - purpose, types, causes, collision diagram, condition diagram, preventive measures
b. **Traffic control devices**: pavement marking, signs, signals, Traffic management, various types of intersection and their design criteria, Traffic Simulation & it's advantages,
   Roadside Developments: Arboriculture, street lighting.

c. **Advanced Urban Transport Technology:** Classification, mass and rapid transit system, introduction to intelligent transportation System (ITS), electronic toll Collection.

Unit-4 (8 hours, 16 marks)

a. Bridges: Site investigation, waterway calculations, scours depth, afflux, and economic span.
b. Classification & suitability: Classification of superstructures with respect to structural behavior and material used types of substructures, flooring joints, movable bridges, and temporary bridges.
c. Construction methods & Maintenance: Methods of erection of various types of bridges, testing and strengthening of bridges.
d. Bridge Bearings & Foundation: Suitability for each type of bridges

Unit-5 (7 hours, 16 marks)

a. **Introduction to Tunneling**: Need, classification, advantages and disadvantages of tunnels compared to open cuts, shape and size of tunnel shafts, pilot tunnels, Alignment of Tunnel.
b. **Tunneling in hard rock:** Meaning of the term 'Faces of Attack', Mucking, methods of removal of muck, heading and benching method, drilling-patterns, blasting, tunnel lining(rock bolting and strata anchoring), methods of Ventilation, Lighting and aspects of drainage, Dust control, Safety in tunnel construction

   Tunneling in soft materials: mucking, forepoling and shield methods, needle beam method, modern tunneling methods.

RECOMMENDED BOOKS:

1. L. R. Kadiyali, N B. Lal, Principles & practice of Highway Engineering, Khanna Publication, 2005.
2. Khanna & Justo, Highway Engineering, Nemchand Bros
3. Rangwala, Highway Engineering, Charotar
4. K. L. Bhanot & S. B. Sehgal, Highway Engineering & Airport
5. S. P. Bindra, Bridge Engineering, Khanna Publication
6. S. Ponnuswamy, Bridge Harbour.
7. Rangwala, Tunnel Engineering,Charotar
8. S. C. Saxena, Tunnel Engineering,Charotar
9. L. R. Kadiyali, Traffic Engineering & Transport Planning, Khanna Publishers

CONSTRUCTION MANAGEMENT – II

Construction Management – II **CM – II**

Course Description: This subject deals with various laws and acts applicable to construction industry, safety measures in construction works, material management, tender and contract systems, various pile driving and compacting equipments.

Lectures	Hours / Week	No. of weeks	Total hours	Semester credit
	03	13	39	03
Tutorial	--	--	--	--

General Objective:

The general objective of this course is to know the important acts and laws related to Construction Industry and safety measures with respect to material handling, managing the materials using different analysis methods, contract and tendering system in construction sector. Also it aims to explain various pile driving, compacting and hoisting equipments.

Learning Outcomes:

Upon successful completion of this course the student will be able to:

- Know various acts in construct on industry like Factory act, Workman compensation act, etc.
- Understand safety measures in handling of building materials. Causes of accidents and their reports.
- Explain material management and inventory analysis by using various analysis methods like ABC Analysis, FSN Analysis, etc.
- Discuss technical terms like buffer stock, EOQ, Material planning, etc.
- Describe quality control management as per ISO.
- Explain and understand the concept of Contract and tendering systems in the construction industry.
- Discuss the various pile driving, compacting, hosting equipments also explain the advance construction equipments like crushers, RMC plants and cranes.

Course Content

Construction Management – II **Semester VI**

Teaching Scheme **Examination scheme**

Lectures: 3 hours / week **End Semester Examination (ESE) : 80 marks**

Paper Duration (ESE): 3 hours **Internal Session Exam. (ESE) : 20 marks**

UNIT –I (07 Hours, 16 marks)

a) Important acts and laws related to constructions Industry- factory act, the employees provident fund Act, minimum wage act, workman compensation act, Indian trade union act, arbitration act,

b) Safety measures in handling of building materials, construction of elements of building, demolition of buildings, hot bituminous works, scaffolding, formwork and other equipments, excavation, causes of accidents and preparing accident reports.

UNIT–II (08 Hours, 16 marks)

Materials management, its aims and functions, inventory analysis, inventory models, ABC analysis, inventory management, buffer stock, lead time, EOQ, material requirement, planning, market research, system of purchase of materials, stock of material at site, MAS account, supervision and quality control, concept of quality, stages of control, measures of control, quality control management, introduction to ISO 9000 and ISO 14000.

UNIT—III (10 Hours, 16 marks)

Contract, essentials, types, registration and law of contract, free consent, contract documents, performance of contract, breach of contract, advances to contractor, bills of contract and payments , subletting , inspection of works, tender, tender notice ,various terms used in tender notice such as SD, EMD, estimated cost, time period of work ,cost of tender form, invitation of tender, concept of e-tendering, time schedule of calling tender, tender documents two envelopes system, scrutiny and acceptance , revocation of tender, extra items , additions and alterations , defect liability , liquidated and un-liquidated damages , escalation of rates, work order.

UNIT IV (07 Hours, 16 marks)

a) Pile driving Equipments:-

Pile hammers, drop, single acting steam, double acting steam, differential acting steam, diesel, vibratory , hydraulic hammers , sonic hammers, selection of pile driving hammers.

b) Crushers – types, primary, secondary, tertiary crushers, jaw, gyratory, cone crushers, hammer mills, roll crushers, rod and ball mills Screening aggregate, revolving, vibrating screens

c) Ready mix concrete plant- central concrete batch plant, portable concrete batch plant, ready mixed concrete – central mixed , shrink mixed, truck mixed concrete, concrete pumps.

UNIT –V (07 Hours, 16 marks)

a) Compacting Equipments:-

Types of compacting equipments such as tamping rollers, smooth wheel rollers, pneumatic tired rollers,

b) Hoisting equipments:

Cranes: Classification, derrick crane, mobile crane, Tower crane, Hydraulic crane, overhead or gantry crane, use of cranes in steel construction, use of cranes in concrete construction and safety in crane operation.

RECOMMENDED BOOKS:

1) R.L.Peurifoy - Construction planning, Equipments and Methods.
2) Mahesh Verma - Construction equipments and its planning and application, Vikas publication
3) U.K. Shrivastava - Construction planning and Management, 3rd edition 2005 reprint 2013
4) S.V.Deodhar - Construction equipment and job planning,Khanna publishers,4th edition 2010 reprint2012.
5) Chitkara - Construction Project Management, TMH,NewDelhi,2009
6) B.N.Dutta - Estimating and Costing, UBS Publishers
7) M.Chakroborty - Estimating and Costing, EWP
8) B.S.Patil - Estimating and Costing -Vol-1& 2, Orient Blackson
9) Seetharaman – Construction Engineering and Management, Umesh Publication.
10) P.S.Gahlot & B.M.Dhir – Construction Planning & Management-2010

STRUCTURAL DESIGN – II

LAB COURSE OUTLINE

Structural Design – II **SD – II**

ICA (Term Work): 25 Marks

ESE (Oral) : 25 Marks

Course Description:-

In this Laboratory course emphasis is given on analysis & design of different structural members such as roof truss, components of industrial building, welded plate girder, etc. using Indian Standard (IS 800:2007) design code and to prepare detailed drawings of the same

	Hours/ Week	No. Of weeks	Total Hours	Semester Credits
Lectures	2	13	26	1

General Objective:

The primary lab course objective is to analyze and design Roof Truss, an Industrial Building, Welded Plate Girder and prepare relevant drawings and details for these structures.

Learning Outcomes:

Upon successful completion of this course the student will be able to:

- Analyze dead load, live load, wind load as per IS: 875 Part I to III & design of various components of roof truss as per IS 800:2007.
- Calculate member forces, design main beam & secondary beams, connections, columns, column bases for an industrial building.
- Analyze & design welded plate girder
- Prepare details and drawing of the above project.

Lab course content:-

1) Design of Roof Truss

a) Load analysis-dead load, live load, wind load as per IS: 875 part I to III

b) Design of various components roof truss by IS 800:2007

c) Detailing & drawing of roof truss.

2) Design of an Industrial Building

a) Analysis of industrial building: Calculations of member forces.

b) Design of main beam & secondary beams, connections, columns, column bases.

c) Detailing & drawing of various components of industrial building.

3) Design of Welded Plate Girder

a) Analysis of welded plate girder- Calculation of maximum shear force and maximum bending moment.

b) Design of web plate for shear, design of flange plate for bending moment, design of web stiffeners, design of intermediate stiffeners, design of bearing stiffeners, curtailment of flange plate

4) A report on at least one site visit.

Drawing shall be on half imperial sheets. At least one sheet of above three designs shall be in A3/A4 size sheets using drafting software.

Guidelines for ICA:

ICA shall be based on continuous evaluation of student's performance throughout the semester and ICA drawing sheets submitted by the students.

Guide lines for ESE:

ESE will be based on drawing sheets submitted by the student. In ESE the student may be asked to answer questions based on ICA. Evaluation will be based on performance in **oral** examination.

RECOMMENDED BOOKS:-

6. Subramanian N.,Design of Steel Structures., Oxford University Press, New Delhi, 2008
7. Shah V. L. & Gore ,Limit state design of Steel Structure, Structures Publication, Pune, 5th Edition.
8. Duggal S. K.,Limit State Design of Steel Structures, Tata Mc Graw Hill publishing company Ltd., New Delhi, 3rd Edition, 2009
9. Bhavikatti S. S ,Design of Steel Structure by Limit State Method as per IS: 800-2007., I K International Publishing House, New Delhi, 3rd Edition
10. Ram Chandra, Design of Steel Structures Vol.I & Vol.II, Standard Book House, New Delhi, 10th Edition, 2011

GEOTECHNICAL ENGINEERING–I

Geotechnical Engineering I Lab **GTE -I Lab**

Course Description:

This laboratory course covers experiments related to properties of soils and measurement of the same.

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Practical	2	13	26	1

Lab Course Content:

Any **eight** experiments out of following set-

1. Field density by core cutter method, sand replacement method.
2. Sieve analysis and particle size determination or hydrometer analysis.
3. Specific gravity determination by voluminometer/ pycnometer method.
4. Determination of liquid limit and plastic limit
5. Determination of shrinkage limit
6. Determination of co-efficient of permeability by constant head and falling head method.
7. Direct shear test.
8. Unconfined compression test
9. Vane shear test.
10. Proctor's test (MDD / OMC)
11. Tri- axial shear test
12. C.B.R. test or Consolidation test
13. Differential free swell test or swelling test.
14. Any one of the following assignments using software / programming –
    a) Classification of Soils.
    b) Construction of Pressure bulb.
15. Assignments on the following topics
    a) Rebhann's and Cullman's graphical method for determination of earth pressure.
    b) Solution of problems on shear strength parameters using graph.

Guidelines for ICA :

ICA shall be based on continuous evaluation of students' performance throughout the semester and practical assignments submitted by the students in the form of journal.

Guide lines for ESE:-

ESE will be based on laboratory journal submitted by the student. In ESE the student may be asked to answer questions based on experiments/assignments. Evaluation will be based on performance in **oral** examination.

RECOMMENDED BOOKS:

1. Dr. B.C.Punmia, Soil Mechanics and Foundation Engineering, Laxmi Publications,
2. Gulhati and Datta , GeoTechnical Engineering, Tata McGraw Hill.
3. Dr. Alam Singh, Soil Engineering in Theory and Practice (Vol. -1), CBS Publication, Delhi.
4. Dr. Alam Singh, Modern Geotechnical Engineering & Foundation, CBS Publication, Delhi.
5. Ramamurthy T.N. and Sitharam T.G., GeoTechnical Engineering,
6. Venkatramaiah C., Geotechnical Engineering,
7. V. N. S. Murthy, Soil Mechanics and Foundation Engineering, Saitech Publications.
8. K. R. Arora, Soil Mechanics and Foundation Engineering, Standard Publishers and Distributors, New Delhi.
9. Taylor, D. W., Fundamentals of Soil Engineering, John Wiley & Sons
10. K. Terzaghi, Soil Mechanics in Engg. Pracice, John Wiley & Sons
11. Relevant Indian Standard Specifications & Codes, BSI Publications, New Delhi.

INFRASTRUCTURAL ENGINEERING II

Lab course outline

Infrastructural Engineering II **IE – II**

ICA (Term Work) : 25Marks

ESE (oral) : 25Marks

Course Description:

The course in infrastructural engineering incorporates experimental methods, assignments and site visits. The experimental methods are as it is given by the Indian standard code for practice. It includes assignments based upon the data analysis and design, in order to fill the gap between theory and practice through real world exposure. It proposes a site visit to a major road project and also to a hot mix plant. Such site visits will enable the students with the real engineering constraints faced by a civil engineering at site.

Practical	**Hours/ week**	**No. of weeks**	**Total hours**	**Semester credit**
	02	**13**	**26**	**1**

General objectives:

The basic objective of this syllabus is to appraise the students with experimental methods as applicable for various civil engineering materials used for road construction. It also includes the introduction to the IS practices applicable at every stage of the Lab work including sampling, testing in the laboratory and data interpretation. Over and above, the syllabus also aims to introduce the students with the real world situation through site visit. The experimental data can be used for design and this aspect is covered by assignments on certain topic of the syllabus.

Learning outcomes:

- Student will be aware of the IS codes prevailing in the testing of road construction materials
- Student will be well versed with the experimental methods as applicable for the testing of common road construction material.
- Student will be able to design flexible and rigid pavement.
- Student will be aware of the site constraints and real working environment situations.

Lab Course Content

A) Any **six** experiments on bitumen out of following set.

1. Penetration test
2. Ductility of Bitumen
3. Softening point of Bitumen
4. Flash & fire point

5. Specific gravity of Bitumen
6. Viscosity of Bitumen
7. Stripping value of road aggregates.
8. Bitumen extraction test(on premix sample)

B) Bituminous mix design Marshal Stability test

C) Numerical based on Flexible Pavement Design

D) Numerical based on Rigid Pavement Design

E) A report on at least one site visit.

Visit to construction site of major road projects, hot mix plant etc.

Guide line for ICA:

ICA shall be based on continuous evaluation of student's performance throughout the semester and ICA submitted by the student.

Guide line for ESE:

ESE will be based on ICA submitted by the student. In ESE the student may ask to answer questions based on practical performed/ assignments. Evaluation will be based on performance in oral examination.

Recommended Books:

1. L. R. Kadiyali, N B. Lal, Principles & practice of Highway Engineering, Khanna Publication, 2005.
2. Khanna & Justo, Highway Engineering, Charotar Publishers
3. Rangwala, Highway Engineering, Charotar Publishers,
4. Khanna S.K, Highway Materials And Pavement Testing, Nem Chand & Brothers-Roorkee

TESTING OF MATERIAL II LAB

Lab course outline

Testing of Material II Lab **TOM – II**

ICA (Term Work) : 25 Marks

Course Description:

The present syllabus includes the IS code prescribed methods of testing of various building materials used in civil engineering. The emphasis is given on aggregate materials like bricks, cement, tiles, timber etc. The course includes experimental methods, data interpretation techniques, and design approaches. It recommends a site visit also for transition of students from the theory to the real application.

Practical	Hours/ week	No. of weeks	Total hours	Semester credit
	02	13	26	1

General Objectives

The basic objective of the syllabus is to appraise the students with the IS code permissible limits, IS code methods of experimentations, safety norms of laboratory and general protocols of material sample collections, preservations, testing and data interpretations. The students should also develop skill in the actual implementation aspect of the experimental observations through design. The student should be exposed to the real working environment also.

Learning Outcomes:-

- Student is expected to perform laboratory testing of any Civil Engineering material.
- Student is expected to plan the testing program me's for any Civil Engineering project.
- Student is expected to know the Indian standard codal provision of testing laid in various codes.
- Student is capable to deduce the Engineering behavior based on laboratory testing of Civil Engineering material.
- Student can deliver the results of laboratory testing according to the industry standards

Lab Course Content

Group A)

It will contain of any **Six** experiments out of following set-

1) Water Absorption by Burnt Brick / Fly ash bricks.
2) Compressive strength of Brick/ Fly ash bricks.
3) Abrasion test on tile.
4) Transverse test on flooring / roof tile.
5) Moisture content in timber.
6) Bending/Flexural test on timber.
7) Compressive strength of timber (load parallel to grain and perpendicular to grain and comparison of results)
8) Tensile strength, Bend/Re-bend test on tor Steel.

B) Minimum three assignments / Study Report on following topics.

1. Study of High-Strength concrete design
2. Study of Polymer Modified Bitumen (PMB)
3. Study of Crumb rubber Modified Bitumen (CRMB)
4. Study of New Building Construction Materials
5. Study of Low-cost Building Construction Materials
6. Study of Eco-Friendly material

RECOMMENDED BOOKS:

1. L. R. Kadiyali, N B. Lal, Principles & practice of Highway Engineering, Khanna Publication, 2005.
2. Khanna & Justo, Highway Engineering, Nemchand Bros
3. Rangwala, Highway Engineering, Charotar Publication
4. M.S.Shetty, Concrete Technology, S Chand
5. M.L.Gambhir, Concrete Technology, TMH Publcation.
6. A.N.Neville, J.J.Books- Concrete Technology
7. R.S.Varshney, Concrete Technology-Oxford & IBH
8. Handbook of Low-Cost Housing, A.K.Lal, New Age International Publishers
9. Pacheco Torgal, Fernando et.al, Eco-efficient Construction & Building Materials, Springer
10. M L Gambhir Neha Jamwal : Building & construction materials lab manual : McGraw Hill Education (India) Pvt. Ltd.

MINOR PROJECT

COURSE CONTENT

Minor Project	**MIP**	
Course Title	Short Title	Course Code

Semester-VI

Laboratory	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	2	**10**	**20**	**2**

Examination Scheme
Internal Continuous Assessment (ICA): 50 Marks

Teacher should facilitate learning of self study, enhance analytical ability, promote research oriented activity by developing ability of extracting the material from the different sources and writing comprehensively and exhaustive report on an allotted topic and ability to explore and present a topic in systematic manner.

Following should be considered:

1	Every student shall undertake the Minor Project in semester VI. It is expected that the broad area of major project shall be finalized by the student in the beginning of the VI semester and Minor project undertaken may be a part of Major Project
2	Each student shall work on an approved project, a group of 05 students (maximum) shall be allotted for the each minor project and same group may be continued for major project
3	Minor project may involve fabrication, design or investigation of a technical problem that may take design, experimental or analytical character or combine element of these areas. The project work shall involve sufficient work so that students get acquainted with different aspects of fabrication, design or analysis
4	Each group of students is required to maintain separate log book for documenting various activities of minor project
5	The three-member committee appointed by Head of the department shall be constituted for finalizing the topics of minor project. Maximum four minor project groups shall be assigned to one teaching staff

Guide lines for ICA: Assessment of the project for award of ICA marks

Shall be done jointly by the guide and departmental committee as per the guidelines given in Table-A.

Assessment of Minor Project

Name of the Project: _____

Name of the Guide: _____

Table-A

SN	Exam Seat No	Name of Student	Project Selection	Documentation	Design /Simulation/Logic	PCB/hardware/programming	Result Verification	Presentation	Total
			5	10	10	10	10	5	50

SEMINAR-I

COURSE CONTENT

Seminar-I Course Title **S-I** Short Title Course Code

Semester-VI

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**2**	**10**	**20**	**2**

Examination Scheme
Internal Continuous Assessment (ICA): 25 Marks

Teacher should facilitate learning of communication ability of an individual and to improve technical knowledge through study of specific topic. Teacher should also facilitate understanding ability, ability to listen, proper language, oral presentation skill amongst students.]

Following should be considered:

1	For Seminar-I every student will individually study a topic assigned to him / her and submit a report and shall deliver a short lecture / Seminar on the topic during the term
2	The three-member committee appointed by Head of the department shall be constituted for finalizing the topics of Seminar-I. Seminar shall be related state of the art topic of his choice approved by the committee
3	Seminar topic should not be repeated and registration of the same shall be done on first come first serve basis
4	Topic of Seminar shall be registered within a two week from commencement of VI Semester and shall be approved by the committee
5	Maximum six seminar supervision shall be allotted to each teacher
6	At the end of semester, student should submit the seminar report (paper bound copy)in following format: a. Size of report shall be about 25 pages. b. Student should preferably refer minimum five reference books / magazines/standard research papers. c. Format of Report i. Introduction ii. Literature survey iii. Theory 1) Implementation 2) Methodology 3) Application 4) Advantages, Disadvantages iv. Future scope v. Conclusion

Guide lines for ICA: ICA shall be based on evaluation of student performance by a seminar presented by the student. Every student shall be required to present a seminar in presence of Panel of teachers constituted by the Head of Department in consultation with the Principal. The evaluation shall be based as per the guidelines given in Table- B

Title of Seminar: _____
Name of Guide: _____

Table-B

SN	Exam Seat No	Name of Student	Topic Selection	Literature survey	Report writing	Depth of understanding	Presentation	Total
			5	5	5	5	5	25

NORTH MAHARASHTRA UNIVERSITY,

JALGAON (M.S.)

Third Year Engineering

(Computer)

Faculty of Engineering and Technology

COURSE OUTLINE

Semester – V

W.E.F. 2014 – 2015

Annexure - I

TE Semester – V

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory		Practical		Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
Software Engineering*	D	3	---	---	3	20	80	---	---	100	3
Formal Language & Automata Theory*	D	3	---	---	3	20	80	---	---	100	3
Computer Network*	D	3	---	---	3	20	80	---	---	100	3
System Programming*	D	3	---	---	3	20	80	---	---	100	3
Principles of Management*	C	3	---	---	3	20	80	---	---	100	3
Software Engineering Lab*	D	---	---	2	2	---	---	25	25 **(OR)**	50	1
Linux Lab*	D	---	---	2	2	---	---	25	---	25	1
Computer Network Lab*	D	---	---	2	2	---	---	25	25 **(PR)**	50	1
System Programming Lab*	D	---	---	2	2	---	---	25	25 **(OR)**	50	1
Java Programming Lab*	B	1	---	2	3	---	---	50	---	50	2
Industrial Training / EDP / Special Study*	D	---	---	---	---	---	---	25	---	25	2
Total		**16**	**---**	**10**	**26**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination **ESE: End Semester Examination** **ICA : Internal Continuous Assessment**

*** Common Subjects with TE I.T.**

TE Semester – VI

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory		Practical		Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
Operating System*	D	3	--	---	3	20	80	---	---	100	3
Object Oriented Modeling & Design*	D	3	---	---	3	20	80	---	---	100	3
Database Management System*	D	3	---	---	3	20	80	---	---	100	3
Analysis & Design of Algorithms	D	3	---	---	3	20	80	---	---	100	3
Management Information System*	C	3	---	---	3	20	80	---	---	100	3
Operating System Lab*	D	---	---	2	2	---	---	25	25 **(OR)**	50	1
Object Oriented Modeling & Design Lab*	D	---	---	2	2	---	---	25	25 **(OR)**	50	1
Database Management System Lab*	D	---	---	2	2	---	---	25	25 **(PR)**	50	1
Web Programming Lab*	B	---	---	2	2	---	---	25	---	25	1
Minor Project*	D	---	---	2	2	---	---	50	---	50	2
Seminar – I*	D	---	---	2	2	---	---	25	---	25	2
Total		**15**	**---**	**12**	**27**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination **ESE: End Semester Examination** **ICA: Internal Continuous Assessment**

*** Common Subjects with TE I.T.**

Software Engineering

COURSE OUTLINE

Course Title	Short Title	Course Code
Software Engineering	**SE**	

Course Description:
The objective of this course is to introduce students the knowledge of Software Development Life Cycle, application of analysis, design, testing principles and project planning & management concepts to develop quality software economically.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	14	42	03

Prerequisite Course(s): Knowledge of programming languages and data structures.

COURSE CONTENT

Software Engineering **Semester-V**

Teaching Scheme

Lecture: 3 Hours/Week

Examination Scheme

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Introduction to Software Engineering (08Hrs, 16 Marks)

a. Nature of Software
b. Software Process
c. Software Engineering Practice
d. Software Myths
e. Generic Process model
f. Process Assessment and Improvement
g. Perspective Process Models
h. Specialized Process Models
i. Personal and Team Process Models
Agile Process models:
j. Agile process
k. Extreme programming

2. Requirements Engineering (08Hrs, 16 Marks)

Requirements Engineering:
a. Eliciting Requirements
b. Building the Requirements Model
c. Negotiating requirements
d. Validating requirements
e. Requirements Analysis

f. Scenario-Based Modeling
g. Requirements modeling strategies
h. Flow-Oriented Modeling
i. Data modeling Concepts
j. Class based modeling
k. SRS.

3. Design Engineering (08Hrs, 16 Marks)

a. Design Process
b. Design Concepts
c. The Design Model

Architectural Design:

d. Software Architecture
e. Architectural Styles
f. Architectural Design

User Interface Design:

a. Rules
b. User Interface Analysis and Design
c. Interface Analysis
d. Interface Design Steps
e. Pattern Based Design
f. Design Patterns
g. Pattern Based software Design
h. Component Level Design patterns
i. User Interface Design patterns
j. WebApp Design patterns

Introduction to UML Diagrams.

4. Software Testing (08Hrs, 16 Marks)

Testing Strategies:

a. A Strategic approach to Software Testing
b. Strategic Issues
c. Testing Strategy for Conventional Software
d. Testing Strategy for Object-Oriented Software
e. Testing strategies for Web App
f. Validation Testing
g. System Testing

Testing Tactics:

h. Testing Fundamentals
i. White Box Testing
j. Basis Path Testing
k. Control Structure Testing
l. Black Box Testing

5. Software Project Planning & Management Concepts (08Hrs, 16 Marks)

a. Management Spectrum
b. People
c. Product

d. Process
e. Project
f. Critical Practices

Estimation for software project:

g. Project Planning Process
h. Software scope and feasibility
i. Resources
j. Decomposition Techniques
k. Empirical Estimation Models
l. Make/Buy Decision

Project Scheduling:

a. Task set for Software project
b. Defining a task network
c. Scheduling
d. Earned Value Analysis

Product Metrics:

e. A framework for product metrics
f. Software Quality
g. Software Quality Factors

Text Books:

1. Pressman R., "Software Engineering, A Practitioners Approach", 7th Edition, Tata McGraw Hill.

Reference Books:

1. Rajib Mall, "Software Engineering", 3rd Edition, PHI.
2. Pankaj Jalote, "An Integrated Approach to Software Engineering", 3rd Edition, Springer.
3. Sommerville, "Software Engineering", 8th Edition, Pearson.
4. Fairly R. , "Software Engineering", Tata McGraw Hill.
5. Davis A. , "Principles of Software Development", Tata McGraw Hill.
6. Shooman, M.L., "Software Engineering", Tata McGraw-Hill.

Formal Language and Automata Theory

COURSE OUTLINE

Course Title | Short Title Course Code
Formal Language and Automata Theory | **FLAT**

Course Description:
The objective of this course is to introduce the students the knowledge of automata Theory, principles of Grammars, Push down Automata, Turing Machines and enable them to apply these concepts for solving real world problems.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	14	42	03

Prerequisite Course(s): Knowledge of Discrete Structure & Graph Theory and Data Structures.

COURSE CONTENT

Formal Language and Automata Theory **Semester-V**

Teaching Scheme
Lecture: 3 hours / week

Examination Scheme
End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Finite State Machines: **(08 Hrs, 16 Marks)**

Mathematical Preliminaries:

a. Sets , Relations and Functions
b. Alphabets, Words / Strings, their Properties and operations
c. Graphs and trees
d. Basic machine

Finite State Machines:

e. State tables, Transition graph
f. Adjacency matrix
g. Description of a Finite automaton
h. Transition Systems
i. Properties of Transition functions
j. Acceptability of a string by a FA
k. Deterministic and Non-deterministic FSM's
l. Equivalence of DFA and NFA
m. Moore and Mealy Models
n. Minimization of Finite Automata
o. FSM with Epsilon moves

2. Regular Expressions: **(08 Hrs, 16 Marks)**

a. Definition, Identities for Regular Expressions

b. Finite Automata and Regular Expressions

   Transition System Containing ^-moves, NDFAs with ^-moves and Regular Expressions, Conversion of Nondeterministic Systems to Deterministic Systems

c. Building RE
d. Construction of Finite Automata Equivalent to a Regular Expression
e. Conversion of RE to FA
f. Converting FA to RE
g. Equivalence of two FA
h. Pumping lemma for regular sets
i. Applications of Pumping lemma
j. Closure properties of Regular sets

(08 Hrs, 16 Marks)

3. Grammars:

a. Definition
b. Derivation trees
c. Leftmost and Rightmost Derivations
d. Ambiguous grammar
e. Removal of ambiguity
f. Chomsky hierarchy
g. Construction of Reduced Grammar
h. Eliminating Useless symbols
i. Eliminating Epsilon productions
j. Eliminating Unit productions

Normal Forms for Context – free Grammars

k. Chomsky Normal Form
l. Greibach Normal Form
m. Reduced Forms – CNF and GNF
n. Reduction to CNF and GNF
o. Pumping Lemma for Context – free Languages
p. Decision Algorithms for Context- free Languages

4. Pushdown Stack Memory Machines & Production Systems (08 Hrs, 16 Marks)

Pushdown Stack Memory Machines:

a. Definition, PDM examples
b. Acceptance by PDA
c. Power of PDM
d. Deterministic and Non-deterministic PDM
e. Construction of PDA from CFG
f. Construction of CFG from PDA

Production Systems:

a. Definition, Post canonical system
b. PMT systems
c. Markov algorithm

5. Turing Machine: (08 Hrs, 16 Marks)

a. Turing Machine Model
b. Representation of Turing Machines

c. Language Acceptability By Turing Machines
d. Design of Turing Machines
e. Techniques for TM Construction
f. Variants of Turing Machines
g. Composite and Iterated TM
h. Universal TM
i. TM limitations
j. The Halting problem

Text Books -

1. E V Krishnamurthy, S.K.Sen, "Introductory Theory of Computer Science", Second Edition, EWP.
2. John E. Hopcroft, Rajeev Motwani, Jeffery D. Ullman, "Introduction to Automata Theory, Languages and Computation", Third Edition, Pearson.
3. K.L.P.Mishra, N. Chandrasekaran, "Theory of Computer Science Automaton, Languages and Computation", Third Edition, PHI.

Reference Books -

1. Daniel Cohen, "Introduction to computer Theory", Wiley India.
2. John Martin, "Introduction to Languages and the Theory of Computation", TMH.
3. Lewis H., Papadimitriou C., "Elements of Theory of Computation", Second Edition, Pearson.
4. Moret B., "The Theory of Computation", Pearson Education.

Computer Network

COURSE OUTLINE

Course Title	Short Title	Course Code
Computer Network	**CN**	

Course Description:

This course is aimed at introducing the fundamentals of Computer Networking to undergraduate students. The objective of the course is to understand the basics and knowledge about the Computer Network concepts and different protocols.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	**3**	**14**	**42**	**03**

Prerequisite Course(s): Data Communications.

COURSE CONTENT

Computer Network **Semester-V**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. TCP/IP Protocol Suit, Data Link Layer and Ethernet

(08 Hours, 16 marks)

TCP/IP Protocol Suit: Physical and Data Link Layers, Network Layer, Transport Layer, Application Layer. Addressing: Physical Addresses, Logical Addresses, Port Addresses, Specific Addresses.

Data Link Layer: Framing: Fixed size and variable size framing.

Ethernet: IEEE Standards: Data Link Layer, Physical Layer. Standard ETHERNET: MAC Sublayer, Physical Layer. Changes in the standard: Bridged Ethernet, Switched Ethernet, Full-Duplex Ethernet. Fast Ethernet: MAC Sublayer, Physical Layer. Gigabit Ethernet: MAC Sublayer, Physical Layer, Ten-Gigabit Ethernet.

2. Network Layer: Logical Addressing, Internet Protocol and Address Mapping

(08 Hours, 16 marks)

Logical Addressing: IPv4 Addresses: Address Space, Notations, Classful Addressing, Classless Addressing, Network Address Translation (NAT).

Internet Protocol: IPv4: Datagram, Fragmentation, Checksum, Options. IPv6: Structure, Address Space, Advantages, Packet Format, Extension Headers, Transition from IPv4 to IPv6: Dual Stack, Tunneling, Header Translation.

Address Mapping: Mapping Logical to Physical Address: ARP, Mapping Physical to Logical Address: RARP, BOOTP and DHCP.

3. Network Layer: Error Reporting, Delivery, Forwarding and Unicast 7 Mulicast Routing Protocols (08 Hours, 16 marks)

Error Reporting: ICMP: Types of Messages, Message Format, Error Reporting, Query, Debugging Tools.
Delivery: Direct Versus Indirect Delivery.
Forwarding: Forwarding Techniques, Routing Table.
Unicast Routing Protocols: Optimization, Intra and Interdomain Routing, Distance Vector Routing, Link State Routing, Path Vector Routing.
Multicast Routing Protocols: Source-Based Tree and Group-Shared Tree, MOSPF, Core-Based Tree (CBT).

4. Transport Layer: UDP and TCP

(08 Hours, 16 marks)

Transport Layer: Transport-layer services: Process-to-Process Communication, Addressing: Port Numbers, Encapsulation and Decapsulation, Multiplexing and Demultiplexing, Flow Control and Error Control.
User Datagram Protocol (UDP): User Datagram, UDP Services: Process-to-Process Communication, Connectionless Services, Flow Control and Error Control.
Transmission Control Protocol (TCP): Services, Features, Segment, Connection, Flow Control, Error Control and Congestion Control: open-loop congestion control and closed-loop congestion control.

5. Wireless Networks: 802.11 and Network Security

(08 Hours, 16 marks)

Introduction to Wireless Network: Why Wireless? A Network by Any Other Name.
Overview of 802.11 Networks: IEEE 802 Network Technology Family Tree, 802.11 Nomenclature and Design, 802.11 Network Operations, Mobility Support.
Network Security: Introduction to cryptography, symmetric-key and asymmetric-key cryptography. Symmetric-Key cryptography: Introduction, traditional ciphers, simple modern ciphers: XOR Cipher, Rotation Cipher, Substitution Cipher: S-box, Transposition Cipher: P-box. Asymmetric-Key cryptography: RSA, Diffie-Hellman algorithms.

Text Books:

1. B. A. Forouzan, "Data Communications and Networking", TMH, Fourth Edition.
2. A. S. Tanenbaum, "Computer Networks", Pearson Education, Fourth Edition.
3. Matthew S. Gast, "802.11 Wireless Networks: The Definitive Guide", O'Reilly, Second Edition.

Reference Books:

1. B. A. Forouzan, “TCP/IP Protocol Suite", TMH, Fourth Edition.
2. W.R. Stevens, “Unix Network Programming”, Vol.1, Pearson Education.
3. S. Keshav, “An Engineering Approach to Computer Networking”, Addison Wesley.
4. Comer, “Internetworking with TCP/IP", Vol. 1, Pearson Education, Fourth Edition.
5. W. Stallings, “Data and Computer Communications", Pearson Education, Fifth Edition.

System Programming

COURSE OUTLINE

Course Title	Short Title	Course Code
System Programming	**SP**	

Course Description:
The objective of this course is to introduce the students to the fundamentals of System Programming. In this basic system programs are studied in order to understand the working of system software.

	Hours per week	No. of Weeks	Total Hours	Semester Credits
Lectures	**03**	**14**	**42**	**03**

Prerequisite Course(s): Discrete Structure and Graph Theory, Data Structures.

COURSE CONTENT

System Programming **Semester-V**

Teaching Scheme
Lecture: 3 hours / week

Examination Scheme
End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Introduction to System Programs and Assembler: (08 Hours, 16 marks)

a. Introduction to system programming, Types of software and application software, System programming and system programs, Need of system software. Assemblers, Loaders, Compilers, Interpreters, Macros, Operating system and formal system, Translators and its types.
b. Assemblers: Structure of assembler, basic function, Machine dependent and machine independent features of assembler, Types of assemblers – single pass, multi-pass, cross assembler.
c. General design procedure of assembler, Design of Pass-I and Pass-II assembler (with reference to 8086 assembler).
d. Operating System:- concept, services, types (brief introduction only).

2. Macro processor & Loader: (08 Hours, 16 marks)

a. Macros and Macro Processors: Definition and function of Macro Processor, Macro expansion, Features of macro facility.
b. Design of macro processor – single pass and two pass macro processor, detailed design of two pass macro processor.
c. Loaders and Linkage Editors: Basic loader functions, Relocation and linking concepts, various loader schemes (Compile and go loader, Absolute loader, Relocating loader, general loading scheme) with their advantages and disadvantages.

3. Loader, Linker & Grammar: (08 Hours, 16 marks)

a. Design of direct linking loaders, specification of problem, specification of data structures, format of databases.
b. Design of a linker, A linker for MS DOS, Linking for overlays.
c. Other loader schemes – Binders, Linking loaders, Overlays, Dynamic binders.
d. Grammar and scanner, Programming language grammar, Derivation, Reduction and Syntax tree, Ambiguity, Regular grammar and Regular expression.

4. Parser and Parsing Techniques (08 Hours, 16 marks)

a. Parsing Techniques: - Concept, Top Down and Bottom up Parsing.
b. Top Down Parsing :- limitations of Top Down Parsing -Recursive descent and Predictive Parsing
c. Bottom Up Parsing:- Concept, Shift Reduce Parser, LR Parser, LALR, SLR Parser
d. Operator Precedence Parser, Syntax directed translation (Concept and introduction only).
e. Introduction to software development tools LEX & YACC.

5. Compiler & Inter Process Communication (08 Hours, 16 marks)

a. Overview of compilation process, Basic functions of complier, Machine dependent and machine independent features of compiler.
b. Types of compilers – single pass, multi-pass, cross compiler and pseudo code compiler,
c. Phase structure of compiler.
d. Introduction to inter process communication in windows(DLL, DDE, OLE, Clipboard:- concept and introduction only).

Reference Books:

1. John J. Donovan, "System Programming", 2nd Edition, TATA Mc GRAW HILL.
2. D. M. Dhamdhere, "System Programming and Operating Systems", Second Revised Edition, TATA Mc GRAW HILL.
3. Aho Alfred V, Sethi Rav and Ullman D, "Compiler Principles Techniques and Tools", 2nd Edition, Pearson Education.

Principles of Management

COURSE OUTLINE

Course Title	Short Title	Course Code
Principles of Management	**POM**	

Course Description:
The objective of this course is to introduce the students to the Knowledge of Functions of Management and Project management, life-cycle of project, its scheduling and total quality management enable them to Understood and gain for further study.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	14	42	03

COURSE CONTENT

Principles of Management **Semester- V**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Basic Concepts of Management (08 Hours, 16 marks)

a. Management :Definition, classification, Characteristics and Importance of management, Principles of Management
b. Management objectives, Types of objectives
c. Functions of managers, Managerial accounting
d. Development of management thoughts : Functional approach to management by Henry Foyal
e. Scientific Management Approach by Taylor, Gilbreth, Gantt
f. Human Relation Approach by Elton Mayo,Follet
g. Schools of management Thoughts
h. Tools of Management science, Managerial economics

2. Functions of Management and Organisations

(08 Hours, 16 marks)

a. Functions of Management: Planning, Organising
b. Staffing - Concept, Nature, Importance, Steps, Concept of Knowledge worker
c. Directing– Concept, Nature, Importance
d. Controlling-Concept, Nature, Importance, Process of controlling Leadership theories, characteristic and styles of leaderships
e. Management by objectives: steps in setting up M.B.O, Problem in the approach of M.B.O., Management of participation, management by exception, quantitative and qualitative objectives

f. Organisation and its Concept: Nature, Importance, Principles, Centralization, Decentralization
g. Organization Structures- Line and Staff, Functional, Organizations.

3. Human Resource Management

(08 Hours, 16 marks)

a. Function and objective Personnel Management
b. Manpower Planning, Selection and Recruitment of Employees
c. Needs & Types of Training, Objective and Benefits of training, Training for Craftsman, supervisor and Executive
d. Motivation and motivators: motivations, perspective: self-motivation
e. Motivation: the carrot and the sticks, kinds of Motivation, Herzberg's motivation, Hygien Theory
f. Personal management: concept, principles of good personal policy
g. Communication in industry, suggestion system, discipline in industry, promotion, transfer, layout and discharge

4. Project and Quality Management

(08ours, 16 marks)

a. Introduction, Project Management Terminology, Concept of project Management
b. Role and Responsibilities of Project Manager
c. Types of project, Project Life Cycle Phase
d. Project Planning, Project Scheduling, Project Monitoring and Control
e. Basic tools and Techniques for Project Scheduling
f. Total quality management: Introduction, factors affecting quality,
g. product quality analysis, product quality analysis, causes of quality failure
h. elements of T.Q.M , requirements of T.Q.M, Aims of T.Q.M., quality circles, ISO 9000

5. Industrial Psychology, Ethics and MIS

(08 Hours, 16 marks)

a. Industrial Psychology: Definition and Concepts, Industrial psychology Vs Personal Management
b. Aims and Objectives of Industrial Psychology, Scope
c. Individual difference in behavior, Group Dynamics
d. Theory X and Y, Working Environmental Conditions, Industrial Fatigue
e. Professional and Business Ethics: Concepts, Ethics and Morals, Business Ethics, Professional Ethics
f. Need and Importance of ethics, Ethical problems and business, Ethical Issues, How to make business ethical
g. Definition, Evolution of MIS, Need/Objective/Functions of an MIS, Need for Information, Qualities of Good information
h. Information as an Organizational Resource, Management Information Categories, Application of MIS

Text Books:

1. T.R.Banga & S.C.Sharma , "Industrial Organization and Management Economics" Twenty-Third Edition, Hanna Publishers.
2. O.P.Khanna, "Industrial Organization and Management Economics", Dhanpat Rai Publications, 2006.

Reference Books:

1. Koontz and Weihrich, "Management –A Global Perspective", Tenth Edition, Mc Graw-Hill International Editions.
2. Tritaphy and Reddy, "Principles of Management", Second edition, TMH.
3. Hill and Steven, "Principles of Management", McGraw Hill, Special Indian Edition, 2007.
4. M.S.Mahajan," Industrial Engineering and Production Management" Dhanpat Rai and Co.
5. W.S.Jawadekar, "Management Information System", TMH.

Software Engineering Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Software Engineering	**SE**	

Course Description:
This laboratory provides students an ability to apply analysis & design concepts to develop quality software economically.

Laboratory	Hours/Week	No. of Weeks	Total Hours	Semester Credits
	02	14	28	01

Prerequisite Course(s) : Knowledge of Object Oriented Concepts and any system programming language.

LAB COURSE CONTENT

The Software Engineering Lab must include any five of following software Mini-Projects covering Problem Definition, Analysis & Design using a CASE Tool and Documentation for each.

1. ATM System
2. Library Management System
3. Inventory Control System
4. Railway Reservation System
5. College Admission System
6. University Result Management System
7. Vehicle Navigation System
8. Hospital Management System
9. Banking System
10. Web based/Online Auction System

Guidelines for ICA:
Students must submit ICA in the form of journal. Each assignment should be well documented. Faculty in charge will assess the assignments continuously and grade or mark each assignment on completion date declared for each assignments.

Guidelines for ESE:
The oral examination will be based on the assignments performed by the candidates as part of ICA. Questions will be asked during the oral examination to judge the understanding of the student. It is expected that student knows theoretical (Software Engineering) aspect of the problem.

Reference Books:

1. Timonthy C. Lethbridge and Robert Laganiere, “Object Oriented Software Engineering – A Practical Software Development using UML and JAVA”, 2nd Edition, Tata McGraw-Hill.
2. Mike O’Docherty, “Object-Oriented Analysis & Design – Understanding System Development with UML 2.0”, Wiley.

Note:-

- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

Linux Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Linux	**Linux**	

Course Description:

This laboratory provides students with a basic knowledge of the linux programming environment. So that students able to use basic commands of linux as well as they will able to perform basic operations.

Laboratory	Hours / Week	No. of Weeks	Total Hours	Semester Credits
	02	**14**	**28**	**01**

Total Semester Credits: 01

Prerequisite Course(s): Fundamental knowledge of Operating system.

LAB COURSE CONTENT

Outline of Content:

Teacher should facilitate learning following lab experiments:

Group A

1. **Installation of Linux OS.**
   Installing latest version of Linux. Observing each step of installation and notice the differences.
2. **Study and execution of various Linux Commands.**
   Studying various basic commands of Linux. Use of commands.
3. **Study of vi editor.**
   Studying basic working and use of vi editor.
4. **Configuration of Linux Server (any two)**
   It shows step by step Configuration of various types of servers
   1) Web Server
   2) Mail Server
   3) Proxy Server
   4) Telnet Server
   5) FTP Server
5. **Shell script for finding out factorial of a number.**
   To calculate the Factorial of number.
6. **Shell script for finding out file type and displaying list of a directory.**
   To find out file type and displaying list of directory.
7. **Shell Script for File Handling.**
   Demonstrates the various file operations such as :
   1) Create a File.
   2) Read a File.
   3) Add a record into a File.

4) Delete a record from File.
5) Delete a file.
6) Update a File.

Group B

1 **Write shell script for displaying user process and system related information using environment variables.**
Displays a user process and system related information using environment variables.

2 **Write a shell script to find the largest among the 3 given numbers.**
To find out largest number among 3 given numbers.

3 **Write a shell script to reverse the contents of a String.**
To print contents of string in reverse order.

4 **Write a shell script to print date and time.**
To print date and time along with greetings depend on time.

5 **Shell script to perform arithmetic operations.**
To perform arithmetic operations such as – Addition, Subtraction, Multiplication, Division**.**

Guidelines for ICA:
Students must submit ICA in the form of journal. Each assignment should be well documented. Faculty in charge will assess the assignments continuously and grade or mark each assignment on completion date declared for each assignments.

Reference Books:

1. Stevens Richard W, Rago Stephen A "Advanced Programming in the Unix Environment", Pearson 2008.
2. Gopalan N P,Sivaselvan B "Beginners guide to unix", PHI Learning: New Delhi, 2009.
3. Richard Blum, Christine Bresnahan, "Linux Command Line and Shell Scripting Bible, 2nd Ed", Wiley India, 2011.
4. Dayanand Ambawade, Deven N. Shah, "Linux Lab: Hands on Linux", Dreamtech Press
5. "Linux Administration", Kogent Learning Solutions Inc.
6. Evi Nemeth, Garth Snyder, Trent R. Hein, Ben Whaley, "Unix and Linux System Administration Handbook" 4th Edition, Pearson.
7. Neil Matthew, Richard Stones, "Beginning Linux Programming", 4th Edition, Wiley.
8. K. L. JAMES, "Linux -Learning the Essentials", PHI, 2011.

Note:

- Concerned faculty should suitably frame at least **10 practical** assignments **(SIX from PART – A and FOUR from PART – B)** out of the above list.
- Every assignment should include syntax, use of commands/functions used for coding & print out of code with proper comments and output.
- Every student is required to submit the assignments in the form of journal.
- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

Computer Network Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Computer Network	**CN**	

Course Description:

This laboratory provides students with a comprehensive study of the Computer Networking and protocols. Classroom lectures stress the strengths of Computer Networks, which provide students with the means of writing efficient, maintainable, and portable code and simulating protocols and networks.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**2**	**14**	**28**	**01**

Total Semester Credits: 01

Prerequisite Course(s): Fundamental knowledge of Computers and Data Communication, C, C++ and Java Programming.

LAB COURSE CONTENT
Outline of Content:

(Note: Minimum SIX Experiments from PART A and TWO from PART B.)

PART - A

1. Implementation of Character count/Bit-Stuffing/Byte stuffing framing methods.
2. Implementation of Dijkastra's Shortest Path Network routing algorithm.
3. Implementation of TCP checksum.
4. Socket programming for TCP.
5. Socket programming for UDP.
6. Encryption/Decryption using XOR symmetric-key cryptography algorithm.
7. Encryption/Decryption using RSA asymmetric-key cryptography algorithm.
8. Implementation of RLE data compression algorithm.

PART – B

1. Simulate the Ethernet LAN for wired networks.
2. Simulate the point-to-point wired network.
3. Simulate any Wireless network.

Guidelines for ICA:
Students must submit ICA in the form of journal. Each assignment should be well documented. Faculty in charge will assess the assignments continuously and grade or mark each assignment on completion date declared for each assignments.

Guidelines for ESE:
ESE will be based on the practical assignments submitted by the students in the form of journal. In the ESE, the students may be asked to perform the practical assignment with minor modification.
Evaluation will be based on the paper work of algorithm, understanding of the logic and the syntax, quality of the program, execution of the program, type of input and output for the program.

NOTE: -

- Concerned faculty should use any network simulator software like NS-2/NS-3/ OPNET/ NetSim/ OMNeT++ to perform **PART-B** assignments.
- Concerned faculty should suitably frame at least **08 practical** assignments **(SIX from PART – A and TWO from PART – B)** out of the above list.
- Every assignment should include, theory, algorithm, print out of code with proper comments and output. Every student is required to submit the assignments in the form of journal.
- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

System Programming Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
System Programming	**SP**	

Course Description:

The objective of this course is to introduce the students to the fundamentals of System Programming. In this basic system programs are studied in order to understand the working of system software.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**2**	**14**	**28**	**01**

Total Semester Credits: 01

Prerequisite Course(s): Fundamental knowledge of Discrete Structures and Graph Theory, Data Structures.

LAB COURSE CONTENT
Outline of Content:

1. **Develop an application to simulate pass-I of Two Pass Assembler.**
   To analyse the source program for finding Pseudo–opcode, Machine opcode, Literals and symbols.
2. **Develop an application simulate pass- II of Two pass Assembler.**
   To analyse the output of pass-I to generate the machine operation code.
3. **Develop an application to create simple text editor.**
   Develop a text editor for creation, opening, editing and saving the content into a file.
4. **Develop an application for simulating Lexical Phase of compiler.**
   Develop a Lexical Analyser for generating keywords, symbols, operators and identifires within the source code.
5. **Develop an application for simulating Syntax Analysis Phase of compiler.**
   Develop a Syntax Analyser for generating a Parse tree from source code.
6. **Develop an application for simulating Pass-I of Macro Processor.**
   Develop Pass-I of Macro processor for recognizing macro definition specified within a program.
7. **Develop an application for simulating Pass-II of Macro Processor.**
   Develop Pass-II of an Macro processor for expanding a macro definition specified within a program
8. **Develop an application for simulation of any one of parsing techniques.**
   Develop a parser from the grammar specified within a source code.

Guidelines for ICA:

Students must submit ICA in the form of journal. Each assignment should be well documented. Faculty in charge will assess the assignments continuously and grade or mark each assignment on completion date declared for each assignments.

Guidelines for ESE:

- ESE will be based on the practical assignments submitted by the students in the form of journal.
- In the ESE, the students may be asked to perform the practical assignment with minor modification.

Note:

- Concerned faculty should suitably frame at least **06 practical** assignments out of the above list.
- Every assignment should include theoretical concept, algorithm, print out of code with proper comments and output.
- Every student is required to submit the assignments in the form of journal.
- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

Java Programming Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Java Programming	**JPL**	

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**2**	**14**	**28**	**01**

Group-A

1 **Write a program that demonstrates string operations.**

2 **Write a program that demonstrate package creation and use in program.**

3 **Write a program to demonstrate the abstract class and abstract method**.

4 **Write a Java program that illustrates the concepts of Java class that includes**

(a) constructor with and without parameters.
(b) Overloading methods.
(c) Overriding methods

5 **Write a Java program to demonstrate inheritance by creating suitable classes.**

6 **Create a Java package, interface and implement in Java program.**

7 **Write a program to demonstrate**

- Use of implementing interfaces.
- Use of extending interfaces.

Group- B

1 **Write a program to implement the concept of threading.**

2 **Write a program to demonstrate the predefined and User defined exception handling.**

3 **Write a program using Applet**

- to display a message in the Applet.
- for configuring Applets by passing parameters.

4 **Write programs for using Graphics class**

- to display basic shapes and fill them.
- draw different items using basic shapes

- set background and foreground colors.

5 **Write a program in Java that demonstrates JDBC**

6 **Write a program that demonstrates JDBC on applet/application**

Guidelines for ICA:
Students must submit ICA in the form of journal. Each assignment should be well documented. Faculty in charge will assess the assignments continuously and grade or mark each assignment on completion date declared for each assignments.

Reference Books:

1. Herbert Schildt, "Java2: The Complete Reference", Tata Mc GrawHill, 5th edition.
2. E. Balagurusamy,"Programming with Java A primer", 3rd Edition.
3. Horstman Cay and Cornell Gary, "Core JavaTM2", Vol.1, Pearson education.
4. Kathey Sierra and Bert Bates, "Head First Java", SPD Publication.
5. Steven Holzner, "JAVA 2 Programming Black Book", Wiley India.

Note:

- Concerned faculty should suitably frame at least **08 practical** assignments **(FIVE from PART – A and THREE from PART – B)** out of the above list.
- Every assignment should include algorithm, print out of code with proper comments and output.
- Every student is required to submit the assignments in the form of journal.
- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

Industrial Training / EDP / Special Study
COURSE CONTENT

Industrial Training / EDP / Special Study	**IT/EDP/SS**	
Course Title	Short Title	Course Code

Semester-V **Examination Scheme**
Total Semester Credits: 02 **Internal Continuous Assessment (ICA): 25 Marks**

Industrial Training

- Student shall undergo industrial training for a minimum period of **two weeks** during summer vacations between fourth semester and fifth semester.
- The industry in which industrial training is taken should be a medium or large scale industry
- The paper bound report on training must be submitted by the student in the beginning of Fifth semester along with a certificate from the company where the student took training.
- Every student should write the report separately.
- Institute / Department/T&P Cell have to assist the students for finding Industries for the training.
- Students must take prior permission from Department before joining for Industrial Training.

OR

EDP (Entrepreneurship Development Program)

- Student has to participate in Entrepreneurship Development Program for a minimum period of **One week** during summer vacations between fourth semester and fifth semester.
- Every student must submit the paper bound report based on the program in the beginning of Fifth semester along with a certificate (Course / Program completion) from the program organizers.
- Every student should write the report separately.
- Institute / Department may arrange Entrepreneurship Development Program at their campus.
- Students must take prior permission from Department before attending any Entrepreneurship Development Program.

OR

Special Study

- Student has to submit name of three topics of his interest to the department.
- Special study in a group shall not be allowed.
- The three-member committee appointed by Head of Department shall allot one topic out of the three topics submitted by the student.
- Every student must submit the paper bound report based on special study at the end of Firth semester.
- Department should allot guide to all such students, for monitoring their progress and

guide them for literature survey / report writing etc.

- Evaluation of special study shall be done based on presentation made by student, followed by brief question answer session.

Evaluation of Industrial Training / EDP / Special Study

ICA: The Internal Continuous Assessment shall be based on the active participation of the students in the training / EDP / Special study and based on knowledge / skill acquired by the student. The three-member committee appointed by Head of Department shall assess the reports and award marks based on following:

(a) Report	10 marks.
(b) Presentation	10 marks.
(c) Viva-voce at the time of presentation	05 marks.
Total:	**25 marks.**

NORTH MAHARASHTRA UNIVERSITY, JALGAON (M.S.)

Third Year Engineering

(Computer)

Faculty of Engineering and Technology

COURSE OUTLINE

Semester – VI

W.E.F. 2014 – 2015

Operating System

COURSE OUTLINE

Course Title	Short Title	Course Code
Operating System	**OS**	

Course Description:
The objective of this course is to introduce the students to the concepts of Operating Systems functions, types and their working details.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	**14**	**42**	**03**

Prerequisite Course(s): Computer Organization, System Programming.

COURSE CONTENT

Operating System **Semester-VI**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Operating System Overview

(08 Hours, 16 marks)

a. Introduction: Computer system organization, Architecture, Evolution of OS, Need of OS, User view and System view of OS.
b. Types of Operating System: Batch, Timesharing, Multiprogramming, Multitasking, RTOS, Distributed.
c. Operating System Services and Components: Different OS services and OS components, System calls and its types.
d. Operating System Structures: Monolithic, Layered, Kernel, Microkernel, Virtual Machine.
e. Threads: Overview, Benefits, Models (Introduction Only).

2. Process and Process Management

(08 Hours, 16 marks)

a. Process Concept: The process, Process states, Process Control Block, Context Switching, SPOOLING, CPU & I/O burst.
b. Scheduling: Concept, Objectives, Queuing diagram.
c. Types of Schedulers: Long term Scheduler, Middle term Scheduler, Short term Scheduler.

d. Scheduling Algorithm (For Uniprocessor System): FCFS, SJF (preemptive & non preemptive), Priority (preemptive & non preemptive), Round Robin, MLQ with and without feedback.

e. IPC: Concept and Types.

f. Critical Section: Critical section problem, Solution to critical section problem, Mutual exclusion with busy waiting, TSL, Peterson's solution for two processes, Dijkstra's semaphore.

g. Problem in Concurrent Programming: Producer-Consumer problem, Readers–Writers problem, Dinning Philosopher problem, Monitors.

3. Deadlocks

(08 Hours, 16 marks)

a. Deadlock: System Model, Deadlock Characterization, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

b. Memory Management: Memory Management Requirements.

c. Memory Partitioning: Fixed and Dynamic Partitioning.

d. Memory Allocation: Allocation strategies (First Fit, Best Fit and Worst Fit), Fragmentation, Swapping, Paging and Segmentation.

e. Virtual Memory Management: Background, Demand Paging, Page Replacement (FIFO, LRU, Optimal LRU), Thrashing.

4. Storage Management

(08 Hours, 16 marks)

a. File concept: File Organization, Access Methods and Directory Structure.

b. Allocation of Disk Space: Contiguous allocation, Non-contiguous allocation (chaining and indexing).

c. Disk Scheduling: FCFS, SSTF, SCAN, C-SCAN, LOOK.

5. Secondary Storage Structure, Protection and Security, Introduction to UNIX.

(08 Hours, 16 marks)

a. Disk Management: Disk formatting, Boot block, Bad blocks.

b. Swap Space Management: Swap Space Use, Swap Space.

c. System Protection: Goals of protection, Domain of protection, Threats, Security attacks.

d. Introduction to UNIX: History, System architecture.

e. Internal Representation of File: Inode, Structure of regular file, Super block, Pipes (No Algorithms).

f. Process Control: Process creation, Process States and Transitions, Process system calls (exec, fork).

Text Books:

1. A. Silberschatz, P. B. Galvin, G. Gagne, “Operating Systems Concepts”, 7th/ 8th edition, John Wiley Publications, 2008.
2. William Stalling, “Operating System Internals and Design Principles”, 6th edition, Pearson Publication, 2013.

Reference Books:

1. Maurice J. Bach, “The Design of the Unix Operating System”, 1st edition, PHI.
2. Dhananjay M. Dhamdhere, “Operating Systems-A Concept-Based Approach”, 3rd edition, TMH, 2012.
3. A. S. Tanenbaum, “Modern Operating System”, 2nd edition, Pearson publication”, 2001.
4. H. M. Deitel, P. J. Deitel, D. R. Choffnes, “Operating System”, 3rd edition, Pearson publication, 2013.
5. Rajiv Chopra, “Operating Systems-A Practical Approach”, 1st edition, S. Chand Publication, 2009.
6. Sibsankar Haldar, Alex A. Arvind, “Operating Systems”, 1st edition, Pearson Publication, 2009.

Object Oriented Modeling & Design

Course Title | Short Title | Course Code

Object Oriented Modeling and Design **OOMD**

Course Description:
The objective of this course is to introduce students the knowledge about Modeling and Design of Software firmware and business processes. It introduces UML 2.0 and its diagrams as a modeling tool for large and complex systems. It also gives understanding of the concepts being modeled in UML.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	14	42	03

Prerequisite Course(s): Knowledge of software engineering and object oriented concepts.

COURSE CONTENT

Object Oriented Modeling and Design **Semester-VI**

Teaching Scheme

Lecture: 3 hours / week

Examination Scheme

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Introduction of Object Oriented Modeling (08 Hrs, 16 Marks)

Introduction:

a. What is object-oriented?
b. What is Object oriented development? : Modeling Concept , Not Implementation , Object- Oriented Methodology , Three Models
c. Object oriented themes

Why We Model:

d. The Importance of Modeling
e. Principles of Modeling
f. Object-Oriented Modeling

4+1 View architecture,

Architectural approaches: Use case driven, Architecture-centric, Iterative and Incremental,

Rational Unified Process:

g. Characteristics of the process

Phases and Iterations:

h. Inception Phase
i. Elaboration Phase
j. Construction Phase
k. Transition Phase
l. Iterations
m. Process Workflows
n. Artifacts
o. Other Artifacts

2. Introduction to UML (08 Hrs, 16 Marks)

a. An Overview of the UML: Visualizing, Specifying, Constructing, Documenting
b. Background , UML Basics

c. Introducing UML 2.0

A Conceptual Model of the UML:

d. Building Blocks of the UML
e. Rules of the UML
f. Common Mechanisms in the UML: Specifications, Adornments, Common divisions
g. Extensibility Mechanisms: stereotypes, tagged values, constraints

Object Constraint Language:

h. OCL Basics, OCL Syntax, Advanced OCL Modeling

3. Class Diagram and Composite Structure Diagram (08 Hrs, 16 Marks)

Object Diagram:

a. **Terms and Concepts:**
Common Properties, Contents, Common Uses
b. **Common Modeling Techniques:** Modeling Object Structures

Class Diagram:

c. Classes, Attributes, Operations, Abstract Classes
d. **Relationships:** Dependency, Association, Aggregation, Composition, Generalization, Association Classes, Association Qualifiers
e. **Advanced Relationships:**
Stereotypes on Dependency, Stereotypes and Constraints on Generalization, Constraints on Association, Realization
f. Interfaces
g. Templates
h. Class Diagram: Common Properties, Contents, Common Uses
i. Common Modeling Techniques : Modeling Simple Collaborations, Modeling a Logical Database Schema
j. Forward and Reverse Engineering

Composite Structures Diagram:

k. Connectors, Ports, Structured classes and Properties

4. Behavioral Diagrams (08 Hrs, 16 Marks)

a. **Use case Diagram**
Names, Use Cases and Actors, Use Cases and Flow of Events, Use Cases and Scenarios, Use Cases and Collaborations, Organizing Use Cases, Common Properties, Contents, Common Uses
b. **Sequence Diagram**
c. **Communication Diagram**
d. **Timing Diagram**
e. **State chart Diagram:**
Behavioral State Machines, States, Composite States, Submachine States, Transitions, Activities, Protocol State Machines ,Pseudo States , Event Processing
f. **Activity Diagram:**
Common Properties, Contents, Action States and Activity States, Transitions, Branching, Forking and Joining, Swimlanes, Object Flow, Common Uses

5. Package Diagram, Component Diagram, Deployment Diagram (08 Hrs, 16 Marks)

Package Diagram:

a. **Terms and Concepts**
Names, Owned Elements, Visibility, Importing and Exporting
b. **Common Modeling Techniques:** Modeling Groups of Elements, Modeling Architectural Views

Component:

c. **Terms and Concepts**
   Names, Components and Classes, Components and Interfaces, Kinds of Components

Component Diagram:

d. Common Properties, Contents, Common Uses
e. **Common Modeling Techniques:** Modeling Source Code, Modeling an Executable Release, Modeling a Physical Database, Modeling Adaptable Systems
f. Forward and Reverse Engineering

Deployment:

g. **Terms and Concepts**
   Names, Nodes and Components, Connections

Deployment Diagram:

h. Common Properties, Contents, Common Uses
i. **Common Modeling Techniques:** Modeling an Embedded System, Modeling a Client/Server System, Modeling a Fully Distributed System
j. Forward and Reverse Engineering

Text Books:

1. James Rumbaugh , Michael Blaha , William Premerlani, Frederick Eddy, William Lorensen ,"Object- Oriented Modeling and Design", Pearson Education.
2. Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language User Guide", Pearson Education.
3. Dan Pilone, Neil Pitman, "UML 2.0 in a Nutshell", SPD ,O'Reilly.

Reference Books:

1. Martin Fowler, "UML Distilled: A Brief Guide to the Standard Object Modeling Language", Third Edition ,Addisioh Wesley.
2. Tom Pender, "UML 2 Bible", Wiley.
3. Meilir Page-Jones, "Fundamentals of Object Oriented Design in UML", Pearson Education.
4. Pascal Roques, "Modeling Software Systems Using UML2", Wiley.
5. Atul Kahate, "Object Oriented Analysis & Design", The McGraw-Hill Companies.
6. Mark Priestley, "Practical Object-Oriented Design with UML", TATA McGraw-Hill.
7. Craig Larman, "Appling UML and Patterns: An introduction to Object–Oriented Analysis and Design and Iterative Development", Pearson Education.
8. Mike O'Docherty, "Object-Oriented Analysis & design understanding system development with UML 2.0", John Wiley and Sons.

Database Management System

COURSE OUTLINE

Course Title	Short Title	Course Code
Database Management System	**DBMS**	

Course Description:
The objective of this course is to introduce the students to Learn and practice data modeling using the entity-relationship and developing database designs, apply normalization techniques to normalize the database, learn techniques for controlling the consequences of concurrent data access also understand the needs of Object based Database and Database System Architecture.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	14	42	03

Prerequisite Course(s): Knowledge of data structures.

COURSE CONTENT

Database Management System **Semester-VI**

Teaching Scheme	Examination Scheme	
Lecture: 3 hours / week	**End Semester Examination (ESE)**	**: 80 Marks**
	Paper Duration (ESE)	**: 03 Hours**
	Internal Sessional Exam (ISE)	**: 20 Marks**

1) Introduction to DBMS **(08 Hrs, 16 Marks)**

a. Database-System Applications
b. Purpose of Database Systems
c. View of Data: Data Abstraction ,Instances and Schemas, data independence
d. Data Models: Relational Model , Entity-Relationship Model ,Object-Based data model, Semistructured Data Model
e. Database Languages
f. Data Storage and Querying
g. Transaction Management
h. Database Architecture
i. Database Users and Administrators

Database Design and E-R Model

j. Overview of the Design Process
k. The Entity Relationship Model: Entity Sets , Relationship Sets, Attributes, Constraints
l. Entity-Relationship Diagram: Basic Structure , Mapping Cardinality, Roles, Weak Entity sets
m. Extended E-R Features: Specialization, Generalization, Attribute Inheritance, Constraints on Generalizations, Aggregation

2) Structured Query Language **(08 Hrs, 16 Marks)**

a. Introduction to relational Model: structure of relational Databases, Database Schema, Keys, Schema Diagrams
b. Overview of the SQL Query Language
c. SQL Data Definition

d. Basic Structure of SQL Queries
e. Additional Basic Operations
f. Set Operations
g. Null Values
h. Aggregate Functions
i. Nested Subqueries
j. Modification of the Database

Intermediate SQL:

k. Joined Expressions: Join Conditions , Outer Joins
l. Views
m. Integrity Constraints

3) Formal Relational Query Languages (08 Hrs, 16 Marks)

The Relational Algebra:

a. Fundamental Operations:
The select Operation, The Project Operation, The Union Operation, The Set-Difference Operation, The Cartesian-Product Operation, The Rename Operation, Formal definition of Relational Algebra
b. Additional Algebra Operations:
The Set-Intersection Operation, The Natural-Join Operation, The Assignment Operation, Outer Join Operations
c. Extended Relational-Algebra Operations:
Generalized Projection, Aggregation

The Tuple Relational Calculus:

d. Formal Definition
e. Example Queries

The Domain Relational Calculus:

f. Formal Definition
g. Example Queries

Functions and Procedures

Triggers

4) Relational Database Design and Transaction Management (08 Hrs, 16 Marks)

Relational Database Design:

a. Features of Good Relational Designs
b. Atomic Domains and First Normal Form
c. Decomposition Using Functional Dependencies:
Keys and Functional Dependencies, Boyce-Codd Normal Form, BCNF and Dependency Preservation, Third Normal Form
d. Decomposition Using Multivalued Dependencies: Multivalued Dependencies, Fourth Normal Form

Transaction Management:

e. Transaction Concept
f. A simple Transaction Model
g. Transaction Atomicity and Durability

Concurrency Control:

h. Lock-Based Protocols: Locks, Granting of Locks, The Two Phase Locking protocol
i. Timestamp–Based Protocols: Timestamps , The Timestamps-Ordering Protocol

Recovery System:

j. Failure Classification
k. Storage
l. Recovery and Atomicity: Log records, Database Modification, Concurrency Control and Recovery ,Transaction Commit , Using the Log to Redo and Undo Transactions

5) Object–Based Databases and Database- System Architectures (08 Hrs, 16 Marks)
Object–Based Databases

a. Overview,
b. Complex Data Types
c. Structure Types and Inheritance in SQL
d. Table Inheritance
e. Array and Multiset Types in SQL: Creating and Accessing Collection Values, Querying Collection-Valued Attributes
f. Object–Identity and Reference Types in SQL
g. Persistent Programming Languages: Persistence of Objects, Object Identity and Pointers

Database-System Architectures

h. Centralized and Client–Server Architectures
i. Server System Architectures
j. Parallel Systems
k. Distributed Systems

Text Book:

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", 6th Edition, McGraw-Hill.

Reference Books:

1. R. Ramkrishnan , J. Gehrke, "Database Management Systems", 3rd Edition, McGraw-Hill.
2. C. J. Date, "Introduction to Database Management Systems", 8th Edition, Pearson.
3. V.K.Jain, " Database Management System", Dreamtech Press (Wiley India).
4. Atul Kahate, "Introduction to Database Management System", 3rd Edition, Pearson.
5. G. K. Gupta, "Database Management Systems", McGraw–Hill.
6. S. K. Singh, "Database Systems Concepts, Design and Applications", Pearson.
7. Bipin Desai, "Introduction to database management systems", Galgotia.

Analysis & Design of Algorithms

COURSE OUTLINE

Course Title	Short Title	Course Code
Analysis and Design of Algorithms	**ADA**	

The objective of this course is to introduce the students to the fundamentals of Algorithm and their analysis. In this basic system program are studied in order to understand the working of system program.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	**14**	**42**	**03**

Prerequisite Course(s): Fundamental knowledge of Algorithm and their analysis.

COURSE CONTENT

Analysis and Design of Algorithms **Semester-VI**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week **End Semester Examination (ESE) : 80 Marks**
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Course Description:

1. Introduction to Algorithm

(08 Hours, 16 marks)

a. Defination
b. Role of Algorithm in computing
c. Performance analysis: space and time complexity
d. Asymptotic notation and complexity issues
e. Analysis of Algorithm: Insertion sort and bubble sort
f. Recurrence: The Master Method

2. Divide and Conquer

(08 Hours, 16 marks)

a. General strategy, analysis
b. Merge sort, Quick Sort, Binary Search- Analysis of algorithm
c. Hiring Problem
d. Indicator Random variable Problem
e. Randomized algorithms

3. Backtracking

(08 Hours, 16 marks)

a. Backtracking: Introduction and Analysis
b. N Queens Problem, graph coloring Problem
c. Branch and Bound: General Strategy and analysis
d. Traveling salesman's problem, knapsack problem
e. Single Source Shortest Path in directed acyclic Graph

4. Advanced Design and Analysis Techniques

(08 Hours, 16 marks)

a. Greedy Algorithms: General strategy, analysis
b. Huffman Code
c. Job sequencing, optimal merge patterns
d. Dynamic Programming: Elements of dynamic programming.
e. Multistage graph, Traveling salesman problem, 0/1 Knapsack Problem, Optimal Binary Search Tree

5. Classification of problems

(08 Hours, 16 marks)

a. Non- deterministic algorithm
b. Satisfiability Problem
c. P, NP-Hard and NP- complete class with example
d. NP-Hard problems: code generation Problems
e. Approximation algorithm for NP-hard problems
f. Parallel Sorting Networks: The zero-one Principle, Parallel Merging Networks, Improved Sorting Networks

Text Books:

1. E. Thomas H. Cormen and Charles E.L. Leiserson, "Introduction to Algorithm", Third Edition, PHI.
2. Horowitz/Sahani, "Fundamentals of Computer Algorithm", Second Edition,Galgotia.
3. Gilles,Brassard and Paul Bratley, " Fundamentals of Algorithmics", PHI.

Reference Books:

1. Aho, "Design & Analysis of Computer Algorithms", Pearson LPE.
2. Russ Miller, "Algorithms: Sequential and Parallel", Dreamtech Press.
3. Goodrich, "Algorithm Design: Foundation and Analysis", Wiley India.
4. Grama , "An Intro to Parallel Computing : Design & Analysis of Algorithms", Second Edition, Pearson LPE.
5. Baase , "Computer Algorithms: Intro to Design & Analysis", Third Edition, Pearson LPE.
6. A. V. Aho and J.D. Ullman, "Design and Analysis of Algorithms", Pearson LPE.
7. Bressard, Bratly, "Fundamentals of Algorithm", Pearson LPE/PHI.
8. Simon Harris, "Beginning Algorithms" Wrox Press (Wiley India).

Management Information System

COURSE OUTLINE

Course Title	Short Title	Course Code
Management Information System	**MIS**	

Course Description:

This course provides an introduction to information systems for business and management. It is designed to familiarize students with organizational and managerial foundations of systems, the technical foundation for understanding information systems, the role of information systems in enhancing business processes and management decision making across the enterprise, and the process of building and managing systems in organizations. The course will focus on topics such as Management of the Digital Firm, Internet and Internet technology, the Electronic Business and Electronic Commerce, the Information Technology (IT) Infrastructure, the Ethical and Security Issues related to Information Systems, and the Enterprise Applications. The course will provide students with information systems knowledge that is essential for creating successful and competitive firms.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	**14**	**42**	**03**

Prerequisite Course(s): Principles of Management.

COURSE CONTENT

Management Information Systems **Semester-VI**

Teaching Scheme
Lecture: 3 hours / week

Examination Scheme
End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Information Systems

(08 Hours, 16 marks)

i. Introduction

a) Data Vs Information
b) Functions of Management
c) Managerial Roles
d) Levels of Management
e) Classification of Information System
f) Framework for Information System

ii. Systems

a) System concepts
b) System and their Environments
c) How system works
d) System approach for problem solving

2. E Business Enterprise:

(08 Hours, 16 marks)

i. E Business Technology

a) Introduction to E Business
b) Models of E Business
c) Internet and WWW
d) Security in E Business
e) Electronic Payment System
f) Web Enabled Business Management
g) Enterprise Portal
h) MIS in Web Environment

ii. Organization of Business in Digital Firm

a) E Business
b) E Commerce
c) E Communication
d) E Collaboration
e) Real Time Enterprise

3. Applications To Functional Business Areas

(08 Hours, 16 marks)

i. Operational Information System

a) Accounting / Finance
b) Marketing
c) Production
d) Human Resource

ii. Tactical Information System

a) Accounting / Finance
b) Marketing
c) Production
d) Human Resource

iii. Strategic Information System

a) Accounting / finance
b) Marketing
c) Production
d) Human Resource

4. DSS, EMS And ES:

(08 Hours, 16 marks)

i. Decision Support System

a) Characteristics of Decision Making Process
b) Features of DSS
c) Development of DSS
d) Benefits and Risks of DSS
e) GDSS

ii. Enterprise Management System

a) ERP System
b) ERP Model and Modules
c) Benefits of ERP
d) Supply Chain Management
e) Customer Relationship Management

iii. Expert Systems

a) Characteristics
b) How an Expert System Works
c) Advantages
d) Expert System and DSS
e) Expert Systems and AI.

5. Information Security and Information Technology

(08 Hours, 16 marks)

i. Information Security Challenges in E Enterprise

a) Risks
b) Common Threats
c) Common Controls
d) Protection of information system

ii. IT: Impact on Society

a) Impact of IT on Privacy
b) Ethics
c) Technical Solution for Privacy Protection
d) Intellectual Property
e) Copyright and Patents
f) Impact of IT on the Workplace
g) Impact of quality on Life

Text Books:

1. Robert Schultheis and Mary Sumner, "Management Information Systems The Managers View", 4th Edition Tata McGraw Hill
2. Waman S. Jawadekar, "Management Information Systems", 4th Edition Tata McGraw Hill.

Reference Books:

1. Sahil Raj "Managament Information Systems" PearsonEducation
2. Kenneth C Laudon and Jane Laudon, "Management Information System", Pearson Education
3. James A. O'Brien, "Management Information Systems", Tata McGraw Hill
4. S. Sadagopan, "Management Information System", PHI.

Operating System Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Operating System	**OS**	

Course Description:

This laboratory provides students with a comprehensive study of the operating system functions, its working details and implementation of various algorithms used in the operating systems.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**02**	**14**	**28**	**03**

Total Semester Credits: 03

Prerequisite Course(s): C Programming, Basic Knowledge of Linux Operating System.

LAB COURSE CONTENT

Outline of Content:

(Note: Minimum FOUR Experiments each from group A and B)

Group A

1. **Study of Commercial and Open Source Operating Systems (01 each) and Design structure of these of Operating Systems.**
   a. Study the basic structures.
   b. Study the File systems.
   c. Study the Security aspects of Operating Systems.
   d. e. g. Windows OS, Linux OS.
2. **Write a program to implement Command Interpreter using system calls.**
   Implementation of Command Interpreter using various system calls showing working of Command Line Interpreter.
3. **Write a program to implement concept of Threading.**
   Demonstrate the concept of Threading in process. (Without using System Call/ Kernel Functions).
4. **Write a program to implement CPU Scheduling algorithms**
   Demonstrate the working of CPU Scheduling algorithms (any two).
   a. FCFS
   b. SJF(Preemptive & non-preemptive)
   c. Round Robin
   d. Priority(Preemptive & non-preemptive)
5. **Write a program to implement algorithmic solution for Critical Section Problem**

Demonstrate solution to overcome the critical section problem.

Group B

1. **Write a program to implement Memory Management algorithms – best fit, first fit, worst fit**
   Demonstrate the working of Memory Management algorithms (any two).
   a. First Fit
   b. Best Fit
   c. Worst Fit
2. **Write a program to implement Page Replacement algorithms**
   Demonstrate the working of Page Replacement algorithms (any two).
   a. FIFO(First In First Out)
   b. LRU(Least Recently Used)
   c. Optimal
3. **Write a program to implement Inter process communication**
   Demonstrate the working of Inter Process Communication (any one).
   a. Full Duplex pipes
   b. Half Duplex pipes
4. **Write a program for Banker's algorithm**
   Demonstrate the working of Banker's algorithm.
5. **Write a program to demonstrate disk scheduling algorithms**
   Demonstrate the working of the Disk Scheduling algorithms (any two).
   a. FCFS
   b. SSTF
   c. SCAN
   d. C-SCAN

Guidelines for ICA:
Students must submit ICA in the form of journal. Each assignment should be well documented. Faculty in charge will assess the assignments continuously and grade or mark each assignment on completion date declared for each assignments.

Guide lines for ESE:-

- ESE will be based on the practical assignments submitted by the students in the form of journal.
- In the ESE, the students may be asked to perform the practical assignment with minor modification.
- Evaluation will be based on the paper work of algorithm, understanding of the logic and the syntax, quality of the program, execution of the program, type of input and output for the program.

Reference Books:

1. A. Silberschatz, P. B. Galvin, G. Gagne, "Operating Systems Concepts", 7th/ 8th edition, John Wiley Publications, 2008.
2. William Stalling, "Operating System Internals and Design Principles", 6th edition, Pearson Publication, 2013.

3. Maurice J. Bach, “The Design of the Unix Operating System”, 1st edition, PHI.
4. Dhananjay M. Dhamdhere, “Operating Systems-A Concept-Based Approach”, 3rd edition, TMH, 2012.
5. A. S. Tanenbaum, “Modern Operating System”, 2nd edition Pearson publication, 2001.
6. H. M. Deitel, P. J. Deitel, D. R. Choffnes, “Operating System” 3rd edition, Pearson publication, 2013.
7. Rajiv Chopra, “Operating Systems-A Practical Approach”, 1st edition, S. Chand Publication, 2009.
8. Sibsankar Haldar, Alex A. Arvind, “Operating Systems”, 1st edition, Pearson Publication, 2009.

Note:-

- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

Object Oriented Modeling & Design Lab

LAB COURSE OUTLINE

Course Title | Short Title Course Code

Object Oriented Modeling and Design | **OOMD**

Course Description:

The objective of this course is to introduce the students to learn how to understand the requirements of a system, its analysis, its scope, good design and good modeling practices and to document them. Students are being able to discuss the pros and cons of system design and issues in modeling large and complex systems. It explores UML 2.0 Basic and advanced concepts and notation for the same & diagrams for modeling different aspects of a system throughout the SDLC lifecycle.

Laboratory	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	02	14	28	01

Total Semester Credits: 01

Prerequisite Course(s): Knowledge of software engineering.

LAB COURSE CONTENT

Outline of Content:

(Note: Minimum Six Experiments out of eight)

To meet above objectives teachers will help students choose a following system for modeling. The students will try and identify scope of such a system as realistically as possible. Students will learn to draw, discuss different UML 2.0 diagrams, concepts, notation, advanced notation, forward and reverse engineering aspects. As far as possible draw as many diagrams for one single system, unless they are not applicable for the chosen system in which case other systems may be chosen for specific diagrams.

1. Design ATM system using Structural and Behavioral UML diagram.
2. Design Coffee vending machine using Structural and Behavioral UML diagram.
3. Design College Admission Process using Structural and Behavioral UML diagram.
4. Design Library Management system using Structural and Behavioral UML diagram.
5. Design Hospital Management system using Structural and Behavioral UML diagram.
6. Design Railway Reservation system using Structural and Behavioral UML diagram.
7. Design Online Shopping system using Structural and Behavioral UML diagram.
8. Design Hotel Management system using Structural and Behavioral UML diagram.

Guidelines for ICA:

Students must submit ICA in the form of journal. Each assignment should be well documented. Faculty in charge will assess the assignments continuously and grade or mark each assignment on completion date declared for each assignments.

Guide lines for ESE:-

- ESE will be based on the practical assignments submitted by the students in the form of journal.

Reference Books:

1. Pascal Roques, "Modeling Software Systems Using UML 2", Wiley.
2. Russ Miles and Kim Hamilton, "Learning UML 2.0, SPD", O'Reilly.
3. Craig Larman, "Applying UML and patterns: An introduction to Object-Oriented Analysis and Design and Iterative Development", Pearson Education.
4. Mike O'Docherty "Object-Oriented Analysis & design understanding system development with UML 2.0", John Wiley and Sons.
5. Jim Arlow, Ila Neustadt, "UML 2 and the Unified Process: Practical Object-Oriented Analysis and Design", 2nd Edition, Addison-Wesley Professional.
6. Mark Priestley, "Practical Object-Oriented Design with UML", TATA McGraw-Hill.

Note:-

- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

Database Management System Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Database Management System	**DBMS**	

Course Description:

The objective of this course is to introduce the students to learn and practice Structure Query Language for creation, Manipulation, controlling database, apply normalization techniques to normalize the database also learn different types of Join, view, PL/SQL, Trigger, Stored Procedure, Stored function and enable them to apply these concepts for solving real world problems.

Laboratory	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	02	14	28	01

Total Semester Credits: 01

Prerequisite Course(s): knowledge of Data Structures

LAB COURSE CONTENT

Outline of Content:

(Note: Group A is Mandatory and Minimum Three experiments from Group B.)

GROUP A

1. Creating a sample database using any client server RDBMS (Oracle/ Open Source Database) package using SQL DDL queries. This will include constraints (Primary key, Foreign key, Unique, Not Null, and Check) to be used while creating tables.
2. SQL DML queries: Use of SQL DML queries to retrieve, insert, delete and update the database created in experiment No. 1.
3. SQL Queries: The queries should involve SQL feature such as aggregate functions, group by, having, order by the database created in experiment No. 1.
4. SQL Queries: The queries should involve Set Operations and Set Comparisons the database created in experiment No. 1.
5. Screen design and Report generation: Sample forms and reports should be generated using any front end tools.

GROUP B

1. Write a program to demonstrate different types of JOIN.
2. Write a program to demonstrate use of Trigger.
3. Write a program to demonstrate view.
4. Write a program to demonstrate PL/SQL block.
5. Write a program to demonstrate stored function.
6. Write a program to demonstrate stored procedure.

Guidelines for ICA:

Students must submit ICA in the form of journal. Each assignment should be well documented. Faculty in charge will assess the assignments continuously and grade or mark each assignment on completion date declared for each assignments.

Guide lines for ESE:-

- ESE will be based on the practical assignments submitted by the students in the form of journal.
- In the ESE, the students may be asked to perform the practical assignment with minor modification.
- Evaluation will be based on the paper work understanding of the logic and the syntax, quality of the program, execution of the program, type of input and output for the program.

Reference Books:

1. Rick F. Van der Lans, "Introduction to SQL", Pearson education.
2. B. Rosenzweig, E. Silvestrova, "Oracle PL/SQL by Example", Pearson education.
3. Steven Feuerstein, "Oracle PL/SQL Programming", SPD, O'Reilly.
4. Dr. P. S. Deshpande, "SQL& PL/SQL for Oracle 10g Black Book", Dreamtech Press
5. M. McLaughlin, "Oracle Database 11g PL/SQL Programming", TMH.
6. J. J. Patrick, "SQL Fundamentals", Pearson Education.

Note:-

- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

Web Programming Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code

LAB COURSE CONTENT

Teacher should facilitate learning following lab experiments:

(Note: 07 practical assignments from Group A and 03 from Group B)

GROUP A

1. **Develop a complete web page using HTML basic tags, CSS, Table and Layout**
   - A simple web page that includes basic tags such as head, body, text formatting tags, lists, paragraph, image tags, css, table and layout etc.
2. **Design a page web using JavaScript to demonstrate, if statement, if...else statement and Switch statement**
   - A simple web page that include JavaScript statements such as if, if...else and switch.
3. **Design a page web using JavaScript to demonstrate, Alert box Alert box with line breaks, Confirm box and Prompt box**
   - A simple web page that include JavaScript alert box, alert box with line breaks, confirm box and prompt box.
4. **Design a page web using JavaScript to demonstrate, Call a function ,Function with an argument, Function that returns a value**
   - A simple web page that include JavaScript call a function, function with arguments, function that return a value.
5. **Design a page web using JavaScript to demonstrate, For loop, While loop, Do While loop, Break a loop, Break and continue a loop**
   - A simple web page that include JavaScript for loop, while loop , do while loop, break a loop, break and continue a loop.
6. **Design a page web using JavaScript to demonstrate, Acting to the onclick event, Acting to the onmouseover event, onblur , onchange, ondblclick, onkeydown, onkeypress, onkeyup, onresize, onunload**
   - A simple web page that include JavaScript events like onclick, onmouseover, onblur, onchange, ondblclick, onkeydown, onkeypress, onkeyup, onresize, onunload etc.
7. **Design a page web using JavaScript to demonstrate, Sort an array (alphabetically and ascending), Sort numbers (numerically and ascending), Sort numbers (numerically and descending)**
   - A simple web page that include JavaScript to sort an array alphabetically and ascending, sort numbers numerically and ascending and sort numbers numerically and descending.
8. **Design a page web using PHP to demonstrate, variables, echo/print, data types, string functions and operators**
   - A simple web page that include PHP variables, echo/print, data types, string functions and operators.
9. **Design a page web using PHP to demonstrate, if-else-elseif, switch, for loop, while loop, functions and arrays**
   - A simple web page that include PHP if-else-elseif, switch, for loop, while loop, functions and arrays.
10. **Design a page web using PHP to demonstrate, form handling, form validation and form URL/E-mail**

- A simple web page that include PHP form handling, form validation and form URL/E-mail**.**

GROUP B

1 **Web server installation and configuration**
   - Installation and configuration of any web server like IIS, Apache, WAMP, XAMP etc.

2 **Design a page web using PHP to demonstrate, date, file, file upload, cookies and sessions**
   - A simple web page that include PHP date, file, file upload, cookies and sessions.

3 **Design a page web using PHP to demonstrate, MySQL connect, create DB/Table, insert into, select, where, order by, update and delete**
   - A simple web page that include PHP MySQL connect, create DB/Table, insert into, select, where, order by, update and delete.

4 **Design a Website with the help of HTML and JavaScript with not less than 15 full size pages for a selected topic (Commercial, Institute, Portal or decided jointly by the student and teacher)**
   - Design a website on the above listed topics with the help of HTML and JavaScript.

5 **Design a Website with the help of HTML and PHP for a selected topic (Banking, Commercial, Institute, Portal or decided jointly by the student and teacher)**
   - Design a website on the above listed topics with the help of HTML and PHP.

Guidelines for ICA:
Students must submit ICA in the form of journal. Each assignment should be well documented. Faculty in charge will assess the assignments continuously and grade or mark each assignment on completion date declared for each assignments.

Reference Books:

1. "Web Technologies HTML, JavaScript, PHP, Java, JSP, XML and AJAX", Black Book, Kogent Learning Solutions Inc., dreamtech press, 2014.
2. Chris Bates, "Web Programming: Building Internet Applications", Third Edition, Wiley India, 2012.
3. Jon Duckett, "Beginning HTML, XHTML, CSS, and JavaScript", John Wiley & Sons publication, 2010.
4. Thomas A. Powell, "HTML & CSS: The Complete reference", Fifth edition, TMH 2010.

Note:

- Concerned faculty should conduct at least 07 practical assignments from group A and 03 from group B out of the above list.
- Every assignment should include print out of program with proper comments and output.

- Every student is required to submit the assignments in the form of journal.
- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

Minor Project
COURSE CONTENT

Minor Project	**MIP**	
Course Title	Short Title	Course Code

Semester-VI

Laboratory	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	2	10	20	02

Examination Scheme
Internal Continuous Assessment (ICA): 50 Marks

- Every student shall undertake the Minor Project in semester VI.
- Each student shall work on an approved project, a group of **05 students (maximum)** shall be allotted for the each minor project.
- Minor project may involve design or investigation of a technical problem that may take design, experimental or analytical character or combine element of these areas. The project work shall involve sufficient work so that students get acquainted with different aspects of design or analysis.
- Each student is required to maintain separate log book for documenting various activities of minor project.
- The three-member committee appointed by Head of the department shall be constituted for finalizing the topics of minor project. Maximum four minor project groups shall be assigned to one teaching staff.
- Assessment of the project for award of ICA marks shall be done jointly by the guide and departmental committee as per the guidelines given in **Table-A.**
- Before the end of semester, student shall deliver a seminar and submit the seminar report (paper bound copy)in following format:
    - Size of report shall be of minimum 25 pages.
    - Student should preferably refer minimum five reference books / magazines/standard research papers.
    - Format of report
        - Introduction.
        - Literature survey.
        - Theory (Implementation, Methodology, Applications, Advantages, Disadvantages. etc)
        - Future scope.
        - Conclusion.

Assessment of Minor Project

Name of the Project: _____
Name of the Guide: _____

Table-A

SN	Exam Seat No	Name of Student	Project Selection	Documentation	Design /Simulation/Logic	PCB/hardware/programming	Result Verification	Presentation	Total
			5	10	10	10	10	5	50

Seminar-I
COURSE CONTENT

Seminar-I **S-I**
Course Title Short Title Course Code
Semester-VI

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**2**	**10**	**20**	**2**

Examination Scheme
Internal Continuous Assessment (ICA): 25 Marks

1. For Seminar-I every student will individually study a topic assigned to him / her and submit a report and shall deliver a short lecture / Seminar on the topic during the term.
2. The three-member committee appointed by Head of the department shall be constituted for finalizing the topics of Seminar-I. Seminar shall be related state of the art topic of his choice approved by the committee.
3. Seminar topic should not be repeated and registration of the same shall be done on first come first serve basis.
4. Topic of Seminar shall be registered within a two week from commencement of VI Semester and shall be approved by the committee.
5. Maximum six seminar supervision shall be allotted to each teacher.
6. Before the end of semester, student shall deliver a seminar and submit the seminar report (paper bound copy).

7. **ASSESSMENT OF SEMINAR-I**

Assessment of the Seminar-I for award of ICA marks shall be done by the guide and a departmental committee jointly, as per the guidelines given in **Table- B**

Title of Seminar: _____
Name of Guide: _____

Table-B

SN	Exam Seat No	Name of Student	Topic Selection	Literature survey	Report writing	Depth of understanding	Presentation	Total
			5	5	5	5	5	25

Syllabus of 3rd Year B. Tech.
Chemical Engineering
w.e.f. 2016-17

Third Year B. Tech. (Chemical Engineering) Revised Syllabus w.e.f. 2016-17							
Course Code	**Title of Course**	**Teaching Hours**	**Tutorial**	**Credits**	**Practical Hours**	**Credits**	**Total Credits**
Fifth Sem.							
HML-301	Industrial Management and Economics	03		03	-	-	03
CHC-301	Mass Transfer-I	04		04	03	1.5	5.5
CHC-302	Instrumentation & Instrumental Analysis	04		04	02	1	5
CHC-303	Chemical Reaction Engg.-I	04		04	03	1.5	5.5
HML-302	Managerial Behavior : Psychosocial Dimensions	03		03	-	-	03
ELECTIVE	Elective-I	04		04	-	-	04
Total		**22**	**-**	**22**	**08**	**4**	**26**
	Sixth Sem						
CHC-304	Mathematical Methods in Chemical Engg.	3		3	-	-	3
CHC-305	Chemical Reaction Engg.-II	04		04	03	1.5	5.5
CHC-306	Mass Transfer-II	04		04	03	1.5	5.5
CHC-307	Process Equipment Design & Drawing	03		03	02	1	4
ELECTI	Elective-II	04		04	-	-	4

VE							
ELECTIVE	Elective-III	04		04	-	-	4
Total		**22**	**-**	**22**	**08**	**04**	**26**

SEMESTER- V

Department	**: Department of Chemical Engineering**
Course code	**: HML-301**
Course Title	**: Industrial Management and Economics (TH)**
Course Type	**: Theory**
Total Hrs	**: 03**
Course credit	**: 03**

Objective

Upon successful completion of this course the student will be able to:

1. Identification and selection of management & administration with aspect towards the Production planning and management Quality control and maintenance. Processes/operations according to job requirement in various departments.

2. Identification, selection and understanding of Financial Management capital structure Sources of Industrial finance including institutional feature inside the organisation as well as outside the organisation.

3. Understanding Cost Analysis Cost statement and sheet Cost control and various type of approach of the Industrial relation Quality management techniques Entrepreneurship Development Management information

4. Identification, understanding Micro and Macro economics Demand and Supply factors of market economy Functions of money w.r.t. organisation

Course Content:

Unit-I

Introduction meaning management & administration Functions of Management Planning and ,Organising staffing c monitoring and leading co-ordinating & communication tool Functional of management Production Material Finance personnel Marketing Management concept of productivity wages .Production planning and management Quality control and maintenance.

Unit-II

Types of management Different approaches of management Functional areas of management Forms of business organisation production management work study

productivity measurement material management Inventory analysis Financial Management capital structure Sources of Industrial finance including institutional feature.

Unit-III

Marketing management consumer satisfaction sales and advertising Marketing Research personnel management Industrial relation Quality management techniques Entrepreneurship Development Management information system Information technology In Management Cost Analysis Cost statement and sheet Cost control , Cost projection.

Unit-IV

Nature and significance of Economics Basic problem in Economics Introduction of Micro and Macro economics Demand and Supply factors of market economy Functions of money Banking types and Functions

Unit-V

Indian Economy Liberalisation privatisation and Globalisation Mixed Economy Public Sector Reforms National income determinants Economic planning nature and Entrepreneurship small scale Industries and SSI.

References:

1) Modern Economics by H.L.Ahuja.

2) Modern economics theory by K.K.Dewett.

3) Monitory economics by M.L.Seth.

4) Industrial Management by I.K. Chopde, A.M. Sheikh.

5). Business Organisation and Management by S.A. Sherlekar.

6) Marketing Management by Philip Kotler

Outcomes:

Upon successful completion of this course the student will be able to:

1. Identification and selection of management & production management work study productivity with aspect towards the material management &Inventory analysis Production planning Quality control and maintenance. Processes/operations according to job requirement in various departments in organisation.

2. Identification, selection and understanding the meaning and utility of Marketing management, consumer satisfaction, sales and advertising Marketing Research personnel management features of the organisation.

3. Understand the importance of Cost Analysis Cost statement and sheet Cost control and various type of approach of the Industrial relation Quality management techniques Entrepreneurship Development Management information system

4. Identification, understanding Micro and Macro economics Demand and Supply factors of market economy National income determinants Economic planning nature and Entrepreneurship Functions of money w.r.t. organisation

5. Identification, selection and understanding according to requirement in

Different organisation Financial Management, capital structure Sources of Industrial finance including institutional feature. Understanding of the working principle of Entrepreneurship Development and S.S.I.

Department	**: Department of Chemical Engineering**
Course code	**: CHC-301**
Course Title	**: Mass Transfer-I (TH)**
Course Type	**: Theory**
Total Hrs	**: 04**
Course credit	**: 04**

Objective:

At the end of the course student will understand the basic fundamental of mass transfer operations carried out in chemical industries, design of plate and packed column used for mass transfer operations, drying operation and fundamental of cooling tower.

Course Content:

Unit-I **(10hrs)**

Diffusion (Gas)

Introduction to Mass Transfer Operation:

Principles of diffusion, steady and unsteady state Operation, Fick's law, diffusion in binary mixture, equimolecular counter diffusion, diffusivities in liquid, vapor and gases, mass transfer through stationary gas, mass transfer velocities, gas phase mass transfer cases, thermal diffusion, Maxwell law, Diffusion in solids, individual and overall mass transfer coefficients concept.

Unit-II **(10hrs)**

Diffusion (Liquid)

Mass transfer across phase boundary, penetration theory, two film theory, surface renewal theories, film- penetration theory of mass transfer, mass transfer coefficients & correlation, counter current mass transfer and transfer units, Mass transfer and chemical reaction, simultaneous mass and heat transfer, diffusion in solids, types of solid diffusion.

Unit-III **(10hrs)**

Absorption

Mechanism of absorption, and application of mass transfer theories, choice of solvent for absorption, rate of absorption & material balance over absorption tower-counter current and concurrent flow, minimum gas-liquid ratio for absorber. Transfer coefficients in wetted wall

column, packed and spray towers. The absorption with & without chemical reaction, Brief Introduction to Desorption or stripping.

Unit-IV **(10hrs)**

Equipments for Gas-liquid Operation:

Mechanically agitated vessels of single phase liquid and gas-liquid contacts.

Packed towers: General construction & working, types of packing merits & demerits, operational difficulties, pressure drop & limiting G-L flow rates, heat liberation & temp. Variation in packed towers. Determination of height of columns, transfer units, capacity.

Plate towers: General characteristics, General construction & working, types of plate, merits and demerits, operational difficulties.

Unit-V **(10hrs)**

Humidification & Drying

Humidification: Principle, humidification terms and charts, adiabatic saturation temperature, wet bulb temperature humidification & dehumidification methods, design procedures and selection criteria along with mass transfer calculations. Types of cooling towers, cooling tower operational characteristics.

Drying: Principle, Rate of drying, constant rate and falling rate periods, equilibrium moisture contents, drying equipments, rotary dryers, drum dryers, vacuum dryers, Spray dryer, fluidized bed dryers, dryer calculations and dryer selection criteria.

References:

1. Treybal R.E. “Mass Transfer Operations” McGraw Hill Book Co., New York 1980
2. McCabe W.L. and Smith J.C. & Harriot, “Unit Operations of Chemical Engineering”, McGraw Hill Book Co., New York 1980
3. Principles of Unit Operations: Foust A.S.
4. Coulson J.M. and Richardson J.F., “Chemical Engineering Vol. I, II & III”, Pergamon Press, New York 1977
5. Unit Operation: Mc Cetta Vol. I
6. Badger W.L. and Banchero J.T., “Introduction to Chemical Engineering”, Tata McGraw Hill Book Co.
7. Chattopadyay P., “Unit Operations of Chemical Engineering”, Vol. 1 & 2, Khanna Publishers, New Delhi.

Course Outcomes:

1. Students will learn about the fundamentals of diffusional mass transfer in solids and fluids.
2. Student will understand the application of mass transfer theories in various unit operations.
3. Student will understand the mechanism and operation of absorption/stripping column.
4. Students will gain the knowledge about the equipments/columns used in various unit operation eg. Absorption, drying, humidification etc.
5. Student will understand Operation of Dryer and cooling tower.

Department	**: Department of Chemical Engineering**
Course code	**: CHC-301**
Course Title	**: Mass Transfer-I (PR)**
Course Type	**: Practical**
Total Hrs	**: 03**
Course credit	**: 1.5**

Objective:

To enhance the knowledge and clear the theoretical concepts in the subject by performing the hands on experiments in the laboratory for detail understanding of the topic.

Course Content:

List of Experiments:

1. Determination of vapour diffusivity
2. Study of Liquid –liquid diffusion through porous pot.
3. Solid -liquid diffusion.
4. Solid-air diffusion
5. Absorption with/ without chemical reaction.
6. Batch drying.
7. Tray dryer.
8. Fluidised bed tower.
9. Humidification study/ Cooling tower.
10. Wetted wall column.

(Minimum 8 experiments).

Outcomes:

Student will be able to solve basic piratical calculations of mass transfer operation.

Student will be able to design Absorption column, dryers, and cooling tower.

Department	**: Department of Chemical Engineering**
Course code	**: CHC-302**
Course Title	**: Instrumentation & Instrumental Analysis (TH)**
Course Type	**: Theory**
Total Hrs	**: 04**
Course credit	**: 04**

Course Objectives:

To impart the thorough knowledge about analysis, measurements of various parameters along with the advance controlled systems in chemical engineering and how to use them on the field in professional life. To make the student to be able to understand and solve the problems in measurement and controlled systems by using standard methods.

Course Content:

Unit-I **(10hrs)**

Measuring instruments:

Elements of measuring instruments

Static and dynamic characteristics of measuring instruments

Dynamic characteristics of 1^{st} order and 2^{nd} order tyope measuring instruments.

Unit-II **(10hrs)**

Temperature Measurements: -

Expansion thermometers

Thermocouples, Thermistors, R.T.D

Radiation based temperature-measuring instruments.

Unit-III **(10hrs)**

Manometers

Measuring elements for gauge pressure and vacuum

Indicating elements for pressure and vacuum gauges

Measurement of absolute pressure etc.

Unit-IV **(10hrs)**

Measurement of Head and Level

Direct and indirect methods: float type, bubbler systems, air purge method

Measurement of Chemical Composition:

Spectroscopic analysis: Absorption spectroscopy. Emission spectroscopy, mass spectroscopy, x-ray diffraction, colour, measurement by spectrometers.

Unit-V **(10hrs)**

Other special methods of analysis including:

Heat of combustion method , Chemical methods for analysis of hydrogen sulfide, carbon dioxide etc., Magnetic susceptibility method, Polarizing cell method, Dilatometer, Interferometer

Introduction to single loop control.

Feed back control system.: Concept of FBC , Block diagram development, Classical FBC controller.

Feed back control design: Preliminary considerations choice of sensors, Transmitters, and final control element,

Introduction to more advanced control system :-

Feed forward, cascade, Augmented feed forward control, ratio control, override controllers, spit range, Auctioneering control. Introduction to digital control system

References:

1. Industrial instrumentation : Eckman, Donald P.
2. Instrumentation devices & Systems: Rangan C. S., Sarma G.R.
3. Principle of Industrial instrumentation: Patranbis d.
4. Process control and instrumentation :vyas R.P.
5. Process Systems Analysis and control :Donald R. Couighanowr.
6. Process Dyanamics modeling and control by Harmon Ray.

Course Outcomes:

a) To get the students well acquainted with basic principles of operation, static and dynamic characteristics of various pressure and temperature measuring instruments.
b) To get the students well acquainted with basic principles of operation, static and dynamic characteristics of various level & chemical composition measuring instruments.
c) To enhance the knowledge of students about various spectroscopic and chromatographic techniques for analysis.
d) The get the students well acquainted with basic knowledge of various sensors, controllers and their application in the control systems, advance control systems.
e) To enhance the ability of students to identify and solve various engineering problems in control systems during operation.

Department	**: Department of Chemical Engineering**
Course code	**: CHC-302**
Course Title	**: Instrumentation & Instrumental Analysis (PR)**
Course Type	**: Practical**
Total Hrs	**: 02**
Course credit	**: 01**

Objective:

To enhance the knowledge and clear the theoretical concepts in the subject by performing the hands on experiments in the laboratory for detail understanding of the topic.

Course Content:

List of Experiments:

1. Study of bimetallic thermometers, Thermocouples, Thermistors, R.T.D, manometer,
2. To study the dynamic characteristics of 1^{st} order system.
3. To study the dynamic characteristics 2^{nd} order system.
4. To study of different pressure gauges.
5. To study control valve characteristics

Outcome:

Student will be able to explain working principle of bimetallic thermometer, Thermocouples, Thermistors, R.T.D and manometer

Student will be able to explain the basics of control valve characteristics.

Department	**: Department of Chemical Engineering**
Course code	**: CHC-303**
Course Title	**: Chemical Reaction Engineering-I (TH)**
Course Type	**: Theory**
Total Hrs	**: 04**
Course credit	**: 04**

Course Objectives:

To impart the thorough knowledge about examining the reaction rate data using various techniques to determine rate laws, and to use them to design chemical reactors.

Course Content:

Unit- I **(10hrs)**

Review of chemical reaction equilibrium, Temperature Dependent term of a rate equation: from Arrhenius classification of chemical reaction, homogeneous & heterogeneous systems, rates of reaction, order of reaction, and rate constant. Theories of reaction rate. Development of kinetics based reaction mechanism, determination of frequency factor & energy of activation.

Unit- II **(10hrs)**

Collection and interpretation of kinetic data using integral , differential half life etc., technique for constant & variable volume reactor , use of linear & nonlinear least square technique . Techniques for determination of kinetics of fast ractions.

Unit- III **(10hrs)**

Ideal reactions: Concept of ideality, Development of design expression for batch, tubular and stirred tank reactors. Combined reactor system, comparison between mixed and plug flow reactor advantages and limitation in application. Series and parallel combination of PFR & CSTR , Reactor set up for autocatalytic reactor .

Unit- IV **(10hrs)**

Thermal characteristics of rectors: Isothermal, adiabatic and non adiabatic conditions.

Principles of reactor stability and optimization: Multiple study state in CSTR.

Simplified objective functions. Kinetics & reactor design foe series, parallel, and complex reaction.

Unit- V **(10hrs)**

Residence time distribution: Residence time function and relation amongst their application to ideal reactors. The modeling of real systems. Non-ideality parameters, prediction of reactor performance. Concept of micro and macro mixing.

References:

1. Chemical Reaction Engineering : Leaven Spiel O
2. Chemical Reaction Engineering: : Fogler
3. Principles of Reaction Engineering : S.D. Dawande

Course Outcome:

a) To enhance the ability of students to understand the classification of reactions, effects of various parameters on rate of reactions with different reaction rate theories.

b) To get the students well acquainted with collection and analysis of rate data using integral, differential, half-life method of analysis of rate data. To understand the kinetics of fast reactions.

c) To enhance the knowledge of students about ideal reactors, autocatalytic reactor, various parameters affecting the reactor performance, combine reaction system and comparison of various reactors.

d) The get the students well acquainted with thermal characteristics of reactors, residence time distribution and modelling of real systems.

e) To enhance the ability of students to identify and solve various engineering problems during product optimization.

Department	**: Department of Chemical Engineering**
Course code	**: CHC-303**
Course Title	**: Chemical Reaction Engineering-I (PR)**
Course Type	**: Practical**
Total Hrs	**: 03**
Course credit	**: 1.5**

Objective:

To impart the thorough knowledge about examining the reaction rate data using various techniques to determine rate laws, and to use them to design chemical reactors.

Course Content:

Experiments based on chemical reaction engg. Such as Study of kinetics reaction, Residence time distribution, Study of various reactors (Batch reactor, PFR , CSTR ,)

Minimum eight experiments based on theory

Course Outcome:

To enhance the knowledge and clear the theoretical concepts in the subject by performing the hands on experiments in the laboratory for detail understanding of the topic.

Department	**: Department of Chemical Engineering**
Course code	**: HML-302**
Course Title	**: Managerial Behaviour and Psychosocial Dimension (TH)**
Course Type	**: Theory**
Total Hrs	**: 03**
Course credit	**: 03**

Course Objectives:

This subject aims at developing students with the required commitment and competencies for working towards the objectives within an organizational framework in order to improve both individual and organizational performance.

Course Content:

Unit- I

Psychosocial dimension of work in organisation Introduction and background

Unit- II

Approaches in Organisational analysis Organisational behaviour approach

Unit- III

Early practises in Management Theories of Organisation Organisational process and Function The structural variables context. Environment of work organisation Socio-cultural Environment Its impact on Organisation Social dimension of organisational and Behaviour Formal and Informal organisation Group Dynamics and terms

Unit- IV

Motivational Process and Theories Communication Technology and Interpersonnel process Leadership process and style. and T.Q.M.

Unit- V

Decision making behaviour, Decision making techniques creativity.

References:

1) Psychosocial Dimensions for management by T.V.Rao

2) Appraising and Developing Managerial Performance Management and Organisational Behaviour by Laurie J. Mullins

3) Managerial Behaviour and Effectiveness by E Ananda Raja, N R V Prabhu, P Kameshwara Rao

4) Managerial Behaviour by O.P. Khanna

Course Outcome:

1) It emphasis on understanding of the issues, problems and practice of managing, working and organising across cultures in organisations.

2) It develops the understanding of psychosocial dimensions in people of organization to sustain relationship.

3) It contributes in developing interpersonal behaviours.

4) The subjects helps students to learn organizational whesiveness, pursuing goal and understand behaviour.

Department	**: Department of Chemical Engineering**
Course code	**: Elective-I PTL-308**
Course Title	**: Specialty Pigments and Additives in Coatings (Th)**
Course Type	**: Theory**
Total Hrs/week	**: 04**
Course credit	**: 4**

Course Content:

Unit -I Metallic, Interference and Cholesteric Pigments **(10 hrs)**

Aluminium, copper, zinc dust, bronze, nickel stainless steel, lead powders and pastes,

Nacreous, luminescent (fluoresecent/phosphorescent) pigments-optical principles, substrate free pearlescent pigments, Special effect pigments based on mica (pigments formed by coating of substrates), pigments based on liquid crystal polymer

Unit -II Functional and Nano pigments **(10 hrs)**

Antifouling pigments-cuprous oxide, other copper compounds, mercuric oxide, barium metaborate, organotin pigments,

Manufacture and properties of nanopigments: alumina, silica, titanium dioxide, iron oxides, zinc oxides, silver, $CaCO_3$, etc. on Nano scale; Bimodally porous nanoparticles (e.g. titanium tetraisopropexide), variables affecting particle size aggregation and crystal structure. Their use as spacing extenders / functional pigments in paints, reinforcing agent in polymers, heat & wear resistant materials, etc.

Unit - III Surfactants **(10 hrs)**

Anionic, cationic, non-ionic and amphoteric surfactants; polymeric surfactants, Gemini surfactants, HLB value, CMC, Kraft point.

Role of surfactants as- emulsifier, wetting agents, dispersing agents.

Unit - IV **(10 hrs)**

Mechanism, dosing and Trade information of coating additives: Antisettling agents, additives for rheology control, flow and levelling control agents, slip additives, adhesion promoters, antiskinning agents, light stabilizers (UV absorbers, antioxidants, HELS), moisture scavengers, hammer and wrinkle finish additives, conductivity control additives etc.

Unit - V **(10 hrs)**

Mechanism, dosing and Trade information of Additives for Water Borne Coating: - Auxiliary and coalescing solvents, neutralization agents, thickeners, flow and levelling control agents, antifoam, antifreeze-thaw, Preservatives (In- can/film)-fungicides, mildew agents, corrosion inhibitors etc.

Department	**: Department of Chemical Engineering**
Course code	**: Elective-I, PLL-308**
Course Title	**: Technology of Elastomers and Additives (TH)**
Course Type	**: Theory**
Total Hrs	**: 04**
Course credit	**: 04**

Course Objectives:

a. To provide knowledge on various additives used in polymer for various applications.
b. To understand about the natural rubber with its history from latex collection to processing of various types of natural rubber.
c. To dessiminate knowledge of various types of synthetic rubber in terms of synthesis, processing, properties and applications.
d. To understand the physical properties of elastomers in terms of vulcanization and testing parameters.

Course Content:

Unit-I **(10 hrs)**

Additives in plastics, types of stabilizing additives (antioxidants, light emitting stabilizers, metal deactivators, heat stabilizers, flame retardance etc.), selection and properties of stabilizing additives, function and level of addition examples, types of processing aids (lubricants, high polymer impact mixture processing aids, slip, antislip, antiblock, mould release agent), their function and level of addition.

Unit-II **(10 hrs)**

Types of fillers and reinforcement, choice of fillers and properties theory of plasticizers, types of plasticizers, reinforcement of plasticizers, function of blowing agent and examples, pigments and dies.

Section-B

Unit-III **(10 hrs)**

Sources and history of natural and synthetic rubber, natural rubber vs. synthetic rubber, significance of structure of natural rubber. Production of different grades of natural rubber

from latex and its classification, mastication, compounding and processing of natural rubber synthetic rubbers, compounding ingredients and method of compounding.

Unit-IV **(10 hrs)**

Manufacturing processes, properties and application of elastomers based on butadiene and its copolymers, acrylonitrile, butyl, ethylenepropylene, silicons, and polycholoprene Rubbers etc.

Unit-V **(10 hrs)**

Mechanism of reinforcement of rubbers, chemistry and technology of vulcanization, processing of rubbers, physical testing of rubbers. Industrial fabrication of rubber articles such as transmission belts, hoses, tyres, tubes, proofed fabrica, moulded goods etc.

Reference books

1) Chemistry and Technology of Rubber: Morton
2) Polymer Chemistry of Synthetic Elastomers Vol: I &II: Kennedy
3) Chemistry of Rubber: Mounten

Course Outcomes:

1. The Students will be able to understand the various application of additives for improvement in mechanical, chemical, physical and environmental properties of the product.
2. This course abreast the students with collection of latex, processing of latex and its characterization for classification of natural rubber.
3. The synthetic rubber and their synthesis, processing and properties are also known to the students at the end of the course

Department	**: Department of Chemical Engineering**
Course code	**: Elective-I, OTL-307**
Course Title	**: Technological Advances in Perfumery and Cosmetics. (TH)**
Course Type	**: Theory**
Total Hrs	**: 04**
Course credit	**: 04**

Course Objectives:

This course will cover the raw material and characterizations of different cosmetics and perfumery materials along with production. The perfume blending for different applications will also be studied.

Course Content:

Unit - I

General Chemistry of essential oils. Raw materials for essential oils, general methods of their manufacture. Different types of essential oil bearing materials.

Unit -II

Physical and Chemical characteristic of essential oils-colour, specific gravity, refractive index, optical rotation, solubility, acid value and ester value. Analysis of essential oils for free alcohols, aldehyde and ketones. Grading and standardization of essential oils, common adulterants and their detection.

Unit- III

Production, properties and composition of important Indian Essential Oils viz Rose, jasmine, khus, sandalwood, keora, palmarosa, lemongrass, peppermint, lemon, clove oil, orange oil, eucalyptus oil, etc.

Unit- IV

The history of perfumery, Perfumery and its function, the mechanism of smelling, classification of perfume ingredients. Blending of perfumes. Important isolates, synthetic perfumery materials and fixatives e.g. menthol, camphor, thymol, citral, geraniol, terpin oil, vanillin, cumarin, musk, benzyl acetate, benzyl benzoate etc.

Unit -V:

Production techniques, functions of ingredients and desirable characteristics of cosmetic products like: Face creams, Face powders, Talcum powders, Hair oil & dyes, Shampoos, Tooth pastes & powders, Shaving creams, Lipsticks, Nail polishes, Depilatories, etc

Course Outcome:

1. Describe the general chemistry of essential oils including the different types of essential oil bearing materials and the method of their manufacture.
2. Understand the principles behind the physical and chemical analytical techniques associated with essential oils.
3. Understand the principles and current practices of production of essential oils.
4. Explain the concepts of perfumery, blending of perfumes and outline the use of synthetic perfumery materials.
5. Describe the production techniques and functions of ingredients in cosmetic products.
6. Use the knowledge acquired from the course for set-up of small and medium scale industries.

Department	**: Department of Chemical Engineering**
Course code	**: Elective-I, FTL-306**
Course Title	**: Advanced Technology in Food Packaging (Elective-I)**
Course Type	**: Theory**
Total Hrs	**: 04**
Course credit	**: 04**

Course Objectives:

1. To study basic packaging materials and their types and functions .
2. To study various packaging systems used for food products.
3. Estimation of shelf life of packaged products.
4. To acquire knowledge of recent trends in food packaging.
5. To acquire knowledge of sealing and lamination techniques.

Course Content:

Unit -I **(10 hrs)**

Principle of food packaging, types and functions of packaging materials, filling and sealing of metallic, glass and plastic containers.

Unit- II **(10 hrs)**

Flexible packaging laminated packaging and retortable pouches, concept and determination of ERH, calculation of shelf life and requirement for packaging. Testing of packaging materials.

Unit- III **(10 hrs)**

Active packaging system: - Packaging requirement for different moisture level food products, Aseptic packaging of fruits & veg. milk and milk products, high barrier plastic

Unit- IV **(10 hrs)**

Product- Package compatibility: - Packaging of microwavable food, MAP of fresh fruit and veg. vacuum and MAP of meat and meat products. Packaging of breakfast cereals, bakery and confectionary products

Unit -V **(10 hrs)**

Packaging requirement for soft drink, alcoholic beverages, distilled spirits fermented food, frozen food, future trends in food packaging.

Books Recommended:

1. Handbook of food packaging edited by F. A Paine and H.Y paine.
2. Modern processing and distribution system for food edited by F. A Paine.
3. Chemical engg. Thermodynamics by Daubert.
4. Chemistry of Food Packaging by Swalam C.M., American Chemical Society, Washington D. C. 1974.
5. Packaging by Neubaner R.G. Van Nostrand Co. New York.
6. Food Packaging Principles and Practice : Gordon L. Robertson

Course Outcomes:

Students learnt following regarding the food packaging:

1. Students learnt basics of food packaging materials, systems and packaging types and functions.
2. Students learnt Flexible packaging, Active packaging system, Aseptic packaging, MAP (fruits and vegetables, meat and poultry),vacuum packaging, smart packaging and sensors for various food products.
3. Students learnt estimation of Shelf life of packaged products
4. Students learnt Packaging of microwavable food, soft drink, alcoholic beverages, frozen food.
5. Students are able to learn sealing and lamination techniques.

SEMESTER- VI

Department	**: Department of Chemical Engineering**
Course code	**: CHC-304**
Course Title	**: Mathematical Methods in Chemical Engineering (TH)**
Course Type	**: Theory**
Total Hrs/ Week	**: 04**
Course credit	**: 04**

Objective

To make the students to apply mathematical techniques for solving set of various types of equations come across during learning of various chemical engineering courses.

Course Content:

Unit- I **(10hrs)**

Matrices properties & classification, eigen value, eigen vector, Hanilton – Caley theorem, Sylvester's formula, determination of A^{-1} (3X3) & (4X4) matrix & Root finding method – Transcendental equation:- 1) Bisection method, 2) Netwon Rapson method, 3) Mullers method, 4) Intention method (method of successive Approximation), 5) Regula falsi method.

Unit- II **(10hrs)**

Solution of simultaneous Linear equation using elimination methods

1) Gausses Jorden method, 2) Gausses elimination method

3) Gauss- Seidal method, 4) Matrix inversion method

5) Relaxation method 5) Augmented matrix method

Unit- III **(10hrs)**

Solution of ordinary differential equation

1) Taylor series method, 2) Piccards method, 3) Euler's method, 4) Euler's modified method, 5) Ranga Kutta method, 6) Ranga Kutta (Forth order) method.

[10 hrs]

Unit- IV **(10hrs)**

Numerical differentiation

1) Newton forward differential formula

2) Newton Backward differential Formula

3) 3) Differentiation at a non- tabular value near the beginning or near the end

4) Central differential formula

a. Bessels formula

b. Starlings formula

5) Dividend different formula & Numerical integration

a. Trapezodial Rule, b. Simpson's 1/3 rule

c. Simson's 3/5 rule d. Weddle's Rule

Numerical based on acted integrated & actual applying the rules

Unit- V **(10hrs)**

Optimisation

A) Mathematical Technique essential for optimization such as linear programming using

1. Graphical method, 2. Trial & Error Method

3. Simplex method,

a. Primary technique, b. Duel Technique

B) Application to equipment

1. Reactor system (Temp optimization in a catalytic reactor)
2. Kinetics of complex retion
3. Distillation (Optimisation of Reflux ratio for a binary distillation column)
4. Dryer Rotary (Optimisation of Dimensions)
5. Optimum of dimensions & outlet temp. of air preheater
6. Optimum design of a packed absorber

Outcomes

Ability to develop and convert chemical engineering problem in terms of mathematical equation and to solve those series of equations using various mathematical techniques.

To learn about optimization techniques for optimization of various parameters of unit operations and processes.

Department	**: Department of Chemical Engineering**
Course code	**: CHC-305**
Course Title	**: Chemical Reaction Engineering-II (TH)**
Course Type	**: Theory**
Total Hrs/ Week	**: 04**
Course credit	**: 04**

Course Objectives:

To impart the thorough knowledge about heterogeneous reacting systems and its design, fluid-fluid reactions, catalysis, solid-catalyzed reactions and design of heterogeneous catalytic reactor.

Course Content:

Unit- I **(10hrs)**

Heterogeneous reacting systems. Rate equations for heterogeneous reactions containing pattern for two phase system.

Fluid-particle reaction, selection of model, unreacted core model for particles of unchanging size, rate of reaction for shrinking spherical particles, determination of the rate controlling steps. Application to design ; particle single size, plug flow solids, uniform gas composition, mixed flow of particles of single unchanging size, mixed flow of size mixture of particle entrainment of solid fines. Instantaneous reaction.

Unit- II **(10hrs)**

Fluid- Fluid Reaction: Rate equation for instantaneous fast, intermediate and for slow reaction, slurry reaction kinetics, Rate equation for infinitely slow reaction, film conversion parameter, Aerobic fermentations, application to design – towers for fast, slow reactions. Mixer settlers, semi-batch contacting patterns, Reactive distillation and extractive reactions.

Unit- III **(10hrs)**

Catalysis:

Concept of catalyst selection, classification and characteristics of catalyst, preparation of a catalyst and its deactivation, poisoning of catalyst and regeneration. Adsorption and its classification, different types of isotherms determination of catalyst surface area By BET method.

Unit- IV **(10hrs)**

Solid-catalyzed reaction:

Rate equations, diffusion within porous catalyst, experimental methods for finding rates, product distribution in multiple reactions.

Application to design staged adiabatic, packed bed reactors and fluidized bed reactors. Fluid-solid catalytic fixed-bed reactors.

Unit- V **(10hrs)**

Design of Heterogeneous catalytic reactors:

Fixed bed reactors, isothermal and adiabatic fixed bed reactor, non-isothermal, non-adiabatic fixed bed reactors, fluidized bed reactors, slurry reactors. Trickle-bed reactors.

Mechanical features, details of mass transfer , heat transfer, fluid flow across reactors. Design problems.

References:

1) O Levenspiel – Chemical Reaction Engineering
2) Dawande S.D.: Chemical Reaction Engineering
3) Fogler : Elements of Chemical Reaction Engineering
4) Smith J.M.: Chemical Engineering Kinetics, M

Course Outcome:

a) To enhance the ability of students to understand the heterogeneous reacting systems and its design, contacting patterns and effects of parameters on rate of reactions.
b) To get the students well acquainted with detail study of fluid-fluid reactions and the reactors for conducting the reactions. to understand the kinetics of slow reactions.
c) To enhance the knowledge of students about catalysis, catalyst activation, deactivation, poisoning of catalyst, determination of surface area by using isotherms.
d) The get the students well acquainted with solid-catalyzed reactions, experimental methods for finding rates, product distribution and heterogeneous catalytic reactors.
e) To enhance the ability of students to identify and solve various engineering problems during product optimization.

Department	**: Department of Chemical Engineering**
Course code	**: CHC-305**
Course Title	**: Chemical Reaction Engineering-II (PR)**
Course Type	**: Practical**
Total Hrs/ Week	**: 03**
Course credit	**: 1.5**

Objectives:

To impart the thorough knowledge about heterogeneous reacting systems and its design, fluid-fluid reactions, catalysis, solid-catalyzed reactions and design of heterogeneous catalytic reactor.

Course Content:

Practical's based on chemical reaction engg. Such as Study of kinetics reaction, Residence time distribution , Study of various reactors (Packed Bed, Fluidised Bed) Study of adsorption isotherm, Study of catalytic reactor, etc. Minimum eight expt. Based on theory

Course Outcome:

To enhance the knowledge and clear the theoretical concepts in the subject by performing the hands on experiments in the laboratory for detail understanding of the topic.

Department	**: Department of Chemical Engineering**
Course code	**: CHC-306**
Course Title	**: Mass Transfer-II (TH)**
Course Type	**: Theory**
Total Hrs/ Week	**: 04**
Course credit	**: 04**

Objective:

To understand the fundamental of Distillation, Liquid-liquid extraction, Solid-liquid operation, Crystallization and Adsorption.

Course Content:

Unit- I **(10hrs)**

Distillation

Vapour liquid equilibria, ideal and non-ideal systems, minimum and maximum boiling azeotropes, relative volatility, X-Y, T-X-Y, H-X-Y diagram, partial vaporisation / condensation, differential distillation and equilibrium distillation, steam, azeotropic and extractive distillation, vacuum distillation, steam distillation.

Fractionation, binary distillation, plate and packed columns for distillation,

Unit- II **(10hrs)**

Various graphical methods for estimation of number of stages in binary distillation column, Importance of reflux ratio, minimum reflux ratio, optimum reflux ratio. Murphree plate efficiency and overall plate efficiency. Effect of feed condition of 'q' line. Concept of HETP, HTU, NTU in distillation

Unit- III **(10hrs)**

Liquid-Liquid Extraction: Principle, selection of solvent for extraction, estimation of mass transfer coefficients, triangular diagram representation, Equipment for liquid-liquid extraction. (Mixer settler, Rotating Disc Contractor, Packed column, spray column) design procedures and equipment selection criteria. Single stage, multistage operations etc.

Unit- IV **(10hrs)**

Solid–Liquid Extraction fundamentals, Solvent selection, equilibrium relationship, triangular diagram representation, single stage, multistage concurrent and counter current operation, equipments for solid – liquid extraction, their design procedure and selection criteria.

Unit- V **(10hrs)**

Crystallization:- Principle, Super saturation, methods of achieving super saturation, phenomenon of crystal formation, crystal structure, equipment for crystallization (agitated vessel, Oslo, vacuum Swenson walker crystalliser), material & heat balance over crystalliser & related problems.

Adsorption: Fundamentals, adsorbent, adsorption equilibria and isotherms.

References:

1. Treybal R.E. "Mass Transfer Operations" McGraw Hill Book Co., New York 1980
2. McCabe W.L. and Smith J.C. & Harriot, "Unit Operations of Chemical Engineering", McGraw Hill Book Co., New York 1980
3. Principles of Unit Operations; Foust A.S.
4. Coulson J.M. and Richardson J.F., "Chemical Engineering" Vol. I, II & III, Pergamon Press, New York 1977
5. Brown G.G., "Unit Operations", John Wiley & Sons, New York
6. Lyderson A.L. "Mass Transfer in Engineering Practice", John Wiley Co. (1983)
7. Badger W.L. and Banchero J.T., "Introduction to Chemical Engineering", Tata McGraw Hill Book Co.

Course Outcomes:

1. The students will develop understanding of implications of factors affecting column operation, and design, effect of reflux ratio, feed conditions, and operational difficulties and thus will demonstrate the calibre of product design according to the standards.

2. Students will understand basic of various phase equilibrium based separation processes such as distillation, liquid-liquid extraction, leaching and adsorption.

3. The students will develop ability to apply mass transfer principles to perform graphical calculations for binary distillation.

4. The students will understand and apply knowledge for calculation of single and liquid-liquid, solid liquid extraction,

Department	**: Department of Chemical Engineering**
Course code	**: CHC-306**
Course Title	**: Mass Transfer-II (PR)**
Course Type	**: Practical**
Total Hrs/ Week	**: 03**
Course credit	**: 1.5**

Objective:

To understand the fundamental of Distillation, Liquid-liquid extraction, Solid-liquid operation, Crystallization and Adsorption.

Course Content:

List of Experiments:

1. To verify Rayleigh's equation,
2. To study boiling point diagram/ vapour-liquid equilibria.
3. Binary Distillation,
4. Estimation of HETP.
5. To study distribution coefficient in liquid-liquid. Extraction.
6. To Construct bimodal curve for ternary system.
7. Study of Solid liquid extraction,
8. Liquid - Liquid extraction (Batch),
9. Liquid - Liquid extraction (column)
10. Laboratory Batch Crystallisation,

(minimum 8 experiments)

Outcome:

At the end of the course student will be able to :

1. To design binary plate and packed distillation column
2. To able to design liquid-liquid and solid-liquid extraction column.
3. To design crystallization and adsorption column.

Department	**: Department of Chemical Engineering**
Course code	**: CHC-307**
Course Title	**: Process Equipment Design & Drawing (TH)**
Course Type	**: Theory**
Total Hrs/ Week	**: 03**
Course credit	**: 03**

Objective-

To study the design procedure for designing chemical equipment and selection of proper material of construction by considering different mechanical and physical properties. To study the behavior of material under stresses. The student should be able to understand the designing of pressure vessels, storage vessels, high pressure vessels, supports, calendria evaporator,shell and tube heat exchanger ,sieve tray and bubble cap tray for distillation column, agitators, rotary dryers. The students should be able to do the proportioning of pressure vessels.

Course Content:

Unit- I **(10hrs)**

Mechanical properties of materials, Selection of materials, general design procedure for designing chemical equipment protective coating, corrosion causes and prevention. Theory of failure, factor of safety. The material behavior under stresses. Fabrication Methods. Unfired pressure vessel subjected to internal and external pressure. Design of shell, nozzle, different types of head.

Unit- II **(10hrs)**

Design for atmospheric storage vessel, types of storage vessel, and different types of roofs for storage vessels. Vessels for high pressure operation, constructional features, multi shell construction, determination of thickness of shell applying various theories of failures.

Unit- III **(10hrs)**

Agitators, design of agitator components, selection, types application, power required for agitation. Drying equipments, Design of rotary dryers in details

Unit- IV **(10hrs)**

Types of support for vertical and horizontal vessels, Design of skirt support in detail, process design for short tube calendria type of evaporator, Design for sieve tray and bubble cap tray for distillation column.

Unit- V **(10hrs)**

Design for heat exchanger, shell and tube heat exchanger construction and design in details. Heating and cooling arrangements for reaction vessel. The proportioning of pressure vessels. Selection of L/D ratio. Optimization.

References:

1 B.C. Bhattacharya, Introduction to Chemical Equipment Design (Mechanical Aspects), CBS Publisher and Distributors, New Delhi.

2 Coulson & Richardson Chemical Engineering (Vol. VI), Butterworth-Heinmann (Elsevier)

3 M.V.Joshi, V.V. Mahajani Process Equipment Design, Macmillan Publishers India Ltd.

4 S.D. Dawande, Process Equipment Design (Vol. I), Denett & Co., Nagpur._

Course Outcomes-

1.From the course the students will able to know the general design procedure for designing chemical equipment and selection of proper material of construction by considering different mechanical and physical properties. They will study the behavior of material under stresses.

2. The student will understand the method for designing of pressure vessels and its components subjected to internal and external pressure. Design for atmospheric storage vessel, vessels for high pressure operation. Design of support for pressure vessel, process design for short tube calendria type of evaporator, Design for sieve tray and bubble cap tray for distillation column.

3.Students understand various types of Agitators, design of agitator components, selection, types application, power required for agitation. Drying equipments, Design of rotary dryers .

4. Students should be able to know Design for heat exchanger, shell and tube heat exchanger construction and design in details. Heating and cooling arrangements for reaction vessel. The proportioning of pressure vessels. Selection of L/D ratio.

Department	**: Department of Chemical Engineering**
Course code	**: CHC-307**
Course Title	**: Process Equipment Design & Drawing (PR)**
Course Type	**: Practical**
Total Hrs/ Week	**: 02**
Course credit	**: 01**

Objective-

To study the design procedure for designing chemical equipment and selection of proper material of construction by considering different mechanical and physical properties. To study the behavior of material under stresses. The student should be able to understand the designing of pressure vessels, storage vessels, high pressure vessels, supports, calendria evaporator,shell and tube heat exchanger ,sieve tray and bubble cap tray for distillation column, agitators, rotary dryers. The students should be able to do the proportioning of pressure vessels.

Students will be required to do process design and submit drawings of at least six equipments such as pressure vessels, heat exchangers, agitators, short tube calendria type evaporator etc. Types of agitators, supports. Design of bubble cap tray , sieve tray, different types of packing

Course Outcomes:

a) At the end of the course the student exhibits how to design and draw in a competitive manner various process equipment with proper scale and each components with detail dimensions.
b) Learn how to draw from the design problem solved in theory the exact Drawings of Pressure vessel, Reaction vessel, Shell and Tube Heat Exchanger, Short Tube Calendria Evaporator.
c) Understands the constructional features with the help of drawings of high Pressure vessels, Rotary Drier, Detail arrangement of Sieve tray and bubble cap trays.
d) Understand how to read drawings to know details about process equipment, which can be utilized for fabrication, maintenance, assembling and dismantling.

Department : Department of Chemical Engineering

Course code : Elective-II PTL-311

Course Title : Technology of Printing Inks

Course Type : Theory

Total Hrs/week : 04

Course credit : 4

Course Content:

Unit-I **(10 hrs)**

Nature of Printing ink, Visual characteristics of inks, Major printing systems, classification and characteristics of printing inks, mechanism of ink drying, adhesive nature of printing inks, resistance properties of printing inks, physical chemistry of printing inks, rheological properties of inks principles of printing

Unit- II **(10 hrs**

Description and schematic diagram of printing processes, it's press configuration and applications e.g. Flexographic, lithographic, gravure, letterpress, planographic, screen , Inkjet printing, substrate selection principles of ink formulations, colour matching and process printing.

Unit-III **(10 hrs)**

Manufacture of inks, manufacturing process, mixing equipments such as High speed impeller, butterfly mixer, Rotar and stator high speed mixer and milling equipments such as three roll mill, bead mill etc. handling, storage and manufacture of UV ink, news paper inks, modern production trends and future of inks.

Unit-IV **(10 hrs)**

Inks for various substrates: paper, plastic, fabric, leather, glass and metal. Testing & Evaluation of finished ink and raw materials for ink manufacture. Inks for News paper (rotary and well offset), publication work, posters, labels, and packaging materials, heat set and quick set inks for multicolour printing.

Unit-V **(10 hrs)**

Metal decorating inks, after print varnishes and lacquers, magnetic inks, ceramic inks, inks for printed circuit boards, inkjet printing, laser printing, dot-matrix printing, and other miscellaneous inks. Various ink trembles and remedial measures

General Textbook

1 . 'Organic coatings : Science and Technology'**,** Edited by Zeno W. Wicks, Jr., Frank N. Jones, S. Peter Pappas; Douglas A. Wicks,Third Edition, John Wiley & Sons, Inc., Hoboken, New Jersey. 2007.

2. Morgans, W.M., 'Outline of Paint Technology', 3rd Edition, CBS Publishers and Distributors, New Delhi, 1996

3 . " Surface Coatings" Volume 1 " Raw material and their usages" Oil and Colour Chemists' Association, TAFE Educational Books, NSW, Australia,1987.

4 . Paul Swaraj, "Surface Coatings – Science and Technology", Wiley Interscience Publishers, John Wiley and Sons, Inc.1986.

5. 'Paints, Coatings and Solvents', Dieter Stoye; Werner Freitag (ed.), 2nd. Edition, Wiley-VCH. Weinheim ; (1998).

Reference Books

1. 'Paint Technology Handbook', Rodger Talbert, CRC Press,Taylor and Francis Group, 2008.

2. Feist, W. C., Finishing Exterior Wood, Federation of Societies for Coatings Technology, Blue Bell, PA, 1996.

3. 'Surface Coatings', Vol. I & II, Oil and Colour Chemists' Association, Tafe Educational Books, NSW, Australia,1987.

4. 'Coating Technology Handbook', Edited by D. Satas and A. A. Tracton, Second Edition, Marcel Dekker, Inc., New York, 2001.

5. 'Automotive Paints and Coatings'Edited by Hans-Joachim Streitberger and Karl-Friedrich Dossel,, Second Edition, WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim 2008.

6. McBane, B. N., Automotive Coatings, Federation of Societies for Coatings Technology, Blue Bell, PA, 1987.

'Surface Coatings', Vol. I & II, Oil and Colour Chemists' Association, TAFE Educational Books, NSW, Australia,1987.

1. ‘Polymers for Electrical Insulations’, Edited by Horst Sulzbach, Ser. 314, DIE BIBLIOTHEK DER TECHNIK, Elantas GmbH, 2008.
2. ‘Powder coatings : chemistry and technology’, Misev, T. V., Third Edition, John Wiley & Sons, New York, 1991.
3. ‘Powder Coating Systems’, Wiliam D. Lehr, McGraw-Hill, New York 1991.
4. Kearne, J. D., Ed., Steel Structures Painting Manual, Vol. I, Good Painting Practices, 3rd ed., 1993; Vol. II, Systems and Specifications, 7th ed., Steel Structures Painting Council, Pittsburgh, PA, 1995. Hare, C. H., Protective Coatings, Steel Structures Painting Council, Pittsburgh, PA, 1995.
5. Martin, J. W.; et al., Methodologies for Predicting Service Lives of Coating Systems, Federation of Societies for Coatings Technology, Blue Bell, PA, 1996.
6. ‘Chemistry and Technology of formulating UV Cure Coatings, Inks, and Paints’, Edited by PKT Oldring, Vol.1-5, Sita Technology Limited, London UK 1991-94.
7. ‘Photoinitiated Polymerization’, Belfield, K. D.; Crivello, J. V., Eds., ACS Symp. Ser. 847, American Chemical Society, Washington, DC, 2003.
8. Koleske, J. V., ‘Radiation Curing of Coatings’, ASTM International, West Conshohocken, PA, 2002.
9. Scranton, A. B.; et al., Eds., Photopolymerization Fundamentals and Applications, ACS Symp. Ser. 673, American Chemical Society, Washington, DC, 1997.
10. ‘Radiation Curing of Polymers’, Edited by D. R. Randell, Ser. 89, The Royal Society of Chemistry, Cambridge 1991.
11. A Window to Paints & Coatings Technology by Dr. N.R. Kondekar, COLOUR PUBLICATIONS PVT. LTD., Mumbai2010
12. Essentials of Pigments - Application and Selection by Dr. Ashok B. Karnik, COLOUR PUBLICATIONS PVT. LTD., Mumbai

19 Glass, J. E., Ed., Technology for Waterborne Coatings, American Chemical Society, Washington,
DC, 1997.

20. Karsa, D. R.; Davies, W. D., Eds., Waterborne Coatings and Additives, Royal Society of Chemistry,Cambridge, 1995.

21. Pruskowski, S. J., Jr., Ed., Waterborne Coatings Technology, Federation of Societies for Coatings Technology, Blue Bell, PA, 2005.

22. G. Buxbaum (Ed.) Industrial Inorganic Pigments, Second, Completely Revised Edition1998 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim.

23. H. M. Smith (Ed.) High Performance Pigments 2002 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim.

24. J. Bieleman (Ed.) Additives for Coatings 2000 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim.

25. Willy Herbst, Klaus Hunger, Industrial Organic Pigments- Production, Properties,Applications.

Third, Completely Revised Edition (With Contributions by Gerhard Wilker, Heinfred Ohleier,

and Rainer Winter) 2004 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim

Department	**: Department of Chemical Engineering**
Course code	**: Elective-II, FTL-308**
Course Title	**: Treatment and Disposal of Food Industrial Waste (Elective–II)**
Course Type	**: Theory**
Total Hrs	**: 04**
Course credit	**: 04**

Course Pre-requisite:

To learn the basic knowledge of treatment and disposal of food industrial waste, requires pre-knowledge of Microbiology and molecular biology (FTC-302), instrumentation and process control (CHC-309) and physical chemistry (BSC-103).

Course Objectives:

1. To learn Primary, secondary and tertiary process for treatment of industrial effluent
2. To learn composition and health hazards of pollutants in effluent
3. To learn principle, design and working of various biological process for treatment of industrial effluent
4. To learn value addition to waste through effluent treatment
5. Estimation of kinetic coefficients for treatment.

Course Content:

Unit-I **(10 hrs)**

Physical, chemical and biological characteristics of food industry waste. Composition of food industry waste.

Unit-II **(10 hrs)**

Classification and application of waste water treatment methods. Treatment process flow sheets. Process design criteria.

Unit-III **(10 hrs)**

Role of micro-organisms in food industry waste. Application of kinetics to biological treatment. Determination of kinetic coefficients.

Unit -IV **(10 hrs)**

Activated sludge process. Suspended-Growth nitrification. Aerobic Aerated Lagoons.

Aerobic digestion. Aerobic stabilization ponds.

Unit-V **(10 hrs)**

Trickling filters, Roughing filters, Rotating biological contactors, Packed bed reactors, Byproduct recovery and value addition to the waste.

Books Recommended:

Waste Water Engineering: Treatment, Disposal and Reuse by Metcalf & Eddy (Second Edition)

Course Outcomes:

1. The students will learn and gain the basic knowledge of composition of industrial effluent and health hazards of pollutants in effluent
2. The students will learn various Primary, secondary and tertiary process for industrial effluent treatment
3. The students will learn principle, design and working of various biological process for treatment of industrial effluent
4. The students will learn various value addition to waste through effluent treatment
5. The students will be able to calculate kinetic coefficients for waste water treatment.

Department	**: Department of Chemical Engineering**
Course code	**: Elective- II, OTL-309**
Course Title	**: Modified and Tailor Made Oils. (TH)**
Course Type	**: Theory**
Total Hrs	**: 04**
Course credit	**: 04**

Course Objectives:

To apply the basic principles of chemistry and technology for the modification of oils and fats. This helps in producing w.r.t. effective and better tailormade products for edible and non-edible applications.

Course Content:

Unit – I

Chemistry of drying oils, natural and synthetic drying oil, modification of oils for surface coating industry, thermal and chemical modifications methods, properties of modified oils such as blown, stand oil, boiled oil, malenized, isomerised oil , etc. Process & plant employed for their commercial production. Chemistry & Technology of Alkyd resins: Classification on the basis of oil length, Selection of ingredients. Fatty acids & monoglyceride routes, fusion & Solvent process. Their merits & demerits.

Unit – II

Plants & process of manufacture of alkyd resin. Modification of alkyd resin. Oil modified synthetic resin: Chemistry, formulation & manufacture, oleoresinuous varnishes, epoxy esters, urethane oils, polyamides, polyester amides, etc.

Unit – III

Application of oils, modified oils, oil modified resins in surface coating industry. Brief review of paint formulation & application. Plants, Processes & applications of metallic soaps, lubricating oils and greases, cutting oil, Hydraulic oils, etc.

Unit – IV

Transesterification: Classification of transesterification: Acidolysis, Alcoholysis, Interesterification / Intraesterification. Mechanism of interesterification (directed and random). Different types of chemical and enzyme catalysts for transesterification. Plants for production of methyl ester, monoglyceride, interesterification products, etc.

Unit – V

Confectionery and Bakery Fats: Raw material for confectionery fats: Cocoa butter, processing of Cocoa butter, composition and properties of Cocoa butter, polymorphism and crystal behaviour of cocoa butter. Methods of obtaining cocoa butter substitutes, replacer, equivalents and extenders. Plastic shortening agents: different types of plastic shortening agents, selection of blends with reference to specific requirements and application in bakery products.

Course Outcome:

1. Understand the chemistry underlying the drying mechanism of oils.
2. Describe the plant and process for modifications of oil for surface coating industry.
3. Outline the paint formulation and applications of lubricating oils, metallic soaps etc.
4. Understand the classification and mechanism of major esterification reactions for synthesis of industrially important products like MG, ME etc.
5. Distinguish between the terminologies related to confectionary and bakery fat; describe the polymorphism and crystal behavior of cocoa butter and discuss the methods of cocoa butter substitute preparations.

Department	**: Department of Chemical Engineering**
Course code	**: Elective - II, PLL-311**
Course Title	**: Plastic Waste Management (TH)**
Course Type	**: Theory**
Total Hrs	**: 04**
Course credit	**: 04**

Course Objective:

a. To understand the concept of plastics recycling.
b. To understand about various sources of plastics waste.
c. To understand various identification and separation method for waste plastics.
d. To learn about different recycling methods for plastics recycling**.**

Course Content:

Unit- I

Introduction, Sources of plastics waste (Industrial waste, post consumer waste, scrap waste and nuisancewaste), Plastic identification and Separation techniques – (density - float sink and froth floatation methods,optical, spectroscopic, electrostatic, sorting by melting temperature, sorting by size reduction, sorting by selective dissolution and other methods), recycling codes.

Unit- II

Plastics Waste Management - 4R's approach (reduce, reuse, recycle – mechanical and chemical, recover),recycling classification- - primary - secondary - tertiary - quaternary recycling with examples. Energy from waste – incinerators-pyrolysis, factors affecting incineration.

Unit- III

Recycling of polyolefins - PVC, PET, polystyrene, polyamides-nylon-6 and nylon-6,6, polyurethanes,mechanical process, applications of recycled materials.

Unit- IV

Recycling of rubber – comparison of thermoset and thermoplastic composites, reclaiming of rubber – fuel source – pyrolysis, Depolymerization of scrap rubber, tyre retreading, uses of recycled rubber – asphalt andother uses.

Unit- V

Recycling of plastics by surface refurbishing - coating application, influence on plastics properties by coating, polishing of the plastics surface, commercial process. Plastics aging - environmental aging, thermal aging, weathering of plastics, mechanical degradation, chemical degradation and environmental stress cracking, wear and erosion, influence of plastic aging in recycling, energy from waste - incinerators

Text books

1. John Scheirs., - "Polymer Recycling" John Wiley and Sons,1998

2. Nabil Mustafa – "Plastics Waste Management" Marcel Dekker Inc.,1998.

3. Steven Blow, Handbook of Rubber Technology, Galgotia Publicatins Pvt. Ltd., New Delhi, 1998.

4. Chandra R. and Adab A., Rubber and Plastic Waste, CBS Publishers & Distributors, New Delhi, 1994.

Reference books

1. Muna Bitter, Johannes Brandup, Georg Menges "Recycling and Recovery of plastics" 1996

2. Attilio.L.Bisio,Marino Xanthos, " How to manage plastics waste: Technology and market Opportunities"

Hanser Publishers, 1994

3. Francesco La Mantia., " Handbook of Plastics Recycling" Chem Tec Publishing,2002

Course Outcomes:

At the end of the course students will have knowledge of:

1. Sources of plastics waste, its identification and separation methods.
2. Approaches of plastic waste management
3. Mechanical and chemical recycling of polymers.
4. Recycling of plastics by surface refurbishing.

Department	**: Department of Chemical Engineering**
Course code	**: Elective-III, CHL-312**
Course Title	**: Energy Resources & Utilization (TH)**
Course Type	**: Theory**
Total Hrs/ Week	**: 04**
Course credit	**: 04**

Course Content:

Unit- I **(10hrs)**

Fuels - Classification, Properties, tests and analysis.

Solid Fuels - Coal, origin, classification, storage and handling, carbonization, gasification and briquetting - gasification of biomass.

Unit- II **(10hrs)**

Liquid fuels - Petroleum based fuels, synthetic fuels, alcohol and blended fuels, storage and handling.

Gaseous fuels - Water gas, carbureted water gas, producer gas, coal gas and natural gas.

Unit- III **(10hrs)**

Combustion - Air requirement for solid, liquid and gaseous fuels, Combustion equipment

Solar energy, Wind energy, Tidal energy

Unit- IV **(10hrs)**

Geothermal energy, Magneto hydrodynamics, Nuclear energy. Energy Management-Principles need, initiating and managing an energy management program.

Unit- V **(10hrs)**

Energy audit – elements, and concepts, types of energy audits, energy audit with respect to industries like sugar, paper etc.,

Energy Conservation-Thermodynamics of energy conservation, cogeneration, waste heat recovery technologies. Industrial insulation - material selection, economical thickness

References:

1. S.P.Sharma and ChanderMohan, “Fuels and Combustion”, Tata McGraw Hill, 2004.

2. J.K.Harker and J.R.Backhurst, “Fuel and energy”, Academic Press, 1981.

3. D.A.Raey, “Industrial Energy Conservation”, Pergomon Press, 1980.

4. J.D.Gilchrist, “Fuels, Furnaces and Refractories”, Pergamon Press, 1977.

Department	**: Department of Chemical Engineering**
Course code	**: Elective-III CHL-313**
Course Title	**: Advance Heat Transfer (TH)**
Course Type	**: Theory**
Total Hrs/ Week	**: 04**
Course credit	**: 04**

Course Content:

Unit-I **(10hrs)**

Steady State Heat Conduction with Heat Generation:

Introduction to Steady State Heat Conduction with Heat Generation, conduction in solid, hollow cylinder with uniform heat generation. Temperature distribution & heat flux in an infinite slab, hollow cylinder with uniform heat generation. Heat generation in nuclear fuel rod.

Unit-II **(10hrs)**

Thermal insulation, insulating materials, design factor, properties of insulating material, economic thickness of insulation, optimum thickness of lagging. Specific heat and thermal diffusivity of insulation. Critical thickness of insulation on minimum heat transfer rate. Determination of thermal conductivity of insulating material. Insulation of hot surface. Thermal insulation of cryogenic services.

Unit-III **(10hrs)**

Transient Heat Conduction:

Introduction to Transient Heat Conduction, classification of transient heat conduction processes, system with negligible internal resistance. Introduction to lumped heat capacity system, transient heat conduction in a plane walls-chart solution, long cylinder of radius r_o, and sphere of radius r_o, Transient heat flow in semi-infinite solid. Unsteady state heat transfer for food and biological materials.

Unit-IV **(10hrs)**

Multiple effect evaporator, Heat transfer area for multiple effect evaporator, criteria for selection of evaporator, factor related to mechanical design, economy of multiple effect evaporator, Optimum number of effect on cost basis, Empirical approach to steam

requirement, wate evaporation distribution approach, resistance time control ring, Multiple effect evaporatordesign, vapour compression technique.

Unit-V **(10hrs)**

Spiral coil and plate tupe heat exchanger, finned tube heat exchanger. Single and multi phase condenser. Designe of reboilers, veporisors, Kettle type and thermosiphon reboilers, forced circulation vaporizers. Heat transfer in agitated vessels both jacketed and with coil, transient heating or cooling, Heat transfer in packed and fluidized beds.

Referneces:

1. J. M. Colson and J. F. Richardson, "Chemical Engineering", 6th Ed. Vol-1. Elsevier Pub.
2. J. M. Colson and J. F. Richardson, "Chemical Engineering", 6th Ed. Vol-6. Elsevier Pub.
3. W. L. McCabe Smith and P. Harriot, "Unit Operation of Chemical Engineering", 6th ed. McGraw Hill,
4. S. D. Davande, "Principals of Heat and Mass Transfer"
5. Fundamentals of Heat and Mass Transfer, Sixth Edition, by F.P. Incropera and B. Lavine, Wiley, 2006.
6. Heat Transfer, A. F. Mills, 1998 (Prentice Hall). TJ260.M52 1998
7. A Heat Transfer Textbook, J. H. Lienhard, 2nd edition, 1987 (Prentice Hall, Englewood Cliffs). TJ260.L445
8. D. Q. Kern, "process Heat Transfer", McGraw Hill
9. Desmon and Karlekar, "Heat and Mass Transfer"
10. P. K. Nag, "Heat Transfer"
11. R. C. Sachdeva, "Fundamentals of Engineering-Heat and Mass Transfer"

Department	**: Department of Chemical Engineering**
Course code	**: Elective-III CHL-314**
Course Title	**: Plant Utility and Safety (TH)**
Course Type	**: Theory**
Total Hrs/ Week	**: 04**
Course credit	**: 04**

Course Content:

Unit -I **(10hrs)**

Various plant utilities, their role and importance in chemical process, Water Sources, Sources of water and their characteristics ;Treatment, storage and distribution of water; water for use in boilers, cooling purposes, drinking and process; Reuse and conservation of water; Water resource management.

Unit -II **(10hrs)**

Steam Generation and Utilization

Steam generation and its application in chemical process plants, distribution and utilization; Design of efficient steam heating systems; steam economy, Steam condensers and condensate utilization, Expansion joints ,flash tank design, steam traps their characteristics, selection and application, waste heat utilization.; Lagging, selection and thickness .Selection and sizing of boilers; waste heat boilers.

Unit- III **(10hrs)**

Compressors, blowers and Vacuum Pumps

Compressors, blowers and vacuum pumps and their performance characteristics; Methods of developing vacuum and their limitations, material handling under vacuum, Piping systems; Lubrication and oil removal in compressors and pumps, Air filters, Air and gas leakage. Inert gas systems, compressed air for process, Instrument air.

Insulation

Importance of insulation for meeting the process requirement, insulation materials and their effect on various material of equipment piping, fitting and valves etc. insulation for high intermediate, low and sub zero temperatures, including cryogenic insulation.

Unit- IV **(10hrs)**

Elements of Safety

Elements of safety, safety and site selection; Plant layout and unit plot planning; Definition of risk and hazard, Identification and assessment of the hazards, distinction between hazards and risk, Hazard operability (HAZOP) hazard analysis (HAZAN); Assessment of the risk, fault tree, event tree, scope of risk assessment; Control of hazards, controlling toxic chemicals and controlling flammable materials.

Prevention of losses

Prevention of losses, Pressure relief, Provision of fire fighting equipments, Technology selection and transfer, Choosing the right process.

Unit -V **(10hrs)**

Control of Process

Control of process, Prevention of hazardous deviation in process variables, e.g. pressure, temperature flow by provision of automatic control systems- interlocks, alarms, trips together with good operating practices and management.

Regulations

Regulations and legislation, Role of government role, risk management routines and tackling disaster.

References:

1. Lees, F. P., "Loss Prevention in Process Industries 3 volume set" Butterwort -Heinemann, Oxford (1996).

2. Nordell, Eskel, "Water Treatment for Industrial and Other Uses", Reinhold Publishing Corporation, New York.(1961).

3. Crowl, D.A. & Louvar, J.F.. "Chemical Process Safety: Fundamentals with Applications". New Jersey: Prentice-Hall. (1989).

4. Goodall, P. M., "The Efficient Use Of Steam" IPC Science and Technology (1980).

Department	**: Department of Chemical Engineering**
Course code	**: Elective-III CHC-315**
Course Title	**: Petroleum Refining Engineering (TH)**
Course Type	**: Theory**
Total Hrs/ Week	**: 04**
Course credit	**: 04**

Objective:

To study about crudes, different petroleum products, properties, testing method, use and applications and petroleum processes.

Course Content:

Unit- I **(10hrs)**

Crude oil & outline of its formation ,Hydrocarbon group wise composition of Petrolium & their structures , sulfur,nitrogen,oxygen & metal-organic compound in petroleum.

Unit- II **(10hrs)**

Characterization & properties of Crude oil, Preteatment of crude, removal of moisture, salt . Refinery flow diagram, equipment & tank layout.

Unit- III **(10hrs)**

Crude Distillation , Atmospheric Topping unit, Vacuum distillation ,TBP distillation of Petroleum fraction & construction of property midpercent ,Residue yield, distillate yield curve.

Unit- IV **(10hrs)**

Major petroleum product & their specifications like Liquified Petroleum Gas , Gasoline, Naptha, Kerosene, Aviation turbine fuel, High Speed Diesel , LDO, furnace fuels, lubricants,base oil,tar & biumen.

Unit- V **(10hrs)**

Catalytic Cracking and thermal processes, Fluidised bed Catalytic Cracking, Catalytic Reforming, cracking process.

References:

1) J.H Gary, & G.E .Handwerk, Petroleum Refining: Technology & Economic 3rd edition, Marcel Dekker Inc.1994

2) J. H. Speight, The chemistry & Techonogy of Petroleum Hydrocarbon, 3rd edition.
3) G.N. Sarkar, Advanced Petroleum Refining, Khanna Publisher,1998.

Outcomes:

a) Students able to know the composition of crudes, types of crudes and crude analysis.

b) Students will understand what are paraffins, napthalenes, aromatics,acetylenes and other hydrocarbons present in petroleum, their composition , properties and structures.

c) Students understand the methods like ASTM distillation, flash and fire point, aniline point, diesel index, pour point, cetane and octane.

Department	**: Department of Chemical Engineering**
Course code	**: Elective-III CHL-316**
Course Title	**: Biofuel (TH)**
Course Type	**: Theory**
Total Hrs/ Week	**: 04**
Course credit	**: 04**

Course Content:

Unit- I **(10hrs)**

Various biofuels, gasoline, biodiesel, bioethanol, market-supply & demand, foreign oil dependency

Unit- II **(10hrs)**

Biodiesel production from oil seeds, waste oils & algae, advantages and disadvantages of generating ethanol from corn, cellulose and sugar cane etc. value added processing of biofuel residues and co-products

Unit- III **(10hrs)**

Thermal gasification of biomass, gases from biomass, composition and properties of wood gas, water gas, producer gas, methane gas, syn gas

Unit -IV **(10hrs)**

Combustion process, nature of combustion process, types of combustion process, kinetics of liquid fuel combustion, kinetics of solid fuel combustion.

Unit -V **(10hrs)**

Biofuels and the environment, impact of biofuels in global change and food production, biomass, bagasse and product of wood carbonization.

References:

1) Anaerobic Biotechnology for bioenergy production; Principles and applications, Samir K. Khanal. Wiley-Blackwell Publishing (2008)
2) Fuel and combustion, Samir Sarkar, Second edition, Orient Longman.

Department	**: Department of Chemical Engineering**
Course code	**: Elective-III CHL-317**
Course Title	**: Industrial Pollution Control (TH)**
Course Type	**: Theory**
Total Hrs/ Week	**: 04**
Course credit	**: 04**

Course Objectives:

To provide detailed knowledge on the discharge of pollutants, either of natural or of anthropogenic origin, into the environment that can induce severe stresses on ecosystems and their inhabitants.

To train students to act as experts in the area of reducing and remediating the impact of wastewater and air pollution.

To introduce theoretical and practical principles of natural purification processes and technological processes to control discharges which drive purification and remediation technologies, with reference to the legislative framework concerned with safeguarding the environment and human health.

To impart knowledge to enable students to critically review modern technology and practices for the monitoring, prevention, treatment and disposal of wastewater and air pollutants.

Course Content:

Unit- I **(10hrs)**

Characterization and control of Air Pollution

Sources and pathological effects of COx, SOx, NOx, H_2S and volatile organic emissions; Methods of sampling and analysis of SOx, NOx, & COx, ; classification of particulate matter on the basis of particle size ; standards for clean air ; Sinks of Atmospheric gases; Factors affecting stability of Dispersion & temperature inversion; Mechanism and remedial measures of photochemical Smog, Green House Effect and Ozone layer depletion. Removal of gaseous pollutants by absorption by liquids and adsorption by solids, control of volatile organic emission.

Unit- II **(10hrs)**

Methods for control of particulate matter

Design, construction and operation of Gravity Settler, Cyclone separators, Electrostatic precipitators, Fabric Filters, Venturi scrubbers, Spray and Packed bed tower. Problems on Design, Comparative performance evaluation.

Unit- III **(10hrs)**

Wastewater characterization and Primary and secondary wastewater Treatment Techniques: Physical characterization of wastewater (Colour, odour, turbidity, MLSS, Dissolved solids etc.); Principle and significance of determination of BOD, COD, DO, TOC; Use of electrochemical analyzer and atomic absorption spectrometer in determination of elements; estimation of phosphorous and nitrogen. Standards for Drinking water.

Primary Treatment Techniques (Neutralization, equalization, segregation, flocculation, micros trainers etc.)

Unit- IV **(10hrs)**

Mechanism and kinetics of Biological oxidation of pollutants. Design, construction of operation of Activated sludge process, Anaerobic Lagoons, Trickling Filters, Rotating Disc Contactors, fluidized bed contactors; Remedial measures for problems in operation of Secondary Treatment Techniques.

Unit- IV **(10hrs)**

Tertiary/ Advanced Waste Water Treatment Techniques and Solid Waste Pollution :

Principle and utilization of Adsorption, Ion Exchange, Electrodialysis, reverse osmosis, ultra filtration in wastewater treatment. Overall layout of Municipal (Domestic) and Industrial Effluent Treatment Plant Techniques for handling , disposal and control of solid waste pollutants (Composting, dumping , incineration, physical and chemical recycling).

Unit- V **(10hrs)**

Overall pollution control in selected Food , Pharmaceutical & Chemical Industries :

Beverages, Distillery, Sugar, Canning, Dairy; Antibiotics (Penicillin, Cephalosporin; etc.), Sulpha Drugs, Petroleum Refinery and Petrochemical Industries.

References:

1. "Pollution Control in Process Industries" by S.P. Mahajan MC Graw Hill
2. " Wastewater Treatment" M. Narayanrao & A.K. Dutta, IBH Publicaiton Co Pvt. Ltd., Delhi.
3. "Wastewater Engineering" Mc Catta , Mc Gvaw Hill.
4. "Air Pollution Control", P. Pratap Mouli and N. Venkata, Diva Jyoti Prakashan, Jodhpur.

5. Physico- Chemical Process for water quality control, W.J. Weber, Wiley Interscience-1972.

Course Outcomes:

After successfully passing the course, graduate will be able to:

a) Build a scientific literacy which will permit a greater understanding industrial processes, products and environmental concerns and how everyday life depends on chemical phenomena
b) Identify sources, types and quantities of pollutants and determine their impact on the environment
c) Recognize and interpret quality parameters of water and air
d) Analyse pollutant transport issues in the environment
e) Identify and propose strategies and techniques for the management and control of pollution.

NORTH MAHARASHTRA UNIVERSITY, JALGAON (M.S.)

Third Year Engineering

(E&TC/E&C)

Faculty of Engineering and Technology

COURSE OUTLINE

Semester – V

W.E.F 2014 – 2015

TE Semester – V

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory		Practical		Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
Electronic Circuit Design (TH)	D	3	---	---	3	20	80	---	---	100	3
Communication System-II (TH)	D	3	---	---	3	20	80	---	---	100	3
Microcontrollers & Peripheral Interface Controller (TH)	D	3	---	---	3	20	80	---	---	100	3
Feedback Control System (TH)	D	3	---	---	3	20	80	---	---	100	3
Electromagnetic Engineering (TH)	D	3	--	---	3	20	80	---	---	100	3
Electronic Circuit Design (LAB)	D	---	---	2	2	---	---	25	25(PR)	50	1
Feedback Control System (LAB)	D	---	---	2	2	---	---	25	---	25	1
Communication System-II (LAB)	D	---	---	2	2	---	---	25	25(PR)	50	1
Microcontrollers & Peripheral Interface Controller (LAB)	D	---	---	2	2	---	---	25	25(PR)	50	1
Computer Programming-III (LAB)	B	1	---	2	3	---	---	50	---	50	2
Industrial Training / EDP / Special Study	D	---	---	---	---	---	---	25	---	25	2
Total		**16**	**---**	**10**	**26**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination **ESE: End Semester Examination** **ICA: Internal Continuous Assessment**

Note 1: Out of 3 practical ESE heads, at least 1 head should be practical.

TE Semester – VI

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory		Practical		Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
Industrial Economics & Telecom Regulation (TH)	C	3	---	---	3	20	80	---	---	100	3
Power Electronics (TH)	D	3	---	---	3	20	80	---	---	100	3
Electronic Measurement (TH)	D	3	---	---	3	20	80	---	---	100	3
Audio Video Engineering (TH)	D	3	---	---	3	20	80	---	---	100	3
Industrial Management (TH)	C	3	---	---	3	20	80	---	---	100	3
Power Electronics (LAB)	D	---	---	2	2	---	---	25	25(PR)	50	1
Electronic Measurement (LAB)	D	---	---	2	2	---	---	25	25(PR)	50	1
Audio Video Engineering (LAB)	D	---	---	2	2	---	---	25	25(PR)	50	1
Application Software (LAB)	B	---	---	2	2	---	---	25	---	25	1
Minor Project	D	---	---	2	2	---	---	50	---	50	2
Seminar - I	D	---	---	2	2	---	---	25	---	25	2
Total		**15**	**---**	**12**	**27**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination **ESE: End Semester Examination** **ICA: Internal Continuous Assessment**

Note 1: Out of 3 practical ESE heads, at least 1 head should be practical.

Electronic Circuit Design

COURSE OUTLINE

Electronic Circuit Design **ECD**

Course Title Short Title Course Code

Course Description:

This course presents the actual concepts of several electronic devices and circuits and the design details, in order to meet a given system specification.

	Hours / Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	**03**	**14**	**42**	**03**

Prerequisite Course(s): A background in basic electronics and circuit theory.

COURSE CONTENT

Electronic Circuit Design **Semester-V**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Unit-I: Design of Power Supplies **No of Lect. – 8, Marks: 16**

a) Design of unregulated power supply (half wave and full wave bridge rectifier with only Capacitor filters)
b) Design of Series Voltage Regulator (with error amplifier), fold back protection circuit. Improvement of Stabilization factor by using Darlington pair for regulator.
c) Design of IC LM317/337 based only adjustable voltage regulator circuits, design of dual tracking power supply using LM317/LM337 with unregulated power supply.
d) Design of switching regulators using IC LM 2575 / 2577 (buck and boost regulators – fixed and adjustable output voltage)

Unit-II: Design of Small Signal Amplifiers using BJT / FET No of Lect. – 8, Marks: 16

a) Design of single stage CE / CS amplifier with biasing circuit.
b) Design of single stage CB / CG amplifier with biasing circuit.
c) Design of Single stage CC/ CD amplifier with biasing circuit.
d) Design of current series negative feedback amplifier using BJT / JFET.

Unit-III: Power and Tuned Amplifiers **No of Lect. – 8, Marks: 16**

a) Design of Class A Amplifier (resistive load and transformer coupled load)
b) Design of Class B amplifier.
c) Design of Class AB amplifier.
d) Design of single tuned amplifier BJT / FET

Unit-IV: Design of Oscillators **No of Lect. – 8, Marks: 16**

a) Design RC and LC Oscillators – RC Phase shift oscillator, Hartley, Colpitts and Clapp oscillator
b) Design of multivibrator - Design of collector coupled Astable multivibrator and collector coupled Monostable multivibrator using BJT
c) Design of UJT relaxation Oscillator, Design of Schmitt trigger using BJT.

Unit-V: Design using Analog Integrated Circuits **No of Lect. – 8, Marks: 16**

a) Design of single supply ac inverting and non-inverting amplifier using IC324.
b) Design of FSK modulator using IC555, Design of ramp generator using IC555
c) Design of V/F and F/V convertors using TC9400
d) Study of different ICs available for digital modulation techniques (PAM, PWM, PPI, ASK, FSK).

Reference Books:

1) Bell - Electronics Devices and Circuits, PHI or Pearson 4/e
2) Goyal, Khetan - Monograph on Electronics Design Principles, Khanna Pub.
3) Rashid – Microelectronics Circuits Analysis and Design, Cenage Learning, 2/e
4) M.M. Shah - Design of Electronics Circuits and Computer Aided Design, New Age Int.
5) Bell – Solid State Pulse Circuits, PHI 4/e
6) Michael Jacob - Application and Design with Analog Integrated Circuits, PHI 2/e
7) Sergio Franco – Design with OP-AMP and Analog Integrated Circuits, TMH, 3/e
8) IC datasheets.

Communication System-II

COURSE OUTLINE

Communication System-II **CS-II**

Course Title Short Title Course Code

Course Description:

This course is aimed at introducing the fundamentals of digital communication to undergraduate students. The background expected includes a prior knowledge of second year course in Communication System-I. The goals of the course are to understand the basic principle of digital communication and application in different era.

Lecture	Hours / Week	No. Of Weeks	Total Hours	Semester Credits
	03	14	42	03

Prerequisite Course(s): Communication System-I.

COURSE CONTENT

Communication System-II **Semester-V**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE): 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Unit-I: Spectra, Probability and Random Variables **No of Lect. –9, Marks: 16**

a) Basic Signal Processing Operation in digital communication
b) Power density spectrum, Energy spectral density
c) Parseval's theorem, Rayleigh Energy theorem
d) Probability and sample space,
e) Random Variables, Random process and Probability Function.
f) Probability Models.

Unit-II: Waveform Coding and Baseband Shaping for Data Transmission **No of Lect. – 8, Marks: 16**

a) Pulse Code Modulation (PCM) & PCM with Noise.
b) Delta Modulation
c) Digital Multiplexing.
d) Discrete PAM Signals and Power Spectra of Discrete PAM Signals.
e) ISI & Nyquist's Criterion for Distortion less Baseband Binary Transmission.
f) Eye Pattern.

Unit-III: Digital Modulation Techniques **No of Lect. –9, Marks: 16**

a) Digital Modulation Formats
b) Coherent Binary Modulation Techniques
c) Coherent Quadrature Modulation Techniques
d) Noncoherent Binary Modulation Techniques
e) M-ary Modulation Techniques
f) Bit Vs symbol Error Probability and Synchronization

Unit-IV: Information and Detection Theory **No of Lect. – 8, Marks: 16**

a) Uncertainty, Information and Entropy
b) Source coding Theory
c) Huffman coding and Discrete Memory less Channels
d) Mutual Information, Channel Capacity and Channel Coding Theory
e) Differential Entropy and Mutual Information
f) Channel Capacity Theorem

Unit-V: Channel Coding **No of Lect. – 8, Marks: 16**

a) Coding introduction, Error probability with repetition in the binary symmetric channel.
b) Linear Block Codes
c) Algebraic Codes
d) Automatic repeat request

Reference Books:

1) S. Haykin, "Digital Communications", Wiley Student Edition, ISBN 9971-51-205-X.
2) A. Carlson, P. Crilly and J. Rutledge, "Communication Systems- An Introduction to Signals and Noise in Electrical Communication", McGraw Hill International Edition, 4th Edition, ISBN 0-07-121028-8.
3) H. Taub, D. Schilling, "Principles of Communication Systems", Tata McGraw Hill, 2nd Edition, 2005, ISBN 0-07-462456-3.

Microcontrollers & Peripheral Interface Controller (PIC)

COURSE OUTLINE

Microcontrollers & PIC	**MC&PIC**	
Course Title	Short Title	Course Code

Course Description:

This course provides an Extensive knowledge about 8051 microcontroller, its programming, interfacing, applications and introduction to PIC.

Lecture	**Hours / Week**	**No. Of Weeks**	**Total Hours**	**Semester Credits**
	03	**14**	**42**	**03**

Prerequisite Course(s): Course on 8085 Microprocessor and Digital Electronics.

COURSE CONTENT

Microcontrollers & PIC **Semester-V**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) :80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Unit-I: The 8051 Microcontroller **No of Lect. – 8, Marks: 16**

a) Overview of the microcontroller Family, Block diagram description of 8051.
b) Memory and Register organization.
c) Stack and operation of stack. Stack related instructions.
d) Looping, Conditional and Unconditional Jumps, Subroutines, Time delay calculations, CALL and RET Instruction.
e) 8051 pin diagram, understanding the function of each pin.
f) I/O port structure and I/O port programming.

Unit-II: 8051 Programming **No of Lect. – 8, Marks: 16**

a) Addressing Modes in 8051.
b) Instruction set of 8051 microcontroller.
c) Programs based on instructions.

Unit-III: Timer, Serial port and Interrupt programming **No of Lect. – 8, Marks: 16**

a) Structure of Timer mode control register (TMOD register), Mode 1 programming.
b) Generation of large delay, Mode 2 programming
c) Counter programming, Timer control register (TCON register) structure.
d) Serial communication basics, 8051 Serial Port Programming.
e) 8051 interrupts, Interrupts Programming.

Unit-IV: Interfacing **No of Lect. – 9, Marks: 16**

a) Switch interfacing, LED interfacing, LCD interfacing,
b) ADC interfacing, DAC interfacing, Sensors interfacing,
c) Stepper motor, Relay interfacing.
d) DS12887 Real Time Clock (RTC) Interfacing
e) Serial communication protocols Inter Integrated Circuit (I^2C), Serial Peripheral Interface (SPI), MODBUS.

Unit-V: PIC microcontrollers **No of Lect. – 9, Marks: 16**

a) PIC microcontrollers overview and features, PIC 16C6X/7X, PIC 16C6X/7X ALU, CPU registers, status register, File selection register (FSR).
b) Pin Diagram, PIC reset actions, PIC oscillator connections.
c) PIC memory organization
d) PIC 16C6X/7X instructions, Addressing modes, I/O ports, interrupt in PIC 16C61/71, PIC 16C61/71 timers
e) PIC 16C61/71 ADC
f) Introduction to PIC 16F8XX Flash microcontrollers.

Reference Books:

1) M.A. Mazidi, J.C. Mazidi, R.D. McKinlay, The 8051 Microcontroller and Embedded Systems using Assembly and C, Second Edition, Pearson
2) Kenneth Ayala, The 8051 Microcontroller, Third Edition, Delmar Learning, a part of Cengage Learning (India Edition)
3) Ajay Deshmukh, Microcontrollers [Theory and Applications], Tata McGraw hill, New Delhi
4) Mike Predko - Programming and Customizing 8051 micro controller, TMH.
5) N Senthil Kumar, M Saravanan, S Jeevananthan, and Satish Shah- Microprocessors and Interfacing (Series - Oxford Higher Education)

Feedback Control System

COURSE OUTLINE

Feedback Control System **FCS**

Course Title Short Title Course Code

Course Description:

This course provides an introduction to feedback control system covering: basic concept of open loop and close loop system, types of control system and their components, modeling of physical system, transfer function methods. Time response of different order system. Stability method and frequency method such as bode plot, polar plot, Nyquist criterion analysis of state variables and controllers.

	Hours / Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	**03**	**14**	**42**	**03**

Prerequisite Course(s): Knowledge of Mathematics at FE and SE level.

COURSE CONTENT

Feedback Control System **Semester-V**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week **End Semester Examination (ESE) :80 Marks**
Paper Duration (ESE) :03 Hours
Internal Sessional Exam (ISE) :20 Marks

Unit-I: Introduction to control system **No of Lect. – 8, Marks: 16**

a) History and development of Automatic control system.
b) Types of control system & open loop and closed loop system.
c) Transfer function of Block diagram algebra.
d) Masons gain formula and transfer function of signal flow graph.
e) Conversion of Block diagram algebra to Signal flow graph.
f) Conversion of electrical system to Signal flow graph.

Unit-II: Time response and stability of control system **No. of Lect. - 8, Marks: 16**

a) Standard test signals
b) Time response of first and second order system.
c) Steady state error and error constant.
d) Design specifications of second order system.
e) Transient response & its specifications.
f) The concept of stability & Necessary condition of stability
g) Hurwitz stability criterion.
h) Routh stability criterion, Relative stability analysis.

Unit-III: The concepts of Root locus **No of Lect. – 8, Marks: 16**

a) General rule to draw root locus.
b) Construction of root locus.
c) Root counter.
d) Effect of addition of open loop poles.
e) Effect of addition of open loops zeros.
f) Design of lead and lag compensator using root locus.

Unit-IV: Frequency domain analysis **No of Lect. – 8, Marks: 16**

a) Correlation between Time and frequency response.
b) Basics of Magnitude and phase plot.
c) Construction of bode plot.
d) Concept of lead and lag compensator using bode plot.
e) Polar plot.
f) Nyquist stability criterion.
g) Assesment of Relative stability using Nyquist criterion.

Unit-V: state space analysis and controllers. **No of Lect. – 8, Marks: 16**

a) Concept of state (State variable and state model).
b) State model of linear system.
c) Solution of state equation
d) Controllability and observability.
e) Introduction to controller PI, PD and PID.
f) Stepper motor. Servo motor and synchronous motor.

Reference Books:

1) I.J. Nagrath and M. Gopal – Control system Engineering- New age 4th edition.
2) I.J. Nagrath and M. Gopal – Control system Engineering- New age 5h edition
3) Katsuhiko Ogata- Modern Control engineering- Pearson 4th edition.
4) Ashok Kumar- Control system- Tata McGraw Hill Publishing Company.
5) R. Amanda and P. Ramesh Babu- Control system Engineering- SciTech.
6) Smarajit Ghosh – Control systems second edition – PEARSON publishers.

Electromagnetic Engineering

COURSE OUTLINE

Electromagnetic Engineering **EME**

Course Title Short Title Course Code

Course Description:

This course covers the Basics of Electric field & Magnetic field, properties of conductor, properties of dielectric material & concept of capacitor with various structures. Electromagnetic waves as a UPW, Maxwell's equation in static, time varying & free space. This course deals with basics of antenna & parameters.

	Hours / Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	**03**	**14**	**42**	**03**

Prerequisite Course(s): Knowledge of Mathematics at FE and SE level.

COURSE CONTENT

Electromagnetic Engineering **Semester-V**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) :80 Marks
Paper Duration (ESE) :03 Hours
Internal Sessional Exam (ISE) :20 Marks

UNIT-I **No. of Lect. – 8, Marks: 16**

Coulomb's law and electric field intensity: –

a) Review of vector Analysis and coordinate systems.
b) Coulomb's force law & Numerical based on force law.
c) Concept of electric field intensity.
d) Volume charge density, surface charge density, Line charge density
e) Electric field due to point charge, line charge, surface charge, Volume charge. Numerical based on different configuration of charges.
f) Concept of Electric Flux. Relation between flux density & electric field intensity.

UNIT-II **No. of Lect. – 8, Marks: 16**

Gauss's law, Energy and Potential:-

a) Gauss's law, Application of Gauss's law to symmetrical charge distribution.
b) Divergence Theorem.(Statement & Proof)

c) Maxwell's first equation in electrostatics.
d) Work Done, Concept of Potential & Potential Difference.
e) Potential difference in field of point, Line, Surface, Volume charge.
f) Potential gradient, Relation between Potential gradient & Electric filed intensity.
g) Dipole and its electric field, Dipole movement.
h) Energy density in electrostatic field.

UNIT-III **No. of Lect. – 9, Marks: 16**

Conductor, Dielectrics and Capacitance:-

a) Current and current density. Current continuity equation.
b) Properties of conductors.
c) The nature of Dielectric materials.
d) Boundary Condition for perfect Dielectric materials, free space, conductor.
e) Capacitance, Parallel plate capacitor.
f) Calculation of capacitance of various configurations.
g) Poisson's and Laplace's equations.

UNIT-IV **No. of Lect. – 8, Marks: 16**

Magneto statics:-

a) Biot-Savarts law and its vector form.
b) Magnetic field due to finite, infinitely and circular loop long current carrying conductor.
c) Ampere's Circuital law, Point form of Ampere's circuital Law/Curl operator.
d) Stokes theorem.
e) Magnetic flux & Magnetic flux density.
f) Scalar and Vector magnetic potential.
g) Lorentz's Force equation. Energy stored in magnetic field.

UNIT-V **No. of Lect. – 8, Marks: 16**

Time Varying Fields & Uniform Plane Waves:-

a) Maxwell's equations (Differential, Integral and Phasor forms) for time varying, Static & free space.
b) Uniform plane waves, Transformation of UPW from time varying form into Phasor, Vice versa.
c) Representation of wave motion in free space. (Wave equations).
d) Representation of wave motion in perfect dielectrics and Lossy dielectrics.
e) Poynting's theorem & Wave power.
f) Propagation in good conductor and Skin effect.
g) Introduction to antenna basic parameter-Patterns, Beam area, radiation intensity, Beam efficiency, directivity & gain, antenna aperture, Effective height.

Reference Books:

1) Engineering Electromagnetic-William H. Hayt, J A Buck, Tata McGraw Hill Publication. 7th Edition.
2) K. D. Prasad - Antenna and Wave Propagation, Satya Prakashan.
3) Electromagnetics- Schaum's outline series, 2nd edition, Joseph A Edminister, Tata Mc Graw Hill edition.
4) R K Shevgaonkar, "Electromagnetic Waves", 1st Edition, Tata McGraw Hill.

Electronic Circuit Design Lab

LAB COURSE OUTLINE

Electronic Circuit Design Lab **ECD LAB**

Course Title Short Title Course Code

Course Description:

In this laboratory course emphasis is on the hand on design practice and implementation and testing of various circuits (discrete and IC based) in laboratory.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**2**	**15**	**30**	**1**

Total Semester Credits: 1

Prerequisite Course(s): A background in basic electronics and circuit theory.

LAB COURSE CONTENT

(Note: Minimum five experiments to be perform)

1. **Design and test discrete series voltage regulator (with error amplifier) with unregulated power supply.**

   a. Design and test of series voltage regulator (using error amplifier).
   b. Using step down transformer, full wave rectifier (using diodes) and capacitor filter, design and test unregulated power supply required for series voltage regulator.
   [Design of series voltage regulator is without protection circuit and max output current 500mA- do not use Darlington pair]

2. **Design and test Inverting /Noninverting amplifier.**

   a. Design and test single stage BJT CE / CC amplifier for given Av, S, Ri, Ro, F_L, Vcc, Q points, R_{LW}, Source resis.
   b. Perform DC and AC analysis find theoretical values and compare it with designed circuit values.
   [Design of single stage (use self-biasing) without feedback CE / CC BJT amplifier]

3. **Design and test of single tuned amplifier using BJT for given center frequency.**

   a. Design of biasing circuit (self bias)
   b. Designing of tuned circuit.
   c. Calculation and verification of f_0 and bandwidth.

4. **Design of Astable Multivibrator using BJT**

    a. Selection of transistor and external components.
    b. Calculation and verification of desired output frequency and amplitude of output signal.

OR

4. **Design and test Schmitt trigger using BJT.**

    a. Selection of transistor and external components for given UTP and LTP.
    b. Calculation and verification of desired UTP and LTP

5. **Design and fabricate any one circuit from Syllabus**

    a. Select the circuit from syllabus (only from Electronic Circuit Design and other than laboratory experiments).
    b. Design the circuit.
    c. Implement and test the designed circuit on Printed Circuit Board. [Maximum group size to conduct this experiment is Four. Implementation must be on PCB. Students have to write report (design, fabrication method and testing results) in their regular Laboratory manual]

All experiments (except Expt No 5), must perform using breadboard only.

Guide lines for ESE:-

ESE will be based on practical assignment submitted by the student in the form of journal. Evaluation will be based on paper work and performance in the practical.

Feedback Control System Lab

LAB COURSE OUTLINE

Feedback Control System Lab	**FCS LAB**	
Course Title	Short Title	Course Code

Course Description:

In this laboratory course student will be familiar with electrical network, motor and lead and lag controller. Also simultaneously student will be familiar about how to find out the Bode, polar & Nyquist plot with the help of MATLAB.

Laboratory	**Hours per Week**	**No. of Weeks**	**Total Hours**	**Semester Credits**
	2	**15**	**30**	**1**

Total Semester Credits: 1

Prerequisite Course(s): Knowledge of Basic Electronics

LAB COURSE CONTENT

(Note: Minimum FOUR Experiments from each group.)

Group A

1) To Plot the magnitude & phase plot of lead electrical network.
2) To Plot the magnitude & phase plot of lag electrical network.
3) To determine the transient response of RLC electrical network
4) Study of flow control using PID controller.
5) Study of synchronous to observe angular displacement.
6) Study of stepper motor.

Group B

1) Obtain the unit step response of a second order system

a) Zeta= 0.5 and ω_n= 6 rad/sec.
$(S^2+9s+19)/ (s^3+7S^2+14S+8)$

2) Sketch the polar plot of (Unity f/b system)

a) G(s) = 20s/(s+10(s+10)
b) G(s) = 10/s(s+1)(s+2)

3) Sketch the Bode plot for the transfer function (Unity f/b system)

a) G(s) = 1000/s(1+0.1s)(1+0.001s)

b) $G(s)= 10/s(s+1)(s+2)$

4) Sketch the Nyquist plot for the system

a) $G(s)\,H(s) = 60/(s+1)(s+2)(s+5)$

b) $G(s)H(s) = 1/(s^2+0.8s+1)$

5) The open loop transfer function of a servo system with unity feedback is given by $G(s) = 10/(s+2)\,(s+5)$. Determine the damping ratio, undamped natural frequency of oscillation. What is the percentage overshoot of the response to a unit step input?

6)

a) A system has $G(s) = 0.035/s(1+0.5s)(1+0.04s)$ Design a suitable lag compensator to give velocity error constant 27.3 s^{-1} and phase margin =45°

b) The open loop transfer function of a unity feedback system $G(s) = K/s(s+1)(s+2)$ Design suitable lag-lead compensator to achieve the following:
Static velocity error constant = 10 s^{-1}. Phase margin = 50° and Gain margin less than Or equal to 10dB.

Guide lines for ESE:-

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical out of Group A and Group B. Evaluation will be based on paper work and performance in the practical.

Communication System-II Lab

LAB COURSE OUTLINE

Communication System-II Lab **CS-II LAB**

Course Title Short Title Course Code

Course Description:

This laboratory course is an introduction to the most common techniques that are used to build both analog and digital communication systems using a modern digital signal processing approach. Communication systems are introduced by looking first at baseband transmission methods such as pulse amplitude modulation (PAM) signaling, and pulse code modulation (PCM). The combination of AM, FM, PM and PAM or PCM finally leads to the most commonly used digital modulation systems such as frequency shift keying (FSK), phase shift keying (PSK) and more general 2-dimensional signal constellations using quadrature amplitude modulation (QAM). In the majority of cases the goal of a communication system is to transmit information reliably as fast as possible within a given channel bandwidth and power constraint.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**2**	**14**	**28**	**1**

Total Semester Credits: 1

Prerequisite Course(s): Communication System-I.

LAB COURSE CONTENT

(Note: Minimum FOUR Experiments from each group.)

Group A

1. **To generate and detect PCM signal.**

    a. Draw input and output waveform.
    b. From sampled output measure quantization level.
    c. Reconstruct PCM waveform from modulated signal.

2. **To understand waveform of Delta Modulation and Demodulation.**

    a. Observation of effect of slope overload.
    b. Observation of Granular noise and SNR.

3. **To understand waveform of Adaptive Delta Modulation and Demodulation.**

    a. Observation of decreasing effect of slope overload.
    b. Observation of Granular noise and SNR.

4. **To generation and detection of FSK input and output waveform.**

    a. Find the FSK frequency when applied logic '1' and '0'.
    b. Reconstruct same signal at receiving side.
    c. Draw detected input and output waveform on graph.

5. **To generation and detection of PSK input and output waveform.**

    a. Find the PSK phase changing when applied logic '1' and '0'.
    b. Reconstruct same signal at receiving side.
    c. Draw detected input and output waveform on graph.

6. **To generation and detection of ASK input and output waveform.**

    a. Find the ASK measure amplitude when applied logic '1' and '0'.
    b. Reconstruct same signal at receiving side.
    c. Draw detected input and output waveform on graph.

Group B

7. **To generation and detection of QPSK/QAM input and output waveform.**

    a. Observed the OPSK/QAM input and output waveform.
    b. Reconstruct same signal at receiving side.
    c. Draw detected input and output waveform on graph.

8. **To Study different line codes (NRZ, RZ, polar RZ, bipolar(AMI),Manchester)**

    a. Describe representation of each code.
    b. Compare each code and made observation.
    c. Draw given input and output waveform on graph.

9. Noise analysis using any software tool (use of any discrete distribution).Find response by changing parameters. (use any open source software)

10. Noise analysis using any software tool (use of any continuous distribution).Find response by changing parameters. (use any open source software)

11. Execute Shannon Fannon algorithm by using any software tool. .(use any open source software)

12. Execute Huffman coding by using any software tool. (use any open source software)

Guide lines for ESE:-

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical out of Group A and Group B. Evaluation will be based on paper work and performance in the practical.

Microcontrollers & Peripheral Interface Controller Lab

COURSE OUTLINE

Microcontrollers & PIC	**MC&PIC LAB**	
Course Title	Short Title	Course Code

Course Description:

In this laboratory course emphasis is on the understanding the instruction set of 8051 microcontroller and PIC. It provides comprehensive treatment of 8051 microcontroller along with technical knowhow about PIC family. The students can use this knowledge to analyze and build the embedded system for different applications.

	Hours per Week	**No. of Weeks**	**Total Hours**	**Semester Credits**
Laboratory	**2**	**14**	**28**	**1**

Total Semester Credits: 1

Prerequisite Course(s): Course on 8085 Microprocessor and Digital Electronics.

LAB COURSE CONTENT

(Note: Minimum SIX Experiments from group A and TWO experiments from group B.)

Group A

1. Study of 8051 / 8085 assembler and Simulator by writing program for addition and Subtraction.
2. Write and Execute program for multiplication and division.
3. Write and Execute program for Calculation of factorial.
4. Write and Execute program to flash LED.
5. Write and Execute program to interface a switch.
6. Write and Execute program to display 0 to 9 continuously on 7-Segment display.
7. Write and Execute program to demonstrate interfacing of Relay.
8. Write and Execute program to demonstrate interfacing of DAC.
9. Write and Execute program to demonstrate interfacing of ADC.

Group B

10. Write and Execute program to demonstrate interfacing of Stepper Motor.
11. Write and Execute program to demonstrate interfacing of LCD.

12. Two experiments based On PIC 16C6X/7X.
13. Two Experiments to understand the working of serial protocols.

Guide lines for ESE:-

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical out of Group A and Group B. Evaluation will be based on paper work and performance in the practical.

Computer Programming-III Lab

COURSE OUTLINE

Computer Programming-III Lab **CP-III Lab**

Course Title Short Title Course Code

Course Description:

This course provides an introduction to computer programming Language MATLAB/Scilab covering: Introduction to MATLAB/Scilab; Handling Arrays and Matrices; Programming in MATLAB/Scilab, M-File Scripts; MATLAB/Scilab Functions and Two-Dimensional Plots; Graphical User Interface and Applications of MATLAB/Scilab.

	Hours / Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	**01**	**14**	**14**	**02**
Lab	**02**	**14**	**28**	

Prerequisite Course(s): Knowledge of C Language and logical reasoning.

THEORY COURSE CONTENT

Computer Programming-III Lab **Semester-V**

Teaching Scheme
Lecture: 1 hours / week

Examination Scheme
Internal Continuous Assessment (ICA): 50 Marks

Unit-I: Introduction to MATLAB/Scilab **No of Lect. – 2**

a) Getting Started with MATLAB/Scilab. Command Window, Editor Window, Figure Window, Help Window, Command History Window, Current Directory Window, Workspace Window.
b) Data Types in MATLAB/Scilab, Variables, Keywords, Assignment Statement, MATLAB/Scilab System Variables, Semicolon, and Percentage Sign.
c) Commonly Used System MATLAB/Scilab Commands.

Unit-II: Handling of Arrays and Matrices **No of Lect. – 4**

a) Creating an Array, Accessing Elements of an Array, Regular Arrays, Expanding and Reducing an Array, the Length and Size functions.
b) Array Sorting, Mathematical Operations on Arrays (Addition, Substraction, Multiplication by Scalar, and Multiplication of two arrays).

c) Division of Two Polynomials, Relational and Logical operators on Arrays.
d) Creating a Matrix, Accessing Element of a Matrix, Length and Size of a Matrix.
e) Expanding and reducing the size of a Matrix, Shifting and sorting Matrices.
f) Creating Special Matrices (Identity Matrix, Anti-Identity Matrix, 0's Matrix, 1's Matrix, and Magic Square), Transpose, Determinant and Inverse of a Matrix.
g) Mathematical Operations on Matrices.

Unit-III: Programming in MATLAB/Scilab, M-FILE Scripts **No of Lect. – 4**

a) String Operations, String MATLAB/Scilab Functions, Time and Date Functions.
b) Introduction to M-file scripts, Creating, Saving and Running an M-file.
c) Variables of a Script File, disp function, fprintf function, Reading Input from keyboard, sscanf function.
d) The Conditional Control Statements, Nested Conditional Control Statements.
e) The Loop Control Statements, for loop, while loop.
f) Break, continue and return statement.

Unit-IV: MATLAB/Scilab Functions and Two-Dimensional Plots **No of Lect. – 3**

a) Creating MATLAB/Scilab function file, local and global variable, saving and using function file, Inline functions, Comparison between script files and function files.
b) The plot Command, fplot command, Plotting Multiple Graphs in the same plot.
c) Formatting a plot, plot with Logarithmic axis, histograms, and polar plots.
d) Plotting multiple plots on the same page, Examples of MATLAB/Scilab Applications on plots.

Unit-V: Graphical User Interface and Applications of MATLAB/Scilab **No of Lect. – 3**

a) Introduction to GUI, GUI Development Environment, Creating a Simple GUI.
b) GUI Components: textbox, pushbuttons, toggle button, checkbox, radio button, popup Menus, List box and Slider.
c) Dialog Boxes: Error and warning Dialog Boxes, Input Dialog Box, Question Dialog Box, List Dialog Box, and File Dialog Box.
d) Application: Linear Algebra, Curve Fitting and Interpolation, Numerical Integration, Digital Image Processing, etc.

Reference Books:

1) Stephen J. Chapman, "MATLAB Programming for Engineers", Thomsan Learning, 3rd Edition, 2007
2) Y. Kirani Singh and B.B. Chaudhari, "MATLAB Programming", PHI, 1st Edition, 2010
3) Amos Gilat, "MATLAB An Introduction with Applications", Wiley India, 1st Edition, 2010
4) Rudra Pratap, " Getting Started with MATLAB 7", OXFORD, 1st Indian Edition, 2006
5) www.scilab.org

LAB COURSE CONTENT

(NOTE: minimum 6 practical from group A and 2 practicals from group B)

GROUP A (MATLAB/Scilab)

1. **Study of creation of arrays.**
   a. Create a row vector that has different elements
   b. Create a column vector that has different elements
   c. Create a matrix for given elements.

2. **Study of various operations on matrices**
   a. Create two matrices
   b. Perform arithmetic operations like addition, subtraction, multiplication & division on any two matrices
   c. Prove addition of matrices is commutative and associative
   d. Show matrix multiplication is distributive

3. **To plot sinusoidal, triangular and square signal**
   a. Plot all signals in a given range on same figure with suitable naming.

4. **Compute sampling of continuous time signal.**
   a. Plot continuous time signal
   b. Plot signals for different conditions of sampling and verify sampling theorem
   c. All signals plot on one figure.

5. **To find the pole zero plot of the given network.**

   a. Obtain Transfer function
   b. Calculate poles & zeros of given system
   c. Plot the Plot -Zero plot for given function.

6. **To find the Polar /Nyquist plot of the given network.**
   a. Obtain transfer function
   b. Plot Polar/Nyquist plot for given system

7. **Modeling of any one differential equation**
   a. Select any one differential equation and implement it with the help of simulation

GROUP B (MATLAB/Scilab)

Applications of MATLAB/ Scilab to Electronics Engineering subjects (4 Practicals)

Reference Books:

1) Rudra Pratap, "Getting Started With MATLAB 7: A Quick Introduction For Scientists and Engineers".
2) Amos Gilat , " MATLAB : An introduction with applications, 4th edition.
3) Stephen Chapman - MATLAB programming for Engineer, Thomson.
4) www.scilab.org

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Industrial Training / EDP / Special Study

COURSE CONTENT

Industrial Training / EDP / Special Study	**IT/EDP/SS**	
Course Title	Short Title	Course Code

Semester-V
Total Semester Credits: 02

Examination Scheme
Internal Continuous Assessment (ICA): 25 Marks

Industrial Training

- Student shall undergo industrial training for a minimum period of **two weeks** during summer vacations between fourth semester and fifth semester.
- The industry in which industrial training is taken should be a medium or large scale industry
- The paper bound report on training must be submitted by the student in the beginning of Fifth semester along with a certificate from the company where the student took training.
- Every student should write the report separately.
- Institute / Department/T&P Cell have to assist the students for finding Industries for the training.
- Students must take prior permission from Department before joining for Industrial Training.

OR

EDP (Entrepreneurship Development Program)

- Student has to participate in Entrepreneurship Development Program for a minimum period of **One week** during summer vacations between fourth semester and fifth semester.
- Every student must submit the paper bound report based on the program in the beginning of Fifth semester along with a certificate (Course / Program completion) from the program organizers.
- Every student should write the report separately.
- Institute / Department may arrange Entrepreneurship Development Program at their campus.
- Students must take prior permission from Department before attending any Entrepreneurship Development Program.

OR

Special Study

- Student has to submit name of three topics of his interest to the department.
- Special study in a group shall not be allowed.
- The three-member committee appointed by Head of Department shall allot one topic out of the three topics submitted by the student.
- Every student must submit the paper bound report based on special study at the end of Firth semester.

- Department should allot guide to all such students, for monitoring their progress and guide them for literature survey / report writing etc.
- Evaluation of special study shall be done based on presentation made by student, followed by brief question answer session.

Evaluation of Industrial Training / EDP / Special Study

ICA: The Internal Continuous Assessment shall be based on the active participation of the students in the training / EDP / Special study and based on knowledge / skill acquired by the student. The three-member committee appointed by Head of Department shall assess the reports and award marks based on following:

(a) Report	10 marks.
(b) Presentation	10 marks.
(c) Viva-voce at the time of presentation	05 marks.
Total:	**25 marks.**

NORTH MAHARASHTRA UNIVERSITY, JALGAON (M.S.)

Third Year Engineering

(E&TC/E&C)

Faculty of Engineering and Technology

COURSE OUTLINE

Semester – VI

W.E.F 2014 – 2015

Industrial Economics & Telecom Regulation

COURSE OUTLINE

Industrial Economics & Telecom Regulation **IETR**
Course Title Short Title Course Code

Course Description:

This course includes material from courses in economics, business, and public policy at the graduate level. Additionally, this course has been supplemented with material from investigations and consulting studies at the international level. A wide spectrum of material has been selected, with the purpose of introducing the participants to the important changes that are happening in the telecommunications industry, and the techniques usually used for cost estimations, prices, rates and other elements related to the regulation of telecommunications industry.

Lecture	Hours / Week	No. Of Weeks	Total Hours	Semester Credits
	03	15	45	03

Prerequisite Course(s): General understanding of economics and management.

COURSE CONTENT

Industrial Economics & Telecom Regulation **Semester-VI**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week
End Semester Examination (ESE) :80 Marks
Paper Duration (ESE) :03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Unit-I: Basic concepts in economics **No of Lect. – 9, Marks: 16**

Demand, supply, elasticity of demand and supply, competition, monopoly, oligopoly, monopolistic competition, causes creating categories of monopoly organization, price determination under perfect competition and monopoly, price discrimination, equilibrium of firm under competition and monopoly. Functions of money, supply and demand for money, money price level and inflation, black money, consequences, Meaning, magnitude.

Unit-II: Banking and Taxation system of Country. **No of Lect. –9, Marks: 16**

Function of commercial banks, multiple credit creation, banking system in India, shortcomings and improvement. Central banking: Function of central banking illustrated with reference to RBI,

monitory policy meaning, objectives and features. Sources of public revenue: principles of taxation, direct and indirect taxes, distribution of incidence, tax structure, reform of tax system.

Unit-III: **No of Lect. – 9, Marks: 16**

International Trade and economic crises of 2008, Theory of international trade, balance of trade and payment, theory of protection, tariffs and subsidies, foreign exchange control, devaluation.
Basic concept of management- Planning, organization, communication, Leadership & motivation.
Marketing management and marketing Mix-Product, Place, price and promotion

Unit-IV: Telecommunications Regulation. **No of Lect. – 9, Marks: 16**

-The Task of Regulation, Markets and market failure, The rules of regulation.
-The Framework for Regulation, Legal frameworks, Instruments of regulation, Enforcement, Dangers of regulation and operational aspects.
-Regulatory Strategy and Price Controls, Market strategies/ structures, Engineering and technology.
-Regulation and the Future (John Buckley, Telecommunications Regulation)

Unit-V: **No of Lect. – 9, Marks: 16**

National Telecom Policy 1994,New Telecom Policy 1999, Guidelines For Up linking From India, Broadband Policy 2004, Guidelines For Obtaining License For Providing Direct-To-Home(DTH) Broadcasting Service In India. TRAI Act 1997, Cable Network Act, TRAI Regulation.
ITU's role in global communications.
(http://www.trai.gov.in/Default.asp
http://www.itu.int/net/home/index.aspx
http://www.itu.int/net/about/index.aspx
Black, Telecommunications Law in the Internet Age, 2002, Elsevier)

Reference Books:

1) R Jayaram, Namita R Kotwani, "Industrial Economics and Telecommunication Regulations", PHI
2) John Buckley, Telecommunications Regulation, Institution of Electrical Engineers © 2003, Published by: The Institution of Electrical Engineers, London, United Kingdom. (ISBN:0852964447)
3) John R McNamara, "The economics of innovation in the telecommunications industry", Quorum Books, Newyork.
4) Hank Intven, McCarthy Tetrault, "Telecommunication Handbook"
5) Indian Economy: A.N Agrawal

Power Electronics

COURSE OUTLINE

Power Electronics **PE**
Course Title Short Title Course Code

Course Description:

This course includes power semiconductor-based devices such as SCR, IGBT and related applications. This course is designed to introduce to the students to the basic principles and applications of power semiconductor devices. It includes fundamentals, operation & characteristics of the power devices. This course provides instruction in the theory and application of power devices in the electronics and electrical industry. Emphasis is placed on the physical characteristics and uses of power devices.

Lecture	Hours / Week	No. Of Weeks	Total Hours	Semester Credits
	03	14	42	03

Prerequisite Course(s): A background in basic electronics and circuit theory.

COURSE CONTENT

Power Electronics **Semester-VI**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Unit-I: Introduction to Power Devices **No of Lect. – 9, Marks: 16**

a) **Silicon Controlled Rectifier (SCR):** Structure, symbolic representation, working principle, two transistor Analogy of SCR, characteristics (Static and Dynamic), Turn-ON methods, Gate triggering circuits of SCR (R,RC,UJT).
b) **Commutation Methods:** Class A, B, C, D, E, F commutation (Circuit diagram, working principle and waveforms)
c) **Protection circuits of SCR:** di/dt and dv/dt protection and Snubber circuit
d) **IGBT, GTO, DIAC, TRIAC:** Structure, symbolic representation, Working principle, characteristics.

Unit-II: Line Frequency Controlled Converters / Rectifiers No of Lect. – 9, Marks: 16

a) **Single phase Half Controlled Bridge Rectifier (R & RL Load)-** Circuit diagram, waveforms, average load voltage, RMS load voltage, average load power, active power, reactive power, current distortion factor, displacement factor, input power factor, efficiency, Ripple factor, Form factor.
b) **Single phase Full Controlled Bridge Rectifier (R&RL Load) -** Circuit diagram, waveforms, average load voltage, RMS load voltage, average load power, active power, reactive power, current distortion factor, displacement factor, input power factor, efficiency, Ripple factor, Form factor.
c) **Three phase half and full controlled converter (R & RL load)** - Circuit diagram, waveforms, average load voltage, RMS load voltage, Average load current, Operating Modes.
d) **Effect of Source Inductance:** 1-Phase and 3-Phase Fully controlled Rectifier

Unit-III: DC – DC Converter No of Lect. – 7, Marks: 16

a) Classification of Choppers, Control strategies of dc - dc- converter
b) **Step down and Step up dc-dc converter**- Circuit diagram, waveform, and output voltage calculations. Continuous conduction mode, Boundary between continuous and discontinuous conduction Mode and Discontinuous Conduction Mode.
c) **Full Bridge dc-dc converter**: PWM with Bipolar voltage switching (Derivation of output voltage.)
d) **Switch mode power supply**: Block diagram and explanation.

Unit-IV: Inverters No of Lect. – 8, Marks: 16

a) **Inverters:** Basic Series and Parallel inverters, construction and principle of operation,
b) **Square and PWM Bridge Inverters:** Single phase half bridge and full bridge inverters with R and R-L load, output voltage calculations. Square wave, quasi-square wave and sinusoidal PWM switching, selection of frequency modulation ratio and amplitude modulation ratio.
c) **Harmonic reduction Techniques**.
d) **Three phase Bridge inverter**: with balanced star resistive load, 120 degree and 180 degree conduction mode for line and phase voltages.

UNIT V: AC Controllers, UPS and simulation of converters No of Lect. – 9, Marks: 16

a) **AC controllers**: Principle of On-Off control or integral cycle and phase angle control**.**
b) 1-Phase Half wave and full wave AC control with R and R -L load, derivation of output Voltage.
c) UPS- Basic principle, Different configurations/ types of UPS – Off-line On-line, Line Interactive, their comparison. , Battery- Ah, back up time and battery charger rating calculations.
d) Simulation of single phase full converter, single phase semi converter, single phase full bridge inverter, single phase AC voltage controller.

Reference Books:

1) Ned Mohan, T. M. Undeland and W. P. Robbins- Power Electronics, converters , Application, and Design, John Wiley and sons , (3rd Edition)
2) M. D. Singh , K. B. Khanchandani - Power Electronics, TMH (3rd Edition)
3) M. H. Rashid - Power Electronics circuits, devices and applications, PHI, 3/e. Or Pearson.
4) Dr. Shailendra Jain, Modeling and simulation using MATLAB-Simulink, Wiley India pvt.Ltd.
5) P. C. Sen Power Electronics Tata Mc-Graw-Hill Publishing Company Limited.
6) Dr. P. S. Bimbhra, Power Electronics, Khanna Publication.
7) M Ramamurthy - An Introduction to Thyristor and their application, Second Edition,
8) M. S. Jamil Asgar, - Power Electronics, PHI, 2004, New Delhi.
9) S. K. Bhattacharya - Industrial Electronics and control , Tata Mc-Graw-Hill (TMH)
10) Deodatta Shingare, Industrial and Power Electronics, Electrotech Pub.
11) MATLAB-SimPowerSystem manuals.

Electronic Measurement

COURSE OUTLINE

Electronic Measurement **EM**
Course Title Short Title Course Code

Course Description:

The main objective of this course is to introduce and expose the students to various measuring instrument, their block diagram, specifications and applications. It includes analog instruments, digital instruments, generators, analyzers, and C.R.O. & data acquisition system.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Lecture	03	14	42	04

Prerequisite Course(s): Knowledge of Elements of Electrical & Electronics Engineering and Component Devices and Instrumentation Technology.

COURSE CONTENT

Electronic Measurement **Semester-VI**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week **End Semester Examination(ESE) : 80 Marks**
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Unit-I: Analog instruments: **No of Lect. – 8, Marks: 16**

a) Q-meter.
b) True RMS responding voltmeter.
c) Vector voltmeter.
d) Vector impedance meter.
e) Bolometer -Measurement of power.
f) Field strength meter.
g) Automatic bridges.

Unit-II: Digital Instruments **No of Lect. – 8, Marks: 16**

a) Digital Frequency Meter.
b) Digital measurement of time.
c) Universal Counter , Electronic Counter.
d) Digital tachometer, Digital PH meter.
e) Phase meter, Capacitance meter.
f) Automation in digital instruments.

Unit-III: Signal Generators and Analyzers **No of Lect. – 9, Marks: 16**

a) Frequency synthesized signal generator,
b) Random noise generator,
c) Sweep generator, TV Sweep generator, Marker generator, Wobbluscope.
d) Vectroscope,
e) Optical Time-Domain Reflectometer.
f) Frequency selective wave analyzer, Heterodyne wave analyzer.
g) Harmonic distortion analyzer.
h) Spectrum analyzer and its applications.

Unit-IV: Oscilloscope **No of Lect. – 9, Marks: 16**

a) Block diagram of CRO, vertical amplifier, horizontal deflecting systems, triggered sweep and trigger pulse circuit.
b) Delay line and its types.
c) Dual beams CRO, dual trace CRO.
d) Sampling (VHF) oscilloscope, storage oscilloscope and digital read out oscilloscope.
e) Probes for CRO
f) Digital storage oscilloscope

Unit-V: Data Acquisition, Conversion and Transmission **No of Lect. – 8, Marks: 16**

a) Generalized Data Acquisition System, Objectives of DAS, single channel and multi channel DAS.
b) Data loggers.
c) Digital Transducer
d) Data transmission systems, advantages and disadvantages of digital over analog transmitter, TDM.
e) The IEEE 488 bus.
f) Testing of audio amplifier and radio receiver.

Reference Books:

1) H. S. Kalsi, "Electronic Instrumentation", TMH, 2nd Edition, 2007.
2) A. D. Helfric and W. D. Cooper, "Modern Electronic Instrumentation and Measurement Technique", Pearson LPE, 3rd Edition, 2005.
3) A. K. Sawhney, "Electrical and Electronics measurement and Instrumentation", Dhanpat Rai and company, 18th Edition, 2007.
4) K. Lal Kishore, "Electronic Measurement and Instrumentation", Pearson 4th, Edition, 2012.

Audio Video Engineering
COURSE OUTLINE

Audio Video Engineering **AVE**
Course Title Short Title Course Code

Course Description:

This course introducing the fundamentals of Television and Consumer Electronic to undergraduate students. As the follow-up to this course, the reader is advised to the access to this course "Colour television –principal and practices" for further information on CTV principles, detailed coverage of integrated circuits used in color receiver and for alignment and servicing of such receivers.

	Hours / Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	03	15	45	03

Prerequisite Course(s): Physics, Analog Communication, Digital Communication, Electromagnetic Engineering.

COURSE CONTENT

Audio Video Engineering **Semester-VI**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) :80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Unit-I: Methods of sound recording and reproduction No of Lect. – 9, Marks: 16

a) Introduction to Disc recording, Magnetic recording, optical recording-CD and DVD.
b) Monophony, stereophony, Hi-Fi (High Fidelity) System.
c) PA system-Basics of aquatics, Block diagram, requirement, Characteristics, its planning for various uses.
d) Introduction to satellite radio reception (word space).
e) Introduction to blue ray disc format.

Unit-II: Basic concept of Television. No of Lect. – 9, Marks: 16

a) Scanning methods, Horizontal and vertical synchronization.
b) Camera Tubes-Image Orthicon, Vidicon, Plumbicon, Saticon, Silicon Diode array.
c) Aspect ratio, Kell factor.
d) Horizontal and vertical resolution.
e) Video bandwidth, Positive and negative modulation, Composite video signal.
f) Television Transmission-VSB transmission, TV Channels, TV Standard, TV Channels bands.
g) Basic block diagram of Monochrome TV receiver.

Unit-III: Colour Television receiver **No of Lect. – 9, Marks: 16**

a) Colour fundamental, compatibility, frequency interleaving.
b) Colour mixing, color camera tube. Colour purity.
c) Picture tubes-Static and dynamic convergence.
d) Encoder and decoder and colour different signals comparison.
e) Different system concepts-PAL, SECAM, NTSC system.
f) Colour TV transmitter and receiver block diagram.

Unit-IV: Advanced TV system and techniques **No of Lect. – 9, Marks: 16**

a) Introduction to digital compression techniques.
b) Introduction to JPEG, MPEG techniques.
c) Block diagram of Digital TV-transmitter and receiver.
d) Introduction to Advanced Display, Plasma, LCD, LED, Organic LED.
e) Introduction to HDTV (high-definition TV) transmitter and receiver.

Unit-V: Advanced Broadcasting systems **No of Lect. – 9, Marks: 16**

a) Introduction to digital cable TV conditional access system (CAS).
b) DTH system, Video on demand.
c) Introduction to 3D DTV system, CCTV, digital terrestrial TV (DTV).
d) Introduction to IPTV and mobile TV.
e) Block diagram and working of FAX Machine.

Reference Books:

1) A.M.Dhake-TV and Video Engineering,TMH
2) R. G. Gupta - TV Engineering and Video system , TMH
3) Kelth Jack - Video Demisified , Penram International
4) S. P. Bali - Colour TV Theory and Practice , TMH
5) R.Gulati - Monochrome and colour TV 4th edition , New Age
6) Bernard Grobb, Charles E - Basic TV and Video system, TMH (6Th Ed.)
7) Philips handbooks on audio ,video and consumer electronics application notes
8) Olson-High Quality Sound recording and reproduction

Industrial Management

COURSE OUTLINE

Industrial Management	**IM**	
Course Title	Short Title	Course Code

Course Description:

This course provides an introduction to: basics of management their organizational structures with man power development, financial management, quality management & industrial acts.

Lecture	**Hours / Week**	**No. Of Weeks**	**Total Hours**	**Semester Credits**
	03	**15**	**45**	**03**

Prerequisite Course(s): General understanding of trade and management

COURSE CONTENT

Industrial Management **Semester-VI**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week **End Semester Examination (ESE):80 Marks**
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Unit-I: Basics of Managements **No of Lect. – 9, Marks: 16**

a) Introduction, definition of management,
b) Scientific management.
c) Function of management.
d) Principles of managements.
e) Level of management, managerial skill/roles.
f) Relation between administration, management and organization.

Unit-II: Organizational Structures **No of Lect. – 9, Marks: 16**

a) Principles of organization. Design of organization.
b) Forms of organization-Line, Lines and staff.
c) Types of ownerships-Partnership, proprietorship
d) Joint stock Company, private limited, Govt. ltd, public limited.
e) Cooperative organization.
f) Public sector and joint ventures.

Unit-III: Personal Management **No of Lect. – 9, Marks: 16**

a) Factors affecting man power planning.
b) Sources of recruitment. Talent acquisition.
c) Education & training methods of training workers.
d) Labor welfare, communication in Industries
e) Suggestion system, discipline in industries.
f) e-business& e-governances.

Unit-IV: Financial management **No of Lect. – 9, Marks: 16**

a) Definition & function of Financial Management
b) Capital Structure. Fixed & working capital. Role of SEBI (Securities & exchange Board of India).
c) Sources of Finance. Loans from Banks. Trade credit. Public deposits.
d) Wants, utility, Demand.
e) Supply, Elasticity of demand & Supply.

Unit-V: Quality management & Industrial Acts. **No of Lect. – 9, Marks: 16**

a) Definition of quality, quality control.
b) Process control. Total quality concepts
c) ISO 9001-2000.
d) Factories Act, industrial accidents, industrial safety.
e) Rights patents, trademarks, copy rights.

Text Book: 1) M. Mahajan: Industrial Engineering & Production Management, Dhanpat Rai& company.

Reference Books:

2) O. P. Khanna: Industrial Engineering & Management, Dhanpat Rai& company.
3) Koontz: Essential of Management, TMH6/e.
4) M.Y.Khan&P.K.Jain : Financial Management, TMH.

Power Electronics Lab

LAB COURSE OUTLINE

Power Electronics Lab	**PE LAB**	
Course Title	Short Title	Course Code

Course Description:

In this laboratory course emphasis is on the understanding of different Power semiconductor devices and their applications like controlled rectifiers, choppers, inverters and ac regulators.

Laboratory	**Hours per Week**	**No. of Weeks**	**Total Hours**	**Semester Credits**
	2	**14**	**28**	**1**

Total Semester Credits: 1

Prerequisite Course(s): Knowledge of Elements of Electrical & Electronics Engineering.

LAB COURSE CONTENT

(Note: Minimum TWO Experiments from each group.)

Group A

1. Study of R, RC triggering circuits of SCR to plot waveforms for various values of firing angle.
2. Study of UJT triggering circuits of SCR to plot waveforms for various values of firing angle.
3. Study and design of Class A, B, C, D, E and F commutation circuits of SCR.(Any two)

Group B

1. Study of 1 - ϕ Half controlled Bridge rectifier with R and RL Load, plot input and output voltage waveforms, average load voltage v/s firing angle.
2. Study of 1- ϕ full controlled converter with R and R-L load, plot input and output voltage waveforms, average load voltage v/s firing angle.
3. Study of 1- ϕ full controlled Bridge converter with R and R-L load, plot input and output voltage waveforms, average load voltage v/s firing angle.

Group C

1. Study of circuit and waveforms of step-up dc –dc converter and plot output voltage v/s duty ratio and switching frequency.
2. Study of circuit and waveforms of step-down dc –dc converter and plot output voltage v/s duty ratio and switching frequency.
3. Study of SMPS.

Group D

1. Study of Series Inverter and find efficiency.
2. Study of Parallel Inverter and find efficiency.
3. Simulation of single phase full converter, development of model, plotting the waveform on figure and FFT analysis (use MATLAB/Scilab - SimPowerSystem Software).
4. Simulation of single phase full bridge inverter, development of model, obtain frequency spectrum using powergui block (use MATLAB/Scilab - SimPowerSystem Software).

Group E

1. Study and plot V-I characteristics of Diac/Triac/GTO/IGBT(any one).
2. Study of 1- ϕ AC controller with R load and measure load voltage and plot waveforms for different firing angles.
3. Study of UPS.

Guide lines for ESE:

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical out of 10. Evaluation will be based on paper work and performance in the practical.

Electronic Measurement Lab

LAB COURSE OUTLINE

Electronic Measurement Lab — Course Title

EM LAB — Short Title Course Code

Course Description:

In this laboratory course emphasis is on the understanding of different instruments front panel of Q meter, true RMS meter, Universal Counter, CRO, DSO, Data logger and Distortion factor meter etc. The students can perform different measurements using these instruments.

Laboratory	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	2	14	28	1

Total Semester Credits: 1

Prerequisite Course(s): Knowledge of Elements of Electrical & Electronics Engineering and Component Devices and Instrumentation Technology.

LAB COURSE CONTENT

(Note: Minimum FOUR Experiments from each group.)

Group A

1. Measurement of reactive and resistive components with LCR-Q meter.
2. Measurement of Vrms signal with true RMS meter / DMM.
3. Measurement of frequency and Time with the help of frequency counter.
4. Measurement of motor speed using Digital Tacho meter.
5. Measurement of various parameters with DATA logger.
6. Measurement of Phase angle with the help of Digital Phase Meter.

Group B

7. Measurement of frequency and phase shift using Lissajous pattern and testing of different components using CRO.
8. Measure and store the frequency and amplitude with the help of DSO.
9. Measurement of distortion and nature of distortion by Harmonic distortion analyzer.

10. Computerized analysis of radio receiver and measurement of power with it.
11. Analysis of test signal with the help of Spectrum analyzer.
12. Measurement of distance with OTDR meter.

Guide lines for ESE:

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical out of 8. Evaluation will be based on paper work and performance in the practical.

Audio Video Engineering Lab

LAB COURSE OUTLINE

Audio Video Engineering Lab	**AVE LAB**	
Course Title	Short Title	Course Code

Course Description:

This course introducing the fundamentals of Audio Video Engineering to undergraduate students. As the follow-up to this course, the reader is advised to the access to this course "Colour television –principal and practices" for further information on CTV principles, detailed coverage of integrated circuits used in colour receiver and for alignment and servicing of such receivers.

Laboratory	**Hours per Week**	**No. of Weeks**	**Total Hours**	**Semester Credits**
	2	**8**	**16**	**1**

Total Semester Credits: 1

Prerequisite Course(s): Physics, Analog Communication, Digital Communication, Electromagnetic Engineering.

LAB COURSE CONTENT

(Note: Minimum FOUR Experiments from each group.)

Group A

1. Study of colour TV receiver.
2. Voltage and waveform analysis for colour TV.
3. Alignment and fault finding of colour TV using pattern generator (2 expts.).
4. Study of HDTV .
5. Study of digital TV.
6. Practical visit to TV transmitter/Studio.

Group B

1. Study of DTH and set of box.
2. Study of CD/DVD players.
3. Study of PA system with cordless microphone .
4. Study of audio system ,MP3 player ,satellite radio(Tone controlled).
5. Study of tape recorder.
6. Web page designing.

Guide lines for ESE:-

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical out of Group A and Group B. Evaluation will be based on paper work and performance in the practical.

Application Software Lab

COURSE OUTLINE

Application Software Lab Course Title | **AS LAB** Short Title | Course Code

Course Description:

This laboratory course emphasis is on the understanding of the open source Electronics Design Automation (EDA) tool like gEDA, KiCad, Ngspice and Oscad. But only Oscad is capable of doing circuit design, simulation and layout design together. Oscad is free and open source EDA tool and that can be i installed on Ubuntu 12.04 / 12.10 or windows operating system. Using Oscad student can create circuit schematic, analyze the result using simulation, and design PCB layout.

	Hours per	No. of Weeks	Total Hours	Semester Credits
Laboratory	**2**	**10**	**20**	**1**

Total Semester Credits: 1

Prerequisite Course(s): Basic of analog and digital electronics.

LAB COURSE CONTENT

(Note: Minimum FOUR Experiments from each group.)

Group A

1. **Installation of Oscad on Ubuntu 12.04 /12.10 and windows.**

   a. Compare open source, free version and license version operating system.
   b. Find the steps to install Open source Oscad on Ubuntu 12.04 / 12.10 and windows operating system.

2. **Study of Architecture of Oscad.**

   a. Describe the meaning of Electronic Design Automation (EDA) tool.
   b. Describe the advantages and disadvantages of Oscad.
   c. Use of Oscad in circuit making, simulation and PCB design.

3. **Study of schematic creation, simulation and PCB design.**

   a. Describe the steps to use Oscad in schematic creation, simulation and PCB design on Ubuntu or on windows operating system.
   b. Describe the procedure of AC and DC analysis.

4. **Simulation of typical circuit using a) R C b) Diode.**

   a. Develop circuit consist of RC network.
   b. Find voltage and current at each node of circuit and compare with the theoretical calculated value.
   c. Develop circuit consist of diode. Measure voltage and current of diode.
   d. Compare simulated result with the theoretical calculated values.

5. **Simulation of typical circuit using a) Transistor b) MOSFET**

   a. Describe operation and construction simple transistor amplifier.
   b. Simulate the circuit and find I_B, I_C, I_E, and V_{CE}.
   c. Compare simulated result with theoretical calculated values.
   d. Describe operation and construction of simple MOSFET based circuit.
   e. Compares all simulated node voltage and current with theoretical calculated values.

Group B

6. **Simulation and PCB design of typical circuit using IC 555.**

   a. Identify the timer 555 IC pin configuration and its use.
   b. Draw the typical circuit using timer 555 IC.
   c. Find out the time when output is high using RC combination.
   d. Find out the steps to create PCB layout.

7. **Simulation and PCB design of typical circuit using Op-Amp 741 IC.**

   a. Identify the Op-Amp 741 pin configuration and its use.
   b. Draw Inverting or Non-Inverting amplifier using IC 741.
   c. Find out the output voltage and gain of Op-Amp.
   d. Compare the simulated and theoretical calculated values.
   e. Create PCB layout.

8. **Simulation and PCB design of typical circuit using 74xx series IC.**

   a. Describe various IC available in 74xx series
   b. Draw the circuit using 74xx series and verify the truth table.
   c. Create PCB layout.

9. Simulation and PCB design of typical circuit using two stage amplifiers.

a. Describe operation and construction of simple two stage transistor amplifier circuit.
b. Simulate the circuit and find I_B, I_C, I_E, and V_{CE}.
c. Find the AC analysis and compare input and output wave form.
d. Compare simulated result of I_B, I_C, I_E, and V_{CE} of each transistor with theoretical calculated values.
e. Create PCB layout.

10. Simulation and PCB design of simple DC power supply. (DC power supply circuit include transformer- rectifier-filter- regulator.)

a. Draw and describe circuit diagram of simple DC power supply.
b. Describe the use of DC power supply.
c. Measure the voltage and current at each stage of circuit.
d. Create PCB layout.
e. (**Optional**- Implement DC power supply circuit on single side copper clad PCB and compare the all node voltage and current with simulated results).

Reference book-

1) **Oscad**- An open source EDA tool for circuit design, simulation, analysis and PCB design. By "**Kannan M. Moudgalya , IIT Bombay**", Shroff Publication and distributors Pvt. Ltd.
2) **http://oscad.in**

Guide lines for ESE:-

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical out of Group A or Group B. Evaluation will be based on paper work and performance in the practical.

Minor Project

COURSE CONTENT

Minor Project	**MIP**	
Course Title	Short Title	Course Code

Semester-VI

Laboratory	**Hours per**	**No. of Weeks**	**Total Hours**	**Semester Credits**
	2	**10**	**20**	**2**

Examination Scheme
Internal Continuous Assessment (ICA): 50 Marks

- Every student shall undertake the Minor Project in semester VI.
- Each student shall work on an approved project, a group of **05 students (maximum)** shall be allotted for the each minor project.
- Minor project may involve fabrication, design or investigation of a technical problem that may take design, experimental or analytical character or combine element of these areas. The project work shall involve sufficient work so that students get acquainted with different aspects of fabrication, design or analysis.
- Each student is required to maintain separate log book for documenting various activities of minor project.
- The three-member committee appointed by Head of the department shall be constituted for finalizing the topics of minor project. Maximum four minor project groups shall be assigned to one teaching staff.
- Assessment of the project for award of ICA marks shall be done jointly by the guide and departmental committee as per the guidelines given in **Table-A.**
- Before the end of semester, student shall deliver a seminar and submit the seminar report (paper bound copy)in following format:
    - Size of report shall be of minimum 25 pages.
    - Student should preferably refer minimum five reference books / magazines/standard research papers.
    - Format of report
        - Introduction.
        - Literature survey.
        - Theory (Implementation, Methodology, Applications, Advantages, Disadvantages. etc)
        - Future scope.
        - Conclusion.

Assessment of Minor Project

Name of the Project: _____

Name of the Guide: _____

Table-A

SN	Exam Seat No	Name of Student	Project Selection	Documentation	Design /Simulation/Logic	PCB/hardware/programming	Result Verification	Presentation	Total
			5	10	10	10	10	5	50

Seminar-I

COURSE CONTENT

Seminar-I	**S-I**	
Course Title	Short Title	Course Code

Semester-VI

Laboratory	**Hours per Week**	**No. of Weeks**	**Total Hours**	**Semester Credits**
	2	**10**	**20**	**2**

Examination Scheme
Internal Continuous Assessment (ICA): 25 Marks

1. For Seminar-I every student will individually study a topic assigned to him / her and submit a report and shall deliver a short lecture / Seminar on the topic during the term.
2. The three-member committee appointed by Head of the department shall be constituted for finalizing the topics of Seminar-I. Seminar shall be related state of the art topic of his choice approved by the committee.
3. Seminar topic should not be repeated and registration of the same shall be done on first come first serve basis.
4. Topic of Seminar shall be registered within a two week from commencement of VI Semester and shall be approved by the committee.
5. Maximum six seminar supervision shall be allotted to each teacher.
6. Before the end of semester, student shall deliver a seminar and submit the seminar report (paper bound copy).

7. ASSESSMENT OF SEMINAR-I

Assessment of the Seminar-I for award of ICA marks shall be done by the guide and a departmental committee jointly, as per the guidelines given in **Table- B**

Title of Seminar: _____

Name of Guide: _____

Table-B

SN	**Exam Seat No**	**Name of Student**	**Topic Selection**	**Literature survey**	**Report writing**	**Depth of understanding**	**Presentation**	**Total**
			5	5	5	5	5	25

NORTH MAHARASHTRA UNIVERSITY, JALGAON (M.S.)

Syllabus for

Third Year Electrical Engineering

Faculty of Engineering and Technology

COURSE OUTLINE

SEMESTER – V and VI

W.E.F 2014 – 2015

PROGRAM EDUCATIONAL OBJECTIVES. (PEOs)

The Board of Studies in Electrical Engineering of North Maharashtra University, Jalgaon(India) has defined a set of program education objectives. The Program Educational Objectives of Electrical Engineering programs are designed to provide graduates with:

PEO1: Professional Knowledge: Graduates shall acquire the fundamental and advanced knowledge in Electrical Engineering subjects along with additional knowledge about other subjects like Mathematics, Basic Sciences, Inter-disciplinary Engineering, Management and Economics to solve basic and complex engineering problem. Graduates will be able to design system within realistic constraints for sustainable developments.

PEO2: Professional Employability: Graduates will have a successful career in Electrical Engineering. Graduates will succeed in getting the entry-level engineering positions in Generation, Transmission, Manufacturing, Government sectors at regional, national levels and an Entrepreneur.

PEO3: Higher Studies & Life Long Learning: Graduates may pursue their professional development through self learning, advanced degree and continue life-long learning. Graduates will be able to use software and modern engineering tools.

PEO4: Social Engineering: Graduates will aware of social responsibility, ethical values, safety standard, economical and environmental issues so that they serve the society better.

PROGRAM OUTCOMES (POs)

a. An ability to apply knowledge of mathematics, science, and engineering.

b. An ability to design and conduct experiments, as well as to analyze and interpret data.

c. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

d. An ability to function on multidisciplinary teams.

e. An ability to identify, formulates, and solves engineering problems.

f. An understanding of professional and ethical responsibility.

g. An ability to communicate effectively.

h. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.

i. Recognition of the need for, and an ability to engage in life-long learning.

j. Knowledge of contemporary issues.

k. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

l. An ability to work professionally in both software and hardware system areas including the design and realization of such systems.

North Maharashtra University, Jalgaon.

Syllabus Structure For Third Year Electrical Engineering w.e.f year 2014-15

Semester –V

Course Code	Name of the Course	Group	Teaching Scheme				Evaluation Scheme				Total	Credits
							Theory		Practical			
			Theory Hrs /week	Tutorial Hrs /week	Practical Hrs /week	Total	ISE	ESE	ICA	ESE		
	Electrical Machines – II (TH)	D	3	--	--	3	20	80	--	--	100	3
	Power System – II (TH)	D	3	--	--	3	20	80	--	--	100	3
	Power Electronics (TH)	D	3	--	--	3	20	80	--	--	100	3
	Electromagnetic Engineering (TH)	D	3	--	--	3	20	80	--	--	100	3
	Industrial Organization & Management (TH)	C	3	--	--	3	20	80	--	--	100	3
	Electrical Machines –II (LAB)	D	--	--	2	2	--	--	25	25 (PR)	50	1
	Power System -II (LAB)	D	--	--	2	2	--	--	25	25 (PR)	50	1
	Power Electronics (LAB)	D	--	--	2	2	--	--	25	25 (OR)	50	1
	Electrical and Electronic Workshop (LAB)	D	--	--	2	2	--	--	25	--	25	1
	Software Application – I (LAB)	B	1	--	2	3	--	--	50	--	50	2
	Industrial Training/EDP/ Special Study	D	--	--	--	-	--	--	25	--	25	2
	Total		**16**	**--**	**10**	**26**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination ESE: End Semester Examination ICA : Internal Continuous Assessment

North Maharashtra University, Jalgaon.

Syllabus Structure For Third Year Electrical Engineering w.e.f year 2014-15

Semester –VI

Course Code	Name of the Course	Group	Teaching Scheme				Evaluation Scheme				Total	Credits
							Theory		Practical			
			Theory Hrs /week	Tutorial Hrs /week	Practical Hrs /week	Total	ISE	ESE	ICA	ESE		
	Control System – I (TH)	D	3	--	--	3	20	80	--	--	100	3
	Electrical Measurement – II (TH)	D	3	--	--	3	20	80	--	--	100	3
	Electrical Machine Design (TH)	D	3	--	--	3	20	80	--	--	100	3
	Microprocessor & Microcontroller (TH)	D	3	--	--	3	20	80	--	--	100	3
	Entrepreneurship Development (TH)	C	3	--	--	3	20	80	--	--	100	3
	Control System – I (LAB)	D	--	--	2	2	--	--	25	25 (OR)	50	1
	Electrical Measurement – II (LAB)	D	--	--	2	2	--	--	25	25 (PR)	50	1
	Microprocessor & Microcontroller (LAB)	D	--	--	2	2	--	--	25	25 (PR)	50	1
	Software Application – II (LAB)	B	--	--	2	2	--	--	25	--	25	1
	Minor Project	D	--	--	2	2	--	--	50	--	50	2
	Seminar-I	D	--	--	2	2	--	--	25	--	25	2
	Total		**15**	**--**	**12**	**27**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination ESE: End Semester Examination ICA : Internal Continuous Assessment

Course Title	Short Title	Course Code
Electrical Machines – II	**EMC-II**	

Course Description:

This course is an advanced level Electrical Machines-I which will further strengthen the knowledge of the students. The course explores on understanding of construction, basic principles underlying the operation of electrical machines, performance, characteristic and testing of AC Machines, Voltage regulation of synchronous alternator, parallel operation and salient features and characteristic of synchronous motor. It also gives the platform to understand construction, working, performance and application of three phase and single phase motors.

Lectures	Hours/Week	No. of Weeks	Total Hours	Credits
	03	15	42	03

Prerequisite Course(s): Knowledge of Electrical Machine-I at second year Engineering.

General Objectives:

The object of syllabus to impart the fundamental knowledge of Synchronous machines. Students will able to develop their ability to apply the specific procedures for comprehensive treatment of rotating machines. In the earlier stage the machine worked in isolation and its simple analysis was sufficient. Now the electric machines form an integral part of large system comprising of other components as well. The object is not great depth, but presentation through enough to give theory at a level that can be understood by undergraduate. With this beginning, the students will have the foundation to continue his education and able to do better in professional duties in the field of manufacturing, testing operation and control.

Course Outcomes:

After successful completion of this lab students will be able to:

1. Apply basic knowledge of science and engineering to understand electrical machines.
2. Understand construction, concepts, principles of operation, testing and application of synchronous machines, induction motor and special function motors.
3. Understand the behavior of synchronous machine on infinite bus and analyze data for qualitative and quantitative parameters to determine characteristics of machines by performing practical.
4. Perform professional duties in team of manufacturing, testing, operation and maintenance with the sense of safety precautions.
5. Apply knowledge for technological subjects such as utilization of electrical energy, switch gear and machine design for economical and sustainable developments.
6. Do higher studies and able to use updated software and tools for continuous updating of knowledge.

Electrical Machines – II

(Course Contents)

Semester-V **Examination Scheme:**

Teaching Scheme: **(ESE) End Semester Examination: 80 Marks**

Lectures : 3 Hrs/Week **(ISE) Internal Sessional Examination: 20 Marks**

(ESE) End Semester Exam duration: 03 Hours

UNIT-I: Synchronous Alternator-I **09 Hours, 16 Marks**

Principle of generator, construction, excitation system, Arrangement of armature winding, E.M.F. equation , winding factors.

Alternator on- load , effect of armature current ; armature reaction ;resistance drop; Concept leakage reactance, synchronous reactance and synchronous impedance.

Voltage regulation of non salient pole alternator by direct load testing, synchronous impedance method; (e.g. method), m.m.f. method and potier triangle method

UNIT-II: Synchronous Alternator-II **09 Hours, 16 Marks**

Two reaction theory for salient pole machines, direct axis and quadrature axis reactance; their determination by slip test; Voltage regulation of salient pole alternator.

Power: power angle relation for non salient pole machines and salient pole

Parallel operation of alternator: need, conditions and method of parallel operation, Two alternators working in parallel, Effect of changing mechanical torque and excitation. Load sharing between two parallel connected alternators. Alternator on an infinite bus . induction generator

Unit-III: Synchronous Motors: **08 Hours, 16 Marks**

Motor action , phasor diagram on the basis of synchronous impedance, expression for gross mechanical power develop; power flow. Operation with constant load and variable excitation : locus of tip of current phasor under the above condition and v curve

Operation with const. excitation and variable load : locus of tip of current phasor circle phasor. Starting method, hunting and it causes and remedies.

Unit-IV: Poly Phase Induction Machines **08 Hours, 16 Marks**

Type and construction , working principal of induction motor, induction motor as generalized transformer, ,slip, rotor e.m.f. current, power, torque relations, torque slip characteristics, condition for maximum torque ,power stage in induction motor, losses and efficiency circle diagram and computation, Methods of starting of slip-ring and cage rotor induction motor ,varies types of starters, double squirrel cage motors, cogging, crawling of induction motor , Speed control of induction motor.

Unit-V : Single Phase Motor **08 Hours, 16 Marks**

Classification, production of magnetic field, equivalent circuit, production of toque, speed torque characteristic and application of capacitor start induction motor, split phase induction motor, shaded pole induction motor, AC series and universal motor. Comparison of single phase and three phase induction motor.

Special purpose machines:- single phase synchronous motor, repulsion motor, reluctance motor, hystresis motor, and linear induction motor.

Reference Books:

1. E.W.Clayton. "Design and Performance of D.C. Machines"
2. M.G.Say. "Design and Performance of A.C. Machines" CBS Publication
3. Langsdorf, " A.C.Machines," TMH.
4. Nagrath and Kothari "Electric Machine" –TMH
5. S K Bhaticharya, "Electrical Machines" –TMH
6. B. L. Theraja, "Electrical Technology", Vol – II, S. Chand Publucation
7. P. S Bimbhra, "Electrical Machinery" 2/E, Khanna Publishers
8. Ashfaq Husain, "Electrical Machines", Dhanpat Rai & Co
9. V K Mehta and Rohit Mehta, ' Principles of Electrical Machines" S Chand Publication
10. http://nptel.iitm.ac.in

Course Title	Short Title	Course Code
Power System – II	**PS-II**	

Course Description:

Power System-II explores the knowledge of parameter, characteristic and performances of transmission line. The subject emphasis on different faults calculation and concept of load flow analysis.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	**3**	**15**	**42**	**3**

Prerequisite Course(s): Knowledge of Power System-I at second year Engineering.

General Objectives:

The approach has always been to develop the thinking process of students in reaching a sound understanding of broad range of topic in power system area of electrical engineering. The object is to promote the students' interest in learning more about the electric power industry. The object is not great depth, but presentation through enough to give theory at a level that can be understood by under graduate. With this beginning, the students will have the foundation to continue his education and able to do better in professional duties in the field of power system.

Course Outcomes:

After successful completion of this course students will be able to:

1. Apply basic knowledge of science and engineering to understand power system.
2. Describe the role of Power System Engineer and necessity of power system analysis to provide good quality, uninterruptable service to the consumer.
3. Represent synchronous machine, transmission line and power transformer to evaluate the performance of power system.
4. Evaluate reactance of synchronous machine on no load and loaded condition.
5. Analyze the power system in terms of symmetrical and unsymmetrical components to calculate the effect of symmetrical and unsymmetrical faults on power system.
6. Understand the concept of load flow analysis for continuous monitoring of power system by using modern computational techniques.
7. Do higher studies in the field of power system analysis and discharge the professional duties as Power System Engineer for economical development through modern technology.

Power System-II

(Course contents)

Semester-V **Examination Scheme:**

Teaching Scheme: **(ESE) End Semester Examination: 80 Marks**

Lectures : 3 Hrs/Week **(ISE) Internal Sessional Examination: 20 Marks**

(ESE) End Semester Exam duration: 03 Hours

Unit I: Line parameters **09 Hours,16 Marks**

Introduction: Constituents of power system and role, necessity of power system analysis Real, reactive , complex power and its direction.

Line parameters: Inductance of three phase line with equilateral and unsymmetrical spacing, Bundled conductor, parallel circuit lines .

Capacitance of transmission line: capacitance of two wire, capacitance of equilateral and unsymmetrical spacing, effect of earth on the capacitance of three phase transmission line, bundled conductors, parallel circuit three phase line.

Unit II: Representation of power system component and characteristic of transmission line: **09 Hours,16 Marks**

Representation of power system: Single phase representation of balance three phase network, one line diagram, impedance diagram (reactance diagram), per unit system, representation of synchronous machine and power transformer.

characteristic and performance of Long transmission line:equivalent circuit of long line, Ferranti effect, power flow through transmission line method of voltage control, receiving end circle diagram.

Unit III: Symmetrical fault analysis **08 Hours,16 Marks**

Transient on transmission line, short circuit current and reactances of synchronous machine on no load and loaded condition, The bus impedance in fault calculations, algorithm for short circuit studies.

Synthesis of unsymmetrical phasors from their symmetrical components, operators, symmetrical components of unsymmetrical phasors, power in terms of symmetrical components.

Unit IV:- Unsymmetrical faults **08 Hours,16 Marks**

Single line to ground fault (LG) on an unloaded generator , line to line fault (LL)on an unloaded generator, double line to ground fault(LLG)on an unloaded generator, unsymmetrical fault on power systems, Single line to ground fault (LG)on a power system, line to line fault (LL)on a power system , double line to ground fault(LLG)on a power system Faults through impedance, analysis of unsymmetrical faults

Unit V:- Load flow analysis: **08 Hours,16 Marks**

Load flow analysis: Introduction, bus classifications, nodal admittance matrix (YBUS), development of load flow equations, load flow solution using Gauss Seidel and Newton-Raphson method, approximation to N-R method,

Traveling Waves: Introduction to surge Impedance loading and its derivation, Introduction to travelling wave on long transmission line

Reference Books:

1. Kothari & Nagrath, "Modern Power System Analysis" 4th edition Tata Mc. Graw Hill
2. W.D. Stevenson, Jr. " Elements of Power System Analysis", Mc Graw Hill.
3. C.L. Wadhwa, "Electrical Power System", New Age International.
4. Stagg and El-Abiad, "Computer Methods in Power System Analysis" TMH.
5. Hadi Sadat; "Power System Analysis", Tata McGraw Hill.
6. L. P. Singh; "Advanced Power System Analysis & Dynamics", New Age International
7. Chakraborthy, Soni, Gupta & Bhatnagar, "Power System Engineering", Dhanpat Rai & Co.
8. T.K Nagsarkar & M.S. Sukhija, "Power System Analysis" Oxford University Press,2007.
9. http://nptel.iitm.ac.in

Course Title	Short Title	Course Code
Power Electronics	**PE**	

Course Description:

Technology has improved by lips and bounds making the power devices more closely to an ideal switch. Power electronics has already found an important place in modern technology and has revolutionized control of power and energy. As the voltage and current ratings and switching characteristics of power semiconductor devices keep improving, the range of applications continues to expand in areas such as lamp controls, power supplies to motion control, factory automation, transportation, energy storage, multimegawatt industrial drives, and electric power transmission and distribution. The greater efficiency and tighter control features of power electronics are becoming attractive for applications in motion control by replacing the earlier electro-mechanical and electronic systems. Applications in power transmission include high-voltage dc (HVDC) converter stations, flexible ac transmission system (FACTS), and static-var compensators. In power distribution these include dc-to-ac conversion, dynamic filters, frequency conversion, and Custom Power System. The syllabus of Power Electronic deals with constructional and operational characteristic of power semiconductor devices, ac to dc , dc to ac converters, choppers and ac to ac converters.

	Hours per Week	**No. of Weeks**	**Total Hours**	**Semester Credits**
Lecture	**3**	**15**	**42**	**3**

Prerequisite Course(s) : Knowledge first year subject Elements of Electrical & Electronics Engineering and second year subject Analog and Digital Electronic .

General Objectives:

Power Electronics is the art of converting electrical energy from one form to another in an efficient, clean, compact, and robust manner for convenient utilization. The objectives of Power electronic is to create an awareness about the general nature of Power electronic devices, key features of the principal Power Electronic Devices, operational analysis of single phase uncontrolled half wave and full wave rectifiers supplying resistive, inductive, capacitive and back emf type loads. The objectives intended to understand the different configurations of inverters , coppers and cycloconverters.

Course Outcomes:

Upon successful completion of this course the students will be able to:

1. Describe the role of Power Electronics as an enabling technology in various applications such as flexible production systems, energy conservation, renewable energy, transportation etc.
2. Understand the behavior of semiconductor devices operated as power switches.
3. Learn the basic concepts of operation of dc-dc converters in steady state in continuous and discontinuous modes and be able to analyze basic converter topologies.
4. Ability to analyze and design ac-to-dc circuits.
5. Ability to analyze and design dc-to-ac inverters.
6. Design power factor correction (PFC) circuits to draw sinusoidal currents at unity power factor.
7. Understand and design single-phase and three-phase thyristor converters.
8. Ability to design, set up, and test power electronic circuits in the laboratory
9. Learn the role of Power Electronics in utility-related applications which are becoming extremely important.

Power Electronics

(Course Contents)

Semester-V **Examination Scheme:**

Teaching Scheme: **(ESE) End Semester Examination: 80 Marks**

Lectures : 3 Hrs/Week **(ISE) Internal Sessional Examination: 20 Marks**

(ESE) End Semester Exam duration: 03 Hours

UNIT-I: **Modern Power Semi-conducting Devices** **09 Hours, 16 Marks**

Thyristors: Introduction, Basic Structure, Operating Characteristics of SCR (Static Characteristics and Dynamic Characteristics during Turn-on and Turn-off), Thyristor Turn-on Methods, Thyristor Protection, di / dt , dv/dt Protection, Design of Snubber Circuits,

Introduction, Basic Structure, ON-OFF Control and Operational characteristics and Applications: DIAC, TRIAC, Gate turn-off thyristor (GTO), PUT, Light Activated thyristor (LASCR), MOS Controlled Thyristors (MCT)

UNIT-II: **Firing circuits, Commutation Techniques, Multi-Connections of SCRs**

09 Hours, 16 Marks

Introduction, Basic Structure, ON-OFF Control and Operational characteristics and Applications Insulated Gate Bipolar Transistor (IGBT), Metal- Oxide Field Effect Transistor (MOSFET), MOS Controlled Thyristors (MCT),

Gate Triggering Circuits/ Firing circuits: R, RC firing circuits(half wave and full wave firing circuits), Ramp and Pedestal triggering,

Commutation Techniques/ Turn-off methods: Forced and Natural, Classification of Forced Commutation- Class A, Class B, Class C, Class D, Class E, Class F

Multi-Connections of SCRs: Series, Parallel connection, String Efficiency

Unit-III: Full Wave controlled Rectifiers **08 Hours, 16 Marks**

Single phase Full Wave Bridge Rectifiers (B-2) connection: With Resistive and Inductive load (R-L load in rectifying and inverting mode), Single phase Full Wave Mid-point converters(Rectifiers) (M-2) connection: With Resistive and Inductive load (R-L load in rectifying and inverting mode), Single phase Symmetrical and Asymmetrical Semiconverters (Half Controlled Bridge Circuits): With Resistive and Inductive load, Three phase Full Wave Full-Controlled Bridge Rectifiers (B-6) connection: With Resistive and Inductive load, Effect of Source Impedance and Effect of Overlap angle (Single phase and Three phase Full Wave Full-Controlled Bridge Rectifiers)

UNIT-IV: **Inverters** **08 Hours, 16 Marks**

Inverters classification, Series inverter, Single Phase Parallel inverter, Single Phase Half Bridge and Full Bridge Voltage Source Inverters (With Resistive and Inductive load), Harmonic reduction, Three Phase Bridge Inverters (180-Degree and 120-Degree mode Voltage source inverters)

Dual Converters: Principle of Operation Ideal and Non-ideal, Dual Converters With and Without circulating current Schemes

Cycloconveters: Principle, Single Phase Cycloconveters

Unit-V: **Choppers** **08 Hours, 16 Marks**

Principle of Operation, Step Down, Step Up Chopper, Multi-Phase Choppers, AC Choppers, Chopper Configuration: Class A, Class B, Class C, Class D, Class E,

AC Regulators**:** Single Phase Half and Full wave with Resistive and Inductive load, Three Phase AC regulators

Speed Control of DC motors: Chopper fed Separately Excited DC motors and DC Series Motors

Reference Books:

1. M. Rashid, "Power Electronics", PHI Pub.
2. M.D. Singh and Khanchandani, "Power Electronics", TMH Pub.
3. M. Rammamurty, "An Introduction to Thyristors and its Applications", East-West Press
4. Mohan , Undeland and Riobbins, "Power Electronics", Wiley India Pvt. Ltd.
5. L Umanand, "Power Electronics Essentials & Applications", Wiley India Pvt. Ltd.
6. P S Bhimbra, "Power Electronic" Khanna Publishers
7. http://nptel.iitm.ac.in

Course Title	Short Title	Course Code
Electromagnetic Engineering	**EME**	

Course Description:
Electromagnetic field theory is an important fundamental course with great academic relevance progress in this exciting theory has made possible the advent of many technologies, such as wireless communication, antennas and wave propagation, micro wave engineering, etc. Interference and electrical noise problems that affect industry can also be better understood and their solutions can be provided using field theory.

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	**3**	**15**	**42**	**3**

Prerequisite Course(s): knowledge of H.S.C. and first year subject Elements of Electrical & Electronics Engineering.

General Objectives: Electromagnetic field theory is the subject of great research, academic and industrial importance and has a large number of applications**.** The objectives to understand basic concepts of static electric field and its associated quantities, Know the boundary condition particularly a boundary between conducting material and free space. The course also deals with significance of moving charges, force between two current carrying conductors, time varying field and radiation and antennas.

Course Outcomes:
Upon successful completion of this course the students will be able to:

1. Apply basic concepts of scalars and vector quantities to evaluate the impact of electromagnetic fields.
2. Understand the basic concepts of static electric field and its associated quantity to evaluate the force between two point charges using Coulomb's Law.
3. Know the boundary condition, particularly a boundary between conducting material and free space.

a. Use Poisson's and Laplacian equations to calculate potential, capacitance and electric field.

4. Understand the magnetization principle and Biot-savart law and its importance.
5. Analysis how a time varying magnetic field induces an electric field and apply Maxwell's equation for analysis of static , dynamic field conditions.
6. Understand of different antennas, parameters, principle pattern multiplication

Electromagnetic Engineering

(Course contents)

Semester-V **Examination Scheme:**

Teaching Scheme: **(ESE) End Semester Examination: 80 Marks**

Lectures : 3 Hrs/Week **(ISE) Internal Sessional Examination: 20 Marks**

(ESE) End Semester Exam duration: 03 Hours

Unit – I: **Electrostatics** **09 Hours, 16 Marks**

a. Coulomb's Law, Concept of electric field and field due to point charge.
b. Concept of volume charge density: electric field due to line charge, sheet of charge
c. Electric flux-density, Gauss's law and Divergence theorem
d. Energy expanded in moving a point charge in electric field, Concept of potential difference between two points and potential due to point charge
e. Potential-gradient and relationship between electric field and potential

Unit – II: **Dipoles, Conductors, Dielecrics And Capacitance** **09 Hours, 16 Marks**

b. Dipole and its electric field and dipole-moment, Energy-density in electrostatic field
c. Concept of current-density, Current continuity equation, properties of conductors
d. Boundary conditions between conductor and free-space, Boundary conditions between two perfect dielectrics
e. Capacitance between parallel plates, co-axial cable and spherical shells, Energy stored in capacitors
f. Poisson's and Laplace's equations to calculate potential, capacitance and electric field

Unit – III: **Magnetostatics** **08 Hours, 16 Marks**

a. Biot-savart law and its vectorial form
b. Ampere's circuital law and its applications to co-axial law
c. Curl operator, magnetic flux-density.
d. Scalar and Vector magnetic potential
e. Magnetic flux-density, Stoke's theorem
f. Lorentz's force equation, Energy stored in magnetic field

Unit – IV: **Time Varying Fields** **08 Hours, 16 Marks**

a. Maxwell's equations in integral and differential form in time-varying fields, free-space, phasor form
b. Uniform plane-wave, Wave motion in free-space, perfect conductor, skin-effect
c. Wave motion in perfect dielectric and lossy dielectric medium
d. Poynting theorem

e. Reflection of uniform plane wave by perfect dielectric (Normal and oblique incidence)
f. Reflection of uniform plane wave by perfect conductor (Normal and oblique incidence)

Unit – V: **Radiation and Antennas** **08 Hours, 16 Marks**

a. Antenna fundamentals: Radiation intensity, Directive gain and Directivity, Power gain and efficiency, Effective length, Effective aperture, Radiation resistance
b. Reciprocity between transmitting and receiving antennas
c. Vector retarted potential, Radiation pattern
d. Antenna Arrays: Broadside arrays, End-fire Array, Binomial Array, Tchebyscheff Array
e. Principle of pattern multiplication
f. Types of Antennas: Folded dipole, Yagi-Uda Antenna, Horn Antenna, Parabolic and Cassegain Antenna

Reference Books:

1. W.H. Hyat, "Engineering Electromagnenic", Tata Mc Graw Hill.
2. S. P. Seth, "Elements of Electromagnetic fields", Dhanpat Roy and Sons
3. R G Kaduskar, " Principles of Electromagnetics", Publication- Wiley
4. Gottapu Sasibhushana Rao, " Electromagnetic Field Theory and Transmission Lines", Publication- Wiley
5. Edward C. Jordan & K. G. Balmain, Electromagnetic Waves & Radiating Systems Second Edition, PHI
6. K.D. Prasad, Antenna and Wave Propagation, Satya Publication
7. http://nptel.iitm.ac.in

Course Title | Short Title | Course Code

Industrial Organization & Management | **IOM**

Course Description:

The course explores concepts of management and functioning of organizations. It introduces both theoretical concepts and empirical applications, focusing particularly on production industries. Management studies have influenced every aspect of business thinking and planning. Apart from this, it also influenced our day-today lives in the form of technological advancements. The syllabus explores the knowledge of principle of management, financial management, human resource management, operational management and marketing management.

	Hours per Week	No. of Weeks	Total Hours	Semester
Lecture	**3**	**15**	**42**	**3**

Prerequisite Course(s) : knowledge basic science and Electronics Engineering .

General Objectives: This subject is designed to expose the students to fundamental concepts of management, its processes and behavioral dynamics in organizations. It will also look at recent developments in business in the context of economic theory. It also aims at making students understand concepts, philosophies, and processes of managing the marketing & financial operations of a firm.

Course Outcomes:

Upon successful completion of this course the students will be able to:

1. Understand various aspects of management.
2. Understand the concepts of human resource management, marketing management, financial management, production and operation management.
3. Estimate the financial feasibility of business and identify the various sources of financing Understand different industrial laws in views of safety, pollutions and societal developments.
4. Discharge professional duties in field of manufacturing and operational management.
5. Function on multidisciplinary teams and able to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
6. Do higher study in various new disciplines in the area of management like entrepreneurs in view of economic objectives of country, such as industrial development, regional growth, employment generation and development.

Industrial Organization & Management

(Course Contents)

Semester-V **Examination Scheme:**

Teaching Scheme: **(ESE) End Semester Examination: 80 Marks**

Lectures : 3 Hrs/Week **(ISE) Internal Sessional Examination: 20 Marks**

(ESE) End Semester Exam duration: 03 Hours

UNIT I: Principles of Management **09 Hours, 16 Marks**

a. Basic Concepts: Definition, Nature, Importance, Management: Art and Science & as a Profession, Management Vs Administration, Evolution of Management: Introduction to Scientific Management by Taylor, Administrative, Management by Fayol, Contribution of Peter Drucker, Levels & Functions of Management, Forms of Business Organization.

b. Approaches to Management: Decision Theory Approach, Contingency Approach, Systems Approach.

c. Organization: Formal & Informal, Line & Staff relationship, Centralization vs. Decentralization, Span of Management, Departmentation, MBO.

UNIT II:- Managerial Economics: **09 Hours, 16 Marks**

a. Introduction:Meaning & Scope of Economics, Basic Theories, Law of Demand & Supply, Elasticity of Demand & Supply.

b. Consumer Theories: Meaning of Utility & Law of Diminishing Utility.

c. Cost Concepts: Opportunity Costs, Sunk Costs, Marginal Cost, Total & Variable Costs, Fixed Costs, Contribution, Law of Diminishing Return.

UNIT III: Operational Management **08 Hours, 16 Marks**

a. Plant location and layout: Factor affecting plant location, different type of plant layout, CPM PERT, quality control manufacturing system, store and inventory control

b. Work study –techniques of work study method study, work measurement, different charts and diagrams used in method study.

UNIT IV: Human Resource Management **08 Hours, 16 Marks**

a. Human resource planning, Recruitment, Selection, Placement & Induction, Performance Appraisal & Development, Employee Training, Internal & External Mobility & Retention Management, Wage & Salary Administration, Fringe Benefits & Incentives Payments, Collective Bargaining, Performance appraisal , compensation

b. Industrial Laws: The factories Act 1947, The Workmen's Compensation Act 1923, Maternity Benefit Act The Payment of Wages Act 1936, The Apprentices Act 1961, industrial safety, prevention of accidents pollution control act

UNIT V: Marketing Management & Financial Management 08 Hours, 16 Marks

a. Introduction to Marketing: Concept of Market, Types of Market, Definition, Nature & Scope of Marketing, Marketing Approaches, Marketing Process, Functions of Marketing Management, 7 P's of Marketing. Advertising media of advertising market forecasting.

b. New trends in Marketing: Green Marketing, e- marketing & Viral Marketing.

c. Introduction to Financial Management: Meaning, Nature & Scope of Financial Management, Capital Structure, Types & Sources of Finance, Money Market & Capital Market, Role of Financial Institutions in Industry.

Reference Books:

1. O P Khanna, "Industrial Engineering Managements"
2. L.M.Prasad, "Principles of Management", Himalaya Publications Ltd
3. D.N. Dwivedi, "Managerial Economics", Vikas Publications
4. S.Chand by S.S.Khanka "Human resource Management"(Text & Cases),
5. P.Subba Rao "Essentials of HRM & IR" (Text, Cases & Games), Himalaya Publishing House
6. R.S.N. Pillai, Bhagavathi , "Legal Aspects of Business" (Mercantile Laws including Industrial & Company Laws)
7. Philip Kotler, "Marketing Management", Tata McGraw Hill
8. Ravi M. Kishor, "Financial Management", Taxmann Publication.

Course Title	Short Title	Course Code
Electrical Machines – II Lab	**EMC – II Lab**	

Course Description:

In this laboratory course emphasis on imparting the practical knowledge and understanding of basic principles, determination of characteristic , performance and testing of AC Machines, Voltage regulation of synchronous alternator. Application of single phase motors

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Practical	**2**	**15**	**28**	**1**

Prerequisite Course(s): Knowledge of Electrical Machine-I at second year Engineering.

General Objectives:

The objective of the laboratory is to impart the fundamental knowledge of Synchronous machine and AC motors. Students will able to develop their ability to apply the specific procedures for analyze the experimental results. The students will able to understand the characteristic of Synchronous alternator and motor, application in process and manufacturing. Application of different methods to find voltage regulation of synchronous alternator. In this lab course, students will be familiar with the use of different equipments, safety precautions on work place. This makes bridge on theoretical knowledge and practical practices.

Course Outcomes:

After successful completion of this lab course students will be able to:

1. Apply basic knowledge of science and engineering to understand electrical machine
2. Understand construction, concepts, and principles of operation, testing of synchronous machines and special function motors.
3. Analyze data for qualitative and quantitative parameters to determine characteristics of machines by performing practical
4. Apply knowledge for technological subjects such as utilization of electrical energy, switch gear & protection, manufacturing processes and safety precautions.
5. Discharging duties in technical field for economical, societal and sustainable developments.
6. Do higher studies and able to use updated software and tools for continuous updating of knowledge.

Electrical Machines-II Lab

(Lab Course Contents)

Semester-V **Examination Scheme:**

Teaching Scheme: **(ICA) Internal Continuous Assessment: 25 Marks**

Practical : 2 Hrs/Week **(ESE) End Semester Examination(PR): 25 Marks**

Teacher should facilitate learning following lab experiments:

1. Determination of voltage regulation and efficiency of three phase alternator by direct load test.
2. Open and short circuit test on three phase alternator: determination of its regulation by e.m.f. method and m.m.f. method.
3. Zero power factor test on three phase alternator: determination of regulation by Potier trangle method.
4. Determination of direct axis and quadrature axis reactance by slip test on synchronous machine. Determination of voltage regulation by two reactance theory.
5. Synchronizing alternators: lamp methods and use of synchroscope.
6. Synchronous alternator on infinite bus: behavior of machine under change in mechanical power and excitation.
7. Characteristic of synchronous motor at constant load and variable excitation.
8. Characteristic of synchronous motor at constant excitation and variable load.
9. Determination of performance of three phase induction motor by direct load test.
10. Determination of performance of three phase induction motor by no load, blocked rotor test and construction of circle diagram.
11. No load and blocked rotor tests on capacitor start single phase induction motor and determination of parameters of equivalent circuit.
12. Load test on single phase induction motor.
13. Speed control of three phase Slip Ring Induction Motor.

Note: Lab file should consist of minimum **Eight** experiments.

Guide lines for ICA :

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guide lines for ESE:-

In ESE the student may be asked to perform any one practical. Evaluation will be based on paper work , performance and oral in the practical examination.

Course Title	Short Title	Course Code
Power System – II Lab	**PS – II Lab**	

Course Description:
Power System-II explores the knowledge of parameter, characteristic and performances of transmission line. The subject emphasis on different faults calculation and concept of load flow analysis.

Practical	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	2	**15**	**28**	**1**

Prerequisite Course(s): Knowledge of Power System-I at second year Engineering.

General Objectives: The approach has always been to develop the thinking process of students in reaching a sound understanding of broad range of topic in power system area of electrical engineering. The object is to promote the students' interest in learning more about the electric power industry. The object is not great depth, but presentation through enough to give theory at a level that can be understood by under graduate. With this beginning, the students will have the foundation to continue his education and able to do better in professional duties in the field of power system.

Course Outcomes:
After successful completion of this lab students will be able to:

1. Apply basic knowledge of science and engineering to understand practical behavior of power system.
2. Describe the role of Power System Engineer and necessity of power system analysis to provide good quality, uninterruptable service to the consumer.
3. Evaluate the performance of long and medium transmission line using ABCD parameter, and effect of Var compensation on voltage profile.
4. Evaluate reactance of synchronous machine on no load and loaded condition.
5. Analyze the power system in terms of symmetrical and unsymmetrical components to calculate the effect of symmetrical and unsymmetrical faults on power system.
6. Understand the concept of load flow analysis for continuous monitoring of power system by using modern computing tools.
7. Do higher studies in the field of power system analysis and discharge the professional duties as Power System Engineer for economical development through modern technology.

Power System-II Lab

(Lab Course Contents)

Semester-V **Examination Scheme:**

Teaching Scheme: **(ICA) Internal Continuous Assessment: 25 Marks**

Practical : 2 Hrs/Week **(ESE) End Semester Examination(PR): 25 Marks**

Teacher should facilitate learning following lab experiments:

1. Measurement of ABCD parameters of a medium transmission line.
2. Measurement of ABCD parameters of a long transmission line.
3. Plotting of receiving end circle diagram to evaluate performance of medium transmission line.
4. Study of the effect of VAR compensation on the profile of receiving end voltage using capacitor bank.
5. Static measurement of sub-transient reactance of a salient-pole alternator.
6. Measurement of sequence reactance of a synchronous machine.
7. Determination of steady state power limit of a transmission line.
8. Unsymmetrical fault analysis for LL,LG, LLG FAULT ON A.C / D.C network analyzer
9. Formulation and calculation of Y- bus matrix of a system using software.
10. Solution of a load flow problem using Gauss-Seidal method using asoftware.
11. Solution of a load flow problem using Newton-Raphson method using software.
12. Unsymmetrical fault analysis of a 3-bus system using a software.
13. Calculation of inductance and capacitance for symmetrical and unsymmetrical configuration of transmission line using software.

Note: Lab file should consist of minimum **Eight** experiments out of eight experiments any two experiments using professional software such as MALAB, Matpower,PSIPCE etc.

Guide lines for ICA :

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guide lines for ESE:-

In ESE the student may be asked to perform any one practical. Evaluation will be based on paper work , performance and oral in the practical examination.

Course Title	Short Title	Course Code
Power Electronics Lab	**PE Lab**	

Course Description:

The greater efficiency and tighter control features of power electronics are becoming attractive for applications in motion control by replacing the earlier electro-mechanical and electronic systems. Applications in power transmission include high-voltage dc (HVDC) converter stations, flexible ac transmission system (FACTS), and static-var compensators. In power distribution these include dc-to-ac conversion, dynamic filters, frequency conversion, and Custom Power System.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Practical	**2**	**15**	**28**	**1**

Prerequisite Course(s) : Knowledge first year subject Elements of Electrical & Electronics Engineering and second year subject Analog and Digital Electronic .

General Objectives:

Power Electronics is the art of converting electrical energy from one form to another in an efficient, clean, compact, and robust manner for convenient utilization. The objectives of Power electronic is to create an awareness about the general nature of Power electronic devices, key features of the principal Power Electronic Devices, operational analysis of single phase uncontrolled half wave and full wave rectifiers supplying resistive, inductive, capacitive and back emf type loads. The objectives intended to understand the different configurations of inverters , coppers and cycloconverters.

Course Outcomes:

Upon successful completion of this course the students will be able to:

1. Understand the behavior of semiconductor devices operated as power switches.
2. Learn the basic concepts of operation of dc-dc converters in steady state in continuous and discontinuous modes and be able to analyze basic converter topologies by conducting practical.
3. Ability to analyze the performance of ac-to-dc circuits and dc-to-ac inverters.
4. Understand and design single-phase and three-phase thyristor converters.
5. Ability to design, set up, and test power electronic circuits in the laboratory
6. Learn the role of Power Electronics in utility-related applications which are becoming extremely important.

Power Electronics - Lab

(Lab Course Contents)

Semester-V **Examination Scheme:**

Teaching Scheme: **(ICA) Internal Continuous Assessment: 25 Marks**

Practical : 2 Hrs/Week **(ESE) End Semester Examination(OR): 25 Marks**

Teacher should facilitate learning following lab experiments:

1. Triggering Circuit of SCR
2. Characteristics of SCR,MOSFET,
3. Commutation circuit class C, class D
4. Single phase full wave controlled rectifiers R, R-L characteristics
5. Single phase semi-converter
6. Three phase full wave controlled rectifiers
7. Step up chopper
8. Step down chopper
9. Series and parallel inverter
10. Three phase inverter

Note: Lab file should consist of minimum **Eight** experiments.

Guide lines for ICA :

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guide lines for ESE:-

In ESE the student may be asked questions on practical. Evaluation will be based on answers given by student in oral examination.

Course Title	Short Title	Course Code
Electrical and Electronic Workshop	**EEW Lab**	

Course Description:

This course provides the basic practical knowledge about the electrical electronics engineering. The course includes the study of different electrical symbols, electrical shocks and safety precautions, equipments used for the measurement and testing of electrical and electronics devices, different types of electronic circuits, The course may includes visit to the electrical industries or power plant for the enhancement of practical knowledge.

	Hours per Week	No. of Weeks	Total Hours	Semester
Practical	**2**	**15**	**28**	**1**

Prerequisite Course(s) : knowledge of H.S.C. and first year subject Elements of Electrical & Electronics Engineering .

General Objectives:

The objective of the course is to provide knowledge about practical practices used in electrical engineering. This course will help students to use various tools for measurement and testing of electrical apparatus. The subject provides scope for practical applications of electrical engineering. The course will also help students to use and implement efficient and techno commercial aspect of maintenance and installation.

Course Outcomes:

Upon successful completion of this course the students will be able to:

1. Understand various electrical symbols and their use in electrical electronics drawing.
2. Familiar with the safety precautions and practices while working in industrial and domestic premises.
3. Understand various maintenance schemes such as preventive, breakdown maintenance.
4. Select correct size and type of cables and wires for different applications.
5. Use different types of measuring instrument and instrumentation and testing equipments.
6. Select correct rating of fuse and MCB for protection scheme and safety.
7. Discharge the professional duties in technical field of maintenance and installation.

Electrical and Electronics Workshop

(Lab Course contents)

Semester: V **Examination Scheme:**

Teaching Scheme: **(ICA) Internal Continuous Assessment: 25Marks**

Practical: 2 Hrs/Week

Teacher should facilitate learning following lab experiments:

1. Details and Layout of DC Armature Windings.
2. Details and Layout of AC Armature Windings.
3. Study of substation equipment:
   a. Classification and use of Lightening arrester
   b. Different type of isolators.
   c. Substation earthing
4. Transformer
   a. Standard rating, vector group of power transformer.
   b. Standard rating of instrument transformer
   c. Class of accuracy for instrument transformer.
5. Study of Starters:
   a. Three phase induction motor starter.
   b. Study of three phase induction motor reverse forward starter.
6. Study of different contactor ,relay and timer with switching demonstration.
7. Study of automatic star delta and soft starter for three phase induction motor.
8. Study and Testing of:
   a. Diode
   b. BJT
   c. MOSFET
   d. IGBT
9. Study of Electronic ballast and fan regulator:
10. Fabrication of single phase capacitor filter rectifier circuit. Or fabrication of any small electronic circuit for domestic and commercial application.

Note: The term work should include a minimum **eight** experiments. Workshop practical practices should be based on above mentioned topics.

Guide lines for ICA :

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Reference Books:

1. A. K .Sawhney, Electric Machine Design Tenth Edition, Danpat Ray and Sons.
2. L Umanand, " Power Electrical Essential and Application", Willey Publication.
3. S L Uppal, "Electrical Wiring, Estimation and Costing"
4. Surjit Singh, "Electrical wiring, Estimation and Costing"
5. S K Bhattacharya, "Electrical wiring, Estimation and Costing"
6. B R Gupta, "Electrical Wiring, Estimation and Costing"

Course Title	Short Title	Course Code
Software Application-I	**SA-I**	

Course Description:
The objective of this course is to introduce the students to the fundamental concepts of MATLAB and enable them to apply these concepts for solving real world problems. This course includes the basic structure and statements required for simple mathematical problems in MATLAB. This course provides the basic concepts of plot and other useful tools required to solve the problems.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	**1**	**15**	**14**	**2**
Practical	**2**	**15**	**28**	

Prerequisite Course(s): Knowledge of mathematics and subject computer programming at first year engineering.

General Objectives: The objective of the course is to provide students with the essential knowledge of C language and MATLAB programming. This course will help students to use various modern tools for solving the problems of electrical engineering. The subject provides scope for practical applications of electrical engineering. The course will help students to analyze the electrical systems using the software. The course provides the effective approach for the higher studies in the efficient system design.

Course Outcomes:
Upon successful completion of this course the students will be able to:

1. Know use of the appropriate statements available in the C and C++ language and MATLAB.
2. Implement small and medium programs of varying complexity using the most commonly used features of the language.
3. Employ good programming style, standards and practices during program development.
4. Solve the different numerical techniques and perform Matrix operations.
5. Understand and use of MATLAB for solving simple mathematical problems.
6. Plot simple, 2-D and 3-D plots using MATLAB.
7. Use modern engineering tools in MATLAB which are useful for analyzing and designing of electrical power system.

Software Application-I

(Course Contents)

Semester-V **Examination Scheme:**

Teaching Scheme:

Lectures : 1 Hrs/Week

Unit-I Introduction to Matlab **03 Hours**

1. Standard Matlab windows
2. Operations with variables : naming ,checking existence, clearing and operations
3. Arrays : columns and rows: creation and indexing , size & length , multiplication, division, power and operations

Unit-II Writing script **02 Hours**

1. Writing script files : logical variables and operators , flow control and loop operators
2. Writing functions : input/output arguments , function visibility, path and Matlab startup.
3. Simple graphics : 2D plots and figures and subplots

Unit-III Data and data flow in Matlab **02 Hours**

1. Data types: Matrix, string, cell and structure, creating, accessing elements and manipulating of data of different types.
2. File Input-Output: Matlab files , text files , binary files , mixed text-binary files

Unit-IV Function minimization and parameters search. **02 Hours**

Polynomial fit : 1D and 2D fits , Data windowing , Error bounds

Unit-V Handle graphics and user interface **03 Hours**

Pre-defined dialogs: handle graphics : graphics objects , properties of objects and modifying properties of graphics objects

Reference Books:

1. Rudra Pratap, "Getting Started With Matlab: A Quick Introduction For Scientists And Engineers" Oxford University Press.
2. Dr. Shailendra Jain, "Modeling & Simulation using MATLAB-Simulink", Wiley India.
3. Yashavant Kanetkar, "Let Us C", BPB Publications, 10/E, 2010.
4. Stephen G Kochan "Programming in C", Pearson Education, 3/E, 2004.
5. Using MATLAB, Version 6, The Math Works, Inc., 2000.
6. MATLAB function reference, The Math Works, Inc., 2000.
7. Using MATLAB Graphics, Version 6, The Math Works, Inc., 2000.
8. MATLAB Release Notes for Release 12, The Math Works, Inc., 2000.

Software Application-I
(Lab Course Contents)

Semester-V **Examination Scheme:**

Teaching Scheme: **(ICA) Internal Continuous Assessment: 50 Marks**

Practical : 2 Hrs/Week

Teacher should facilitate learning following lab experiments:

1. A. Simple Arithmetic Calculation: Perform simple arithmetic calculations: Addition, subtraction, multiplication, division and exponentiation.
   B. Assign values to variables.
   C. Suppress screen output.
   D. Control the appearance of floating point numbers on the screen.
2. A. Compute the Y-Coordinates of line with given slope m and the intercept c at the x coordinates.
   B. Create a vector t with 10 elements: 1, 2, 3,……., 10 and compute the following quantities: X= t sin(t), Y=(t-1)/(t+1), Z=$\sin(t^2)/ t^2$
   C. Create Matrices, Vectors for finding the size of matrices and perform the addition, subtraction, multiplication, transpose and inverse operation.
3. Create : Simple sine plot, line plot, an exponentially decaying sine plot, space curve, log scale plot, Overlay plot and Fancy plots.
4. Create Polynomial curve fit and compare different fits.
5. A. Create a line along with an explicit handle and then use set command to change the line style, its thickness, and values of some y-coordinates.
   B. Write some text at a specified position, create its handle, and then use the set command to change the font size, font, and string of the text.
6. Study of different types of errors.
7. Write program to find voltage and power in voltage divider circuit.
8. Write a program to calculate voltage across any resistance in a circuit.
9. Write a program to find transient response in RC circuit.
10. Write a program to find transient response in RL circuit.
11. Write a program to plot voltage and current in resistive circuit.
12. Write a program to plot voltage and current in inductive and capacitive circuit.

Note: Lab file should consist of minimum **Eight** experiments.

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and assignment submitted by the student in the form of journal.

Course Title | Short Title | Course Code

Industrial Training/EDP/Special Study | IT/EDP/SS

Course Description:

Industrial training and special study is very essential for understanding the latest advancement in electrical engineering. It makes bridge between theoretical knowledge and its implementation. The industrial training provides platform to understand general organization and its functions.

	Semester Credits
Two week Industrial Training/One week EDP/ Special Study	**2**

Course Objectives:

The objective of industrial training is to prepare students to work on multidisciplinary team. Student will be able to understand the use of modern tools and technique for testing and maintenance in electrical utilities.

Course outcomes:

Upon successful completion of industrial training/special study students will be able to:

1. Understand basic organizational structure of industry.
2. Work on multidisciplinary teams and understand the impact of engineering solutions in a global, economic, environmental, and societal context.
3. To analyze the different types of Case studies and Estimate the financial feasibility of project.
4. To develop Innovative ideas and implement the theoretical concepts in practical fields.
5. Use latest testing and measuring instrument and safety precaution at work place.
6. Communicate effectively and able to write detailed project report.

Industrial Training/EDP/Special Study

(Course Content)

Semester: V **Examination Scheme:**

Teaching Scheme: **(ICA) Internal Continuous Assessment: 25Marks**

Industrial Training

- Student shall undergo industrial training for a minimum period of **two weeks** during summer vacations between fourth semester and fifth semester.
- The industry in which industrial training is taken should be a medium or large scale industry
- The paper bound report on training must be submitted by the student in the beginning of Fifth semester along with a certificate from the company where the student took training.
- Every student should write the report separately.
- Institute / Department/T&P Cell have to assist the students for finding Industries for the training.
- Students must take prior permission from Department before joining for Industrial Training.

OR

EDP (Entrepreneurship Development Program)

- Student has to participate in Entrepreneurship Development Program for a minimum period of **One week** during summer vacations between fourth semester and fifth semester.
- Every student must submit the paper bound report based on the program in the beginning of Fifth semester along with a certificate (Course / Program completion) from the program organizers.
- Every student should write the report separately.
- Institute / Department may arrange Entrepreneurship Development Program at their campus.
- Students must take prior permission from Department before attending any Entrepreneurship Development Program.

OR

Special Study

- Student has to submit name of three topics of his interest to the department.
- Special study in a group shall not be allowed.
- The three-member committee appointed by Head of Department shall allot one topic out of the three topics submitted by the student.
- Every student must submit the paper bound report based on special study at the end of Firth semester.
- Department should allot guide to all such students, for monitoring their progress

and guide them for literature survey / report writing etc.

- Evaluation of special study shall be done based on presentation made by student, followed by brief question answer session.

Evaluation of Industrial Training / EDP / Special Study

ICA: The Internal Continuous Assessment shall be based on the active participation of the students in the training / EDP / Special study and based on knowledge / skill acquired by the student. The three-member committee appointed by Head of Department shall assess the reports and award marks based on following:

(a) Report	10 marks.
(b) Presentation	10 marks.
(c) Viva-voce at the time of presentation	05 marks.
Total:	**25 marks.**

NORTH MAHARASHTRA UNIVERSITY,

JALGAON (M.S.)

Syllabus for

Third Year Electrical Engineering

Faculty of Engineering and Technology

COURSE OUTLINE

SEMESTER –VI

W.E.F 2014 – 2015

Course Title	Short Title	Course Code
Control System-I	**CS-I**	

Course Description:

The study of Control System Engineering is essential for the students of Electrical, Electronics, Mechanical, Aerospace & Chemical Engineering. It has applications ranges from Electrical Power System to process Control System. The course explores the knowledge of basic control systems, control system components, mathematical modeling, time response & frequency response analysis. The course also deals in concept of design & its preliminary consideration.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	**3**	**15**	**42**	**3**

Prerequisite Course(s): Mathematics and electrical engineering subject

General Objectives:

Control system engineering is an exciting field in which to apply engineering talents. The object of course to derive mathematical modeling , transfer –functions, time response and frequency response. The objectives are to find transient response and steady state error in given system.

Course Outcomes:

Upon successful completion of this course the students will be able to:

1. Apply basic mathematical for modeling of control system and responses of first and second order system.
2. Describe the role of control system as an enabling technology in various applications such as in power systems, automation, renewable energy, etc.
3. Understand the response of control system subjected to different input signals, design, set up, and test control system in the laboratory.
4. Analyze and design open and closed control system.
5. Design dc servo motor and stepper motor to meet the characteristics of control system application.
6. Become proficient with computer skills (e.g., PSPICE and MATLAB) for the simulated analysis and design of control system and able to use control system in utility-related applications .

Control System -I

(Course Contents)

Semester-VI **Examination Scheme:**

Teaching Scheme: **(ESE) End Semester Examination: 80 Marks**

Lectures : 3 Hrs/Week **(ISE) Internal Sessional Examination: 20 Marks**

(ESE) End Semester Exam duration: 03 Hours

Unit –I **09 Hours, 16 Marks**

The Control System:

Open loop & closed control; servomechanism, Physical examples. Transfer functions, Block diagram algebra, Signal flow graph, Mason's gain formula Reduction of parameter variation and effects of disturbance by using negative feedback

Unit –II **09 Hours, 16 Marks**

Time Response analysis:

Standard test signals, time response of first and second order systems, time response specifications, steady state errors and error constants. Design specifications of second order systems: Derivative error, derivative output, integral error and PID compensations, design considerations for higher order systems, performance indices

Unit –III **08 Hours, 16 Marks**

Control System Components:

Constructional and working concept of ac servomotor, synchros and stepper motor. Stability and Algebraic Criteria concept of stability and necessary conditions, Routh-Hurwitz criteria and limitations. Root Locus Technique: The root locus concepts, construction of root loci

Unit –IV **08 Hours, 16 Marks**

Frequency response Analysis:

Frequency response, correlation between time and frequency responses, polar and inverse polar plots, Bode plots

Stability in Frequency Domain: Nyquist stability criterion, assessment of relative stability: gain margin and phase margin, constant M&N circles.

Unit –V **08 Hours, 16 Marks**

Introduction to Design:

The design problem and preliminary considerations lead, lag and lead-lag networks, design of closed loop systems using compensation techniques in time domain and frequency domain. Review of state variable technique: Review of state variable technique, conversion of state variable model to transfer function model and vice-versa, diagonalization, Controllability and observability and their testing.

Reference Books:

1. Nagrath & Gopal, “Control System Engineering”, 4th Edition, New age International.
2. K. Ogata, “Modern Control Engineering”, Prentice Hall of India.
3. B.C. Kuo & Farid Golnaraghi, “Automatic Control System” Wiley India Ltd, 2008.
4. Norman s Nise, “Control System Engineering” Wiley India Pvt Ltd
5. Dr. Rajeev Gupta, “NISE’s Control System Engineering” Wiley India Pvt Ltd
6. D.Roy Choudhary, “Modern Control Engineering”, Prentice Hall of India.
7. Ajit K Mandal, “Introduction to Control Engineering” New Age International,2006.
8. R.T. Stefani, B.Shahian, C.J.Savant and G.H. Hostetter, “ Design of Feedback Control Systems”.
9. Narendra Singh Beniwal and Beniwal,”Automatic control system with Matlab Programming “University Science Press.
10. Eugene Xavier S.P. and Joseph Cyril Babu,J.,”Principles of control systems “S.Chand
11. S.Sivangaraju,L.Devi ,”Control Systems Engineering “New Age International Publishers.
12. http://nptel.iitm.ac.in

Course Title	Short Title	Course Code
Electrical Measurement-II	**EM-II**	

Course Description:

This course provides a brief introduction to transducers and its response. This course also explores the knowledge of measurement of pressure, temperature and displacement by transducers. Construction, principle of working, characteristics, error and adjustment of different types measuring instruments.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	**3**	**15**	**42**	**3**

Prerequisite Course(s) : Knowledge of second year subject Electrical Measurement-I.

General Objectives:

To expose the students to a broad knowledge of experimental methods and measurement techniques. To train the students in the skill of operation of instruments in the electrical & electronic engineering applications. To understand the basic working of instruments. To understand the errors in measurements and their rectification. To gain proficiency in the use of common measuring instruments. To compare theoretical predictions with experimental results and to resolve any apparent differences.

Course Outcomes:

Upon successful completion of this course the students will be able to:

1. Understand the basic concepts in measurement and measuring instruments.
2. Understand the need and process of standardization, calibration of instruments, their significance in process and manufacturing industries for international acceptance.
3. Select instruments on basis of accuracy, sensitivity and response time in generation, transmission, manufacturing, power system, testing and energy auditing purposes.
4. Perform technical and professional duties in any type of industries.
5. Do higher studies and use of modern instruments for automation, process control for sustainable developments.

Electrical Measurement-II

(Course Contents)

Semester-VI **Examination Scheme:**

Teaching Scheme: **(ESE) End Semester Examination: 80 Marks**

Lectures: 3 Hrs/Week **(ISE) Internal Sessional Examination: 20 Marks**

End Semester Exam duration: 03 Hours

Unit-I: **09 Hours, 16 Marks**

Introduction to instrumentation:

Definition, purpose, measurement – definitions, types and Classification of instruments, generalized measurement system, standards, and calibrations

Instrument Response :Instrument Response to step, ramp, sinusoidal i/p up to second order system. Errors – types – gross, systematic, random, limiting, sources of errors, techniques to minimize them.

Unit-II: **09 Hours, 16 Marks**

Introduction to transducers:

Definition, classification, selection of transducer**.** Measurement of temperature**:** using R T D, thermocouple, bimetallic, thermocouple. Pressure thermometers, pyrometers**.** Pressure Measurement: Bourdon Tubes, bellows, diaphragms. Vacuum Measurement**:** McLeod gauge, pirani gauge.

Unit-III: **08 Hours, 16 Marks**

Flow measurement-:

Rota meter, electromagnetic flow meter, hot wire anemometer, ultrasonic flow meter.

Displacement measurement : LVDT, strain gauge, -types, working principles, measurement circuitry Level measurement :mechanical, pneumatic methods , electrical methods- capacitance level gauge, hot wire / carbon resistance method nucleonic level gauge, ultrasonic method.

Unit-IV: **08 Hours, 16 Marks**

A .C. Bridges:

Classification, Maxwell, Anderson, hay, Schering, Campbell, and Wein Bridge , Special measuring instruments- construction and principles of 1 Ø & 3 Ø p.f.meters ,frequency meters ,synchronoscope, trivector meter , max. Demand Indicators, C.R.O.

Unit-V: **08 Hours, 16 Marks**

Recorders:

Necessity, construction, working, types- strip chart, circular chart, self balance potentiometric, X-Y recorder, ultraviolet recorder. Electronic technique : for measurement of voltage, current, power, energy, phase angle and rms values.

Reference Books:

1. E. W. Golding. , "Electrical Measurements and Measuring instruments", Reem Publication.
2. C. T. Baldwin. , "Fundamentals of Electrical Measurements", Kalyani Publication
3. Cooper and Derfllick, "Electronic Instrumentation and Measurements Techniques", 3rd edition, Prentice-Hall of India.
4. A. K. Sawney. "Electrical & Electronic Measurement and Instrumentation" Danpant Rai & Co.
5. J.B. Gupta, "Electrical & Electronic Measurement and Instrumentation", S K Kataria & Son.
6. R K Rajput, "Electrical & Electronic Measurement and Instrumentation", S Chand.
7. http://nptel.iitm.ac.in

Course Title	Short Title	Course Code
Electrical Machine Design	**EMD**	

Course Description:
The course consists of general factor of machine design, material classification, temperature rise and rating of machines. It explores the design concept of transformer core, winding overall dimension performance and cooling design of transformer. The course also provides sound understanding and basic concepts of rotating machine design.

	Hours per Week	No. of Weeks	Total Hours	Semester Credit
Lecture	**3**	**15**	**42**	**3**

Prerequisite Course(s) : Knowledge of Electrical Machines-I and Electrical Machines-II
General Objectives: The approach has always been to develop the thinking process of students in reaching a sound understanding of broad range of topic in electrical machine design. The object is to promote the students' interest in learning more about latest trend in electrical machine design. The object is not great depth, but presentation through enough to give theory at a level that can be understood by undergraduate. With this beginning, the students will have the foundation to continue his education and able to do better in professional duties in the field of design and manufacturing industries.

Course Outcomes:
Upon successful completion of this course the students will be able to:

1. Apply knowledge of mathematics, science, and engineering for design of electrical machines.
2. Understand the electrical engineering material characteristic for designing an energy efficient electrical machine.
3. Understand the temperature rise in electrical machines and impact on rating and duty of machines.
4. Ability to design an electrical machines and components to meet desired needs within realistic constraints such as economic, environmental, social, safety, manufacturability, and sustainability.
5. Function on multidisciplinary teams with professional and ethical responsibility.
6. Discharge duties in the field of design and manufacturing industries and able to do higher studies in optimal design and use latest software and engineering tools.

Electrical Machine Design
(Course Contents)

Semester-VI **Examination Scheme:**
Teaching Scheme: **(ESE) End Semester Examination: 80 Marks**
Lectures : 3 Hrs/Week **(ISE) Internal Sessional Examination: 20 Marks**
(ESE) End Semester Exam duration: 03 Hours

Unit-I **09 Hours, 16 Marks**

Introduction- principles of design and design factors, rating, specifications, standards, brief study of magnetic, electric, insulating and other material. Theory of solid body heating, heating and cooling time curve, rating of machines, and type of duty.
Design of Starters-Shunt Motors, Series Motor, Slip ring induction motor.

Unit – II: **09 Hours, 16 Marks**

Design of Transformer- Design of distribution and power Transformer,-types, classifications, specifications, core construction, transformer winding, design of transformer, output equation of single phase and three phase transformer ,overall dimension, design of core, winding, estimation of leakage reactance for H.V. and L.V. winding, resistance of winding, calculation of losses, determination of voltage regulation.

Unit III: **08 Hours, 16 Marks**

Design Performances of Transformer-

No Load Current of –single phase, Three phase, Magnetizing Volt-ampere, change of parameters with change of frequency, Temperature rise of transformers , transformer oil as a cooling medium, temperature rise in plain walled tanks, design of tank with tubes ,air blast cooling, forced oil circulation , thermal rating , heating time constant of transformers.

Unit –IV: **08 Hours, 16 Marks**

Induction motors:

Relation between rating and dimensions of rotating Machines-symbols, Main dimensions , total loading, specific loading , output equation , factor affecting size of rotating machines , choice of specific magnetic loading , choice of specific electric loading , variation of output & losses with Linear dimensions , separation of D and L- d.c. Machines, Induction Motors , Synchronous Machines, standard Frames.
Design of three phase Induction Motors-design output equation, choice of average flux density in air gap, choice of ampere conductors per metre, efficiency & power factor, main dimensions.

Unit –V: **08 Hours, 16 Marks**

D.C.Machine Windings- types of D.C. Windings, choice and design of simplex and duplex lap and wave Windings, equalizer connections, dummy coils, concept of multiplex Windings, reason for choosing them.

A.C. Machine Windings- single and double layer, single phase ac Windings with integral and fraction slots, three phase Windings.

Reference Books:

1. A. K .Sawhney, Electric Machine Design Tenth Edition, Danpat ray and sons.
2. A. E .Clayton, Performance and Design Of DC Machine, Third Edition, ELBS, ISAAC Pitman Sons.
3. A. E. Clayton Performance and Design Of AC Machine, Third Edition, ELBS, ISAAC Pitman Sons.
4. N. Vinogradov, Electric Machine Winder, MIR Publication.
5. Say and Taylor, D.C. Electric Machine, ELBS, Pitman Sons.
6. Feinberg,Macmillan,Modern Power Transformer Design Practices.First Edition, Feinberg, Macmillan,
7. Transformers BHEL.
8. http://nptel.iitm.ac.in

Course Title	Short Title	Course Code
Microprocessor and Microcontroller	**MPMC**	

Course Description:
The course explores knowledge of microprocessor and microcontroller. The course comprises of architecture, assemble language programming and interfacing of peripherals and their applications.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	**3**	**15**	**42**	**3**

Prerequisite Course(s) : Analog and digital electronic and software application at second year engineering.

General Objectives:
To meet the challenges of growing technology , student will be conversant with the programmable aspect of microprocessor and microcontroller. Programming is a process of problem solving and communication in language of mnemonics. The object of course is to understand microprocessor and microcontroller demand, concept and develop skill in two discipline hardware and programming.

Course Outcomes:
Upon successful completion of this course the students will be able to:
1. Apply basic electronic subject and software algorithm application for understanding architectures assemble language of microcontroller and microprocessor.
2. Know the pin configuration and memory organization of a typical microprocessor and microcontroller.
3. Develop assemble language programming and interfacing peripherals for wide application in electrical engineering.
4. Develop assembly language source code for applications that use I/O ports, timer and single/multiple interrupts
5. Apply techniques for measurement of electrical quantities by microprocessor.
6. Apply the knowledge of microprocessor and microcontroller in application of microprocessor and microcontroller based electrical protection system.
7. Do higher study in the field of automation, operation and control of power system by microprocessor and microcontroller.

Microprocessor and Microcontroller

(Course Contents)

Semester-VI **Examination Scheme:**

Teaching Scheme: **(ESE) End Semester Examination: 80 Marks**

Lectures : 3 Hrs/Week **(ISE) Internal Sessional Examination: 20 Marks**

(ESE) End Semester Exam duration: 03 Hours

Unit – I: **09 Hours, 16 Marks**

8085 Microprocessor: Organization, architecture, Generation of control signal, Addressing modes, Instruction format classification of instructions, Instruction set, interrupt.- interrupt structure . Serial data transfer program using RIM and SIM

Unit-II **09 Hours, 16 Marks**

Programming Memory Interfacing: Introduction to assembly language programming , stack , subroutine, types of subroutine , I/O Mapped I/O and memory mapped I/O, Memory module chip capacity, address space,. Memory specification, Types of memory-ROM, RAM: static & dynamic, PROM, EPROM, EEPR0OM, memory organization & interfacing of RAM and ROM.

Unit-III **08Hours, 16 Marks**

Interfacing Peripherals and Applications: Study of common peripheral devices, their architecture ,control words and control register & different modes of operation 8155: static RAM, I/O ports, timers, 8255 PPI, 8279 keyboard display interface.

Unit-IV **08 Hours, 16 Marks**

Data Conversion and Applications :D to A – types, Ladder, R-2R , A to D converters, SAR type, dual slope. ADC 0808 architecture, interfacing with 8085 microprocessor.

Microprocessor Applications: Frequency measurement, phase angle and power factor measurement , current voltage measurement, KVA , KW and Maximum demand measurement**.**

Unit-V **08 Hours, 16 Marks**

Microcontroller:

8051microcontroller:architecure:, registers, SFRs pins, memory organization, I/O port structure, interrupts, timer and counter circuit, serial port.

8051Instruction set classification, addressing mode, simple assembly language programs. Programming related to Timer/Counter

Reference:

1. R.S. Gaonkar ."Microproccer Architecture, Programming, & Applications with 8085", Third edition, Penram International Publication (India) Pvt. Ltd.
2. Leventhal, "8085 Assembly Languages Programming" Tata McGraw Hill.
3. B. Ram ,"Fundamentals of Microprocessors & Microcontrollers" Dhanpat Rai Publication.
4. Muhammad Ali Mazidi, Janice Gillispie Mazidi andRolin D. McKinlay, "The 8051 Microcontroller and Embedded SystemsUsing Assembly and C", Second Edition.
5. Kenneth J.Ayala "The 8051 Micro Controller :Architecture, Programming,", Penram International, Mumbai.
6. http://nptel.iitm.ac.in

Course Title	Short Title	Course Code
Entrepreneurship Development	**ED**	

Course Description: Last few decades have seen the advent of various new disciplines in the area of management. One such discipline, Entrepreneurship has emerged quite recently. The syllabus explore the concept of entrepreneurship, financial requirements of a new enterprise, Expansion strategies of an enterprise, challenges for small enterprises and Institutional Support for small enterprises

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	**3**	**15**	**42**	**3**

Prerequisite Course(s) : knowledge of subject Industrial Organization And Management.

General Objectives:

The economic objectives of country, such as industrial development, regional growth, employment generation and development of small scale industries entirely depend on the growth of entrepreneurship. As concept, Entrepreneurship poses a challenge for entrepreneurs to select and implement business strategies to tread the glorious path of success and growth. Successful entrepreneurship requires passion of an entrepreneur and thus, it is more than the money and luck. In the contemporary world, the study of this discipline become of umpteen importance to understand the complexities of business environment at national and international levels.

Course Outcomes:

Upon successful completion of this course the students will be able to:

1. Understand the various new disciplines in the area of management.
2. Understand concept of entrepreneurship and learn the procedure of setting up an enterprise.
3. Understand the concepts of human resource management, marketing management, financial management, production and operation management in a new enterprise.
4. Function on multidisciplinary teams and understand the impact of engineering solutions in a global, economic, environmental, and societal context.
5. Estimate the financial feasibility of business and identify the various sources of financing.
6. Understand the role of small scale enterprises in economic development of a country and understand the linkage between small and large scale enterprises.
7. Develop skills to become an entrepreneurs in view of economic objectives of country, such as industrial development, regional growth, employment generation and development of small scale industries through technological developments.

Entrepreneurship Development

(Course Contents)

Semester-VI **Examination Scheme:**

Teaching Scheme: **(ESE) End Semester Examination: 80 Marks**

Lectures: 3 Hrs/Week **(ISE) Internal Sessional Examination: 20 Marks**

(ESE) End Semester Exam duration: 03 Hours

Unit I **09 Hours, 16 Marks**

Introduction to Entrepreneurship

Introduction, Concept of entrepreneurship: Significance of entrepreneurship, Theories of entrepreneurship, Models of entrepreneurship development

Definition of entrepreneur: Traits and characteristics of successful entrepreneur , Functions of an entrepreneur , Types of entrepreneurs, Factors influencing entrepreneur, Professional vs. family entrepreneurs, Entrepreneurial leaders vs. managers,

Entrepreneurial process: Entrepreneurial motivation, Entrepreneurial barriers, Women as entrepreneur , Role of woman entrepreneurs in society, Barriers to women entrepreneurs , Myths of entrepreneurship, Problems faced by entrepreneurs and capacity building for entrepreneurship, Profiles of successful entrepreneurs.

Unit –II **09 Hours, 16 Marks**

Financial requirements of a new Enterprise: Estimating financial requirements, Estimation of fix capital requirements, Estimation of working capital requirements

Identifying the sources of finance –sources of long-term financing: Sources of medium-term financing , Sources of short-term financing

Institutions providing financial assistance: Venture capital funding- venture capital funding in the Indian scenario, Venture capital funding process, Importance of financial management, Working capital management, Accounting and book keeping, Financial statement, Financial ration analysis

Unit –III **08 Hours, 16 Marks**

Expansion strategies of an Enterprise

Expanding and enterprise: Expansion through concentration, Expansion through integration, Expansion through diversification , Expansion through cooperation, Expansion through internationalization, Expansion through digitalization , Organization life cycle, Strategic management, The essence of business ethics

Unit –IV **08 Hours, 16 Marks**

Challenges for small Enterprises

Problem faced by small enterprises: Managerial problems, Marketing management, Human resource, Production management, Technological problems

Role of central and state governments in promoting small enterprises: Fiscal and tax concessions for small enterprises, Industrial policies for small enterprises, Importance of marketing, Customer relationship management (CRM), Marketing services

Unit- V **08 Hours, 16 Marks**

Institutional Support for small enterprises and decision support system

Institutions supporting small scale enterprises: Small scale industries (SSI) board, Khadi and village industries commission (KVIC), Micro, small and medium enterprises development organization (MSME-DO), National small industries corporation limited (NSIC), National institute for entrepreneurship and small business development (NIESBUD)' Indian institute of entrepreneurship (IIE), State industrial development / Investment Corporation (SIDCs/SIICs), State directorate of Industries (SDIs), District industry centers (DICs) ,Industry associations , Non-Governmental organization

Institutions providing financial association: Small industries development bank of India (SIDBI), State financial corporation (SFCs)

Technological up gradation and moderation of small enterprises: ISO 9000/14001 certification fee reimbursement scheme,

Reference Books:

1. Alpana Trehan, "Entrepreneurship" Published –Dreamtech Press.
2. Jack M. Kaplan, "Patterns of Entrepreneurship" Published -WILEY.
3. Poornima M. Charantimath, "Entrepreneurship Development –Small Business Enterprises" Publisher –Pearson.
4. Thomas W. Zimmerer & Norman M. Scarborough, "Essential Of Entrepreneurship and Small Business Management" 4th Edition , Publisher –Pearson.

Course Title	Short Title	Course Code
Control System-I Lab	**CS-I**	

Course Description:

The study of Control System Engineering is essential for the students of Electrical, Electronics, Mechanical, Aerospace & Chemical Engineering. It has applications ranges from Electrical Power System to process Control System. The course explores the knowledge of basic control systems, control system components, mathematical modeling, time response & frequency response analysis. The course also deals in concept of design & its preliminary consideration.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Practical	**2**	**15**	**28**	**1**

Prerequisite Course(s): Mathematics and subjects of electrical engineering

General Objectives: Control system engineering is an exciting field in which to apply engineering talents. The object of practical to derive mathematical modeling, transfer – functions, time response and frequency response. The objectives are to find transient response and steady state error in given system.

Course Outcomes:

Upon successful completion of this practical course the students will be able to:

1. Apply basic of mathematical modeling of control system and responses of first and second order system.
2. Describe the role of Control system as an enabling technology in various applications such as in power systems, energy conservation, renewable energy, transportation etc.
3. Understand the response of control system subjected to different input signals, design, set up, and test control system in the laboratory.
4. Analyze and design open and closed control system.
5. Design dc servo motor and stepper motor to meet the characteristics of control system application.
6. Become proficient with computer skills (e.g., PSPICE and MATLAB) for the simulated analysis and design of control system and able to use control system in utility-related applications.

Control System-I Lab

(Lab contents)

Semester-V I **Examination Scheme:**

Teaching Scheme: **(ICA) Internal Continuous Assessment: 25 Marks**

Practical : 2 Hrs/Week **(ESE) End Semester Examination(OR): 25 Marks**

Teacher should facilitate learning following lab experiments:

1. To determine speed-torque characteristics of an ac servomotor.
2. To study potentiometer as an error detector.
3. To study DC position control system
4. To determine time response of second order control system
5. To determine speed-torque characteristics of dc servomotor.
6. To study PID Controller.
7. To study synchro-transmitter and receiver and obtain output V/S input characteristics.
8. To Study Stepper Motor.
9. To determine time domain response of a second order system for step input and obtain performance parameters by using software .
10. To convert transfer function of a system into state space form and vice-versa, by using software .
11. To plot root locus diagram of an open loop transfer function and determine range of gain 'k' for stability by using software.
12. To plot a Bode diagram of an open loop transfer function by using software.
13. To draw a Nyquist plot of an open loop transfer functions and examine the stability of the closed loop system by using software

Note: The minimum eight experiments are to be performed from the following list of experiments. Any Six experiments compulsorily to be performed from no 1 to 8 and any two from 09 to 15.

Guide lines for ICA :

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guide lines for ESE:-

In ESE the student may be asked questions on practical. Evaluation will be based answers given by student in oral examination.

Course Title	Short Title	Course Code
Electrical Measurement– II Lab	**EM- II Lab**	

Course Description:

In this laboratory, course emphasis on imparting the practical knowledge and understanding of basic principles, characteristic, performance of different measuring instruments and measurement of different electrical quantities. It also gives the platform to understand need and importance of calibration and standardization.

Practical	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	2	**15**	**28**	**1**

Prerequisite Course(s): Knowledge of Electrical Measurement-I

General Objectives:

The objective of the laboratory is to impart the fundamental knowledge of measuring instruments. Students develop their ability to select the specific instrument in reference of ranges and resolution of instruments for proper and correct analysis. The students will able to understand the characteristic of measuring instruments. In this lab course, students will be familiar with the use of different equipments, safety precautions on work place. This makes bridge on theoretical knowledge and practical practices.

Course Outcomes:

Upon successful completion of this lab students will be able to:

1. Conduct practical and able to analyze the practical data for various purposes.
2. Measure various electrical quantities and circuit parameters
3. Able to select the measuring instrument with proper range and type for practical uses.
4. Calibrate various types of instruments as per IS .
5. Do professional duties in technical field and able to use advance measuring instruments.

Electrical Measurement-II LAB

(Lab Course Contents)

Semester: VI **Examination Scheme:**

Teaching Scheme: **(ICA) Internal Continuous Assessment: 25Marks**

Practical: 2 Hrs/Week **(ESE) End Semester Examination Practical (PR) : 25Marks**

Teacher should facilitate learning following lab experiments:

1. Strain Measurement using strain gauge .
2. Study of CRO of it's different types and Applications.
3. Measurement of temperature by RTD/Thermocouple.
4. Study of pressure transducers.
5. Study of recorders.
6. Study of LVDT.
7. Measurement of inductance by Andersons Bridge.
8. Measurement of capacitance and loss angle of capacitor by Schering bridge.
9. Step response of meters.
10. Measurement of systematic errors of wattmeter.

Note: The term work should include a minimum **eight** experiments from the above list

Guide lines for ICA :

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guide lines for ESE:-

In ESE the student may be asked to perform any one practical. Evaluation will be based on paper work , performance and oral in the practical examination.

Course Title | Short Title | Course Code

Microprocessor and Microcontroller Lab | **MPMC- Lab**

Course Description:

The practical course explores knowledge of microprocessor and microcontroller. The course comprises of architecture, assemble language programming and interfacing of peripherals and their applications.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Practical	**2**	**15**	**28**	**1**

Prerequisite Course(s) : Analog and digital electronic and software application at second year engineering.

General Objective:

To meet the challenges of growing technology, student will be conversant with the programmable aspect of microprocessor and microcontroller. Programming is a process of problem solving and communication in language of mnemonics. The object of practical course is to understand microprocessor and microcontroller demand, concept and develop skill in two discipline hardware and programming.

Course Outcomes:

Upon successful completion of this course the students will be able to:

1. Know the pin configuration and memory organization of a typical microprocessor and microcontroller.
2. Develop assemble language programming and interfacing peripherals for wide application in electrical engineering.
3. Develop assembly language source code for applications that use I/O ports, timer and single/multiple interrupts
4. Apply techniques for measurement of electrical quantities by microprocessor.
5. Apply the knowledge of microprocessor and microcontroller in application of microprocessor and microcontroller based electrical protection system.
6. Do higher study in the field of automation, operation and control of power system by microprocessor and microcontroller.

Microprocessor and Microcontroller LAB

(Lab Course Contents)

Semester: VI **Examination Scheme:**

Teaching Scheme: **(ICA) Internal Continuous Assessment: 25Marks**

Practical: 2 Hrs/Week **(ESE) End Semester Examination Practical (PR) : 25Marks**

Teacher should facilitate learning following lab experiments:

1. Study of architecture and instructions of 8085 along with opcodes.
2. Study of architecture and instructions of 8051..
3. 8255 interfacing
4. Memory interfacing
5. Microprocessor 8085 assembly language programs based on data transfer instruction
6. Microprocessor 8085 assembly language programs based on arithmetic instruction
7. Microprocessor 8085 assembly language programs based on logical instruction
8. Applications of microprocessor 8085 in measurement of electrical quantity.
9. Applications of microprocessor 8085 in Electrical drives and speed control for stepper motor.
10. Microcontroller 8051 assembly language programs based on data transfer instruction.
11. Microcontroller 8051 assembly language programs based on arithmetic and logical instructions.
12. Generation of delay using Timers of 8051 in mode 0, 1 and 2.

Note: The term work should include a minimum **eight** experiments on hardware kits and simulation.

Guide lines for ICA :

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guide lines for ESE:-

In ESE the student may be asked to perform any one practical . Evaluation will be based on paper work, performance and oral in the practical examination.

Course Title	Short Title	Course Code
Software Application-II	**SA-II**	

Course Description:
The objective of this course is to introduce the students to the fundamental concepts of MATLAB and enable them to apply these concepts for solving real world problems. This course includes the basic structure and statements required for simple mathematical problems in MATLAB. This course provides the basic concepts of plot and other useful tools required to solve electrical the problems.

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Practical	**2**	**15**	**28**	**1**

Prerequisite Course(s): Knowledge of mathematics and subject computer programming at first year engineering.

General Objectives: The objective of the course is to provide students with the essential knowledge of C language and MATLAB programming. This course will help students to use various modern tools for solving the problems of electrical engineering. The subject provides scope for practical applications of electrical engineering. The course will help students to analyze the electrical systems using the software. The course provides the effective approach for the higher studies in the efficient system design.

Course Outcomes:
Upon successful completion of this course the students will be able to:

1. Know use of the appropriate statements available in the C and C++ language and MATLAB.
2. Implement small and medium programs of varying complexity using the most commonly used features of the language.
3. Employ good programming style, standards and practices during program development.
4. Solve the different numerical techniques and perform Matrix operations.
5. Understand and use of MATLAB for solving simple mathematical problems.
6. Plot simple, 2-D and 3-D plots using MATLAB.
7. Use modern engineering tools in MATLAB which are useful for analyzing and designing of electrical power system.

Software Application-II

(Lab Course Contents)

Semester-VI **Examination Scheme:**

Teaching Scheme: **(ICA) Internal Continuous Assessment: 25 Marks**

Practical : 2 Hrs/Week

Teacher should facilitate learning following lab experiments:

1. Build a simple circuit with Power System blocks and connect it to other Simulink blocks
2. Use the Powergui block and analyze static and frequency-domain response.
3. Create an electrical subsystem, simulate transients, and discretize simple circuits.
4. Single phase fully controlled converter using R and RL load using MATLAB / SIMULINK
5. Single phase AC voltage regulator using MATLAB / SIMULINK
6. Formation of Y bus matrix by inspection / analytical method using MATLAB Software
7. Formation of Z bus using building algorithm using MATLAB Software
8. Gauss Seidal load flow analysis using MATLAB Software
9. Newton Raphson method of load flow analysis using MATLAB Software
10. Fast decoupled load flow analysis using MATLAB Software
11. Fault analysis using MATLAB Software

Note: Lab file should consist of minimum **Eight** experiments.

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and assignment submitted by the student in the form of journal.

Reference Books:

1. Rudra Pratap, "Getting Started With Matlab: A Quick Introduction For Scientists And Engineers" Oxford University Press.
2. Dr. Shailendra Jain, "Modeling & Simulation using MATLAB-Simulink", Wiley India.
3. Yashavant Kanetkar, "Let Us C", BPB Publications, 10/E, 2010.
4. Stephen G Kochan "Programming in C", Pearson Education, 3/E, 2004.
5. Using MATLAB, Version 6, The Math Works, Inc., 2000.
6. MATLAB function reference, The Math Works, Inc., 2000.
7. Using MATLAB Graphics, Version 6, The Math Works, Inc., 2000.
8. MATLAB Release Notes for Release 12, The Math Works, Inc., 2000.

Course Title	Short Title	Course Code
Minor Project	**MP**	

Course Description:
The course explores the knowledge of design, experiment and analysis of data. The course develops ability to work on multidisciplinary teams, Identify, formulate, and solve engineering problems in view of economic, environmental and societal context.

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Laboratory	**2**	**15**	**28**	**2**

Prerequisite Course(s): Knowledge of science, mathematics, computer programming and core subject of engineering.
General Objectives: The objectives of project are to develop ability to work in group. The scope of work is design and conduct experiments, as well as to analyze and interpret data within realistic constrain such as economic, environmental, social, safety and manufacturability. The project work provides plate form for planning, material procurement, preparing specification and execution of work. The project also develop to work on multidisciplinary teams, communicate effectively and Knowledge of contemporary issues.
Course Outcomes:
Upon successful completion of this course the students will be able to:

1. Apply knowledge of mathematics, science, and engineering for innovative ideas.
2. Design and conduct experiments, as well as to analyze and interpret data.
3. Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
4. Function on multidisciplinary teams, communicate effectively and Knowledge of contemporary issues.
5. Identify, formulate, and solve engineering problems by understanding professional and ethical responsibility.
6. Understand the impact of engineering solutions in a global, economic, environmental, and societal context.
7. Recognition of the need for, and an ability to engage in life-long learning.
8. Use the techniques, skills, modern engineering tools and software necessary for engineering practice.

Minor Project

(Lab Course Contents)

Semester-VI **Examination Scheme:**

Teaching Scheme: **(ICA) Internal Continuous Assessment: 50 Marks**

Practical : 2 Hrs/Week

- Every student shall undertake the Minor Project in semester VI. It is expected that the broad area of major project shall be finalized by the student in the beginning of the VI semester and Minor project undertaken may be a part of Major Project.
- Each student shall work on an approved project, a group of **05 students (maximum)** shall be allotted for the each minor project and same group may be continued for major project.
- Minor project may involve fabrication, design or investigation of a technical problem that may take design, experimental or analytical character or combine element of these areas. The project work shall involve sufficient work so that students get acquainted with different aspects of fabrication, design or analysis.
- Each student is required to maintain separate log book for documenting various activities of minor project.
- The three-member committee appointed by Head of the department shall be constituted for finalizing the topics of minor project. Maximum four minor project groups shall be assigned to one teaching staff.

Guide lines for ICA : Assessment of the project for award of ICA marks shall be done jointly by the guide and departmental committee as per the guidelines given in **Table-A.**

Assessment of Minor Project

Name of the Project: _____

Name of the Guide: _____

Table-A

SN	Exam Seat No	Name of Student	Project Selection	Documentation	Design /Simulation/Logic	PCB/hardware/programming	Result Verification	Presentation	Total
			5	10	10	10	10	5	50

Course Title | Short Title | Course Code

Seminar-I

Course Description: The course explores the knowledge of design, experiment and analysis of data. The course develops ability to work on multidisciplinary teams, Identify, formulate, and solve engineering problems in view of economic, environmental and societal context.

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Practical	**2**	**14**	**28**	**2**

Prerequisite Course(s): Knowledge of science, mathematics, computer programming and core subject of engineering.

General Objectives: The objectives of project are to develop ability to work in group. The scope of work is design and conduct experiments, as well as to analyze and interpret data within realistic constrain such as economic, environmental, social, safety and manufacturability. The project work provides plate form for planning, material procurement, preparing specification and execution of work. The project also develop to work on multidisciplinary teams, communicate effectively and Knowledge of contemporary issues.

Course Outcomes:

Upon successful completion of this course the students will be able to:

1. Apply knowledge of mathematics, science, and engineering.
2. Design and conduct experiments, as well as to analyze and interpret data.
3. Function on multidisciplinary teams, communicate effectively and Knowledge of contemporary issues.
4. Identify, formulate, and solve engineering problems by understanding professional and ethical responsibility.
5. Understand the impact of engineering solutions in a global, economic, environmental, and societal context.
6. Use the techniques, skills, modern engineering tools and software necessary for engineering practice.
7. Practice the use of various resources to locate and extract information using offline & online tools, journals.
8. Practice the preparation and presentation of scientific papers and seminars in an exhaustive manner.

Seminar-I

(Course Contents)

Semester-VI **Examination Scheme:**

Teaching Scheme: **(ICA) Internal Continuous Assessment: 25 Marks**

Practical : 2 Hrs/Week

1. For Seminar-I every student will individually study a topic assigned to him / her and submit a report and shall deliver a short lecture / Seminar on the topic during the term.
2. The three-member committee appointed by Head of the department shall be constituted for finalizing the topics of Seminar-I. Seminar shall be related state of the art topic of his choice approved by the committee.
3. Seminar topic should not be repeated and registration of the same shall be done on first come first serve basis.
4. Topic of Seminar shall be registered within a two week from commencement of VI Semester and shall be approved by the committee.
5. Maximum six seminar supervision shall be allotted to each teacher.
6. At the end of semester, student should submit the seminar report (paper bound copy)in following format:
    a. Size of report shall be of minimum 25 pages.
    b. Student should preferably refer minimum five reference books / magazines/standard research papers.
    c. Format of report
        i. Introduction.
        ii. Literature survey.
        iii. Theory 1) Implementation 2) Methodology
            3) Application 4) Advantages, Disadvantages.
        iv. Future scope.
        v. Conclusion.

ASSESSMENT OF SEMINAR-I

Guide lines for ICA : Assessment of the Seminar-I for award of ICA marks shall be done by the guide and a departmental committee jointly, as per the guidelines given in **Table-B**

Title of Seminar: _____

Name of Guide: _____

Table-B

SN	Exam Seat No	Name of Student	Topic Selection	Literature survey	Report writing	Depth of understanding	Presentation	Total
			5	5	5	5	5	25

NORTH MAHARASHTRA UNIVERSITY,

JALGAON (M.S.)

Third Year Engineering

(Information Technology)

Faculty of Engineering and Technology

COURSE OUTLINE

Semester – V

W.E.F 2014 – 2015

Annexure - I

TE Semester – V

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory		Practical		Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
Software Engineering*	D	3	---	---	3	20	80	---	---	100	3
Formal Language & Automata Theory*	D	3	---	---	3	20	80	---	---	100	3
Computer Network*	D	3	---	---	3	20	80	---	---	100	3
System Programming*	D	3	---	---	3	20	80	---	---	100	3
Principles of Management*	C	3	---	---	3	20	80	---	---	100	3
Software Engineering Lab*	D	---	---	2	2	---	---	25	25 **(OR)**	50	1
Linux Lab*	D	---	---	2	2	---	---	25	---	25	1
Computer Network Lab*	D	---	---	2	2	---	---	25	25 **(PR)**	50	1
System Programming Lab*	D	---	---	2	2	---	---	25	25 **(OR)**	50	1
Java Programming Lab*	B	1	---	2	3	---	---	50	---	50	2
Industrial Training / EDP / Special Study*	D	---	---	---	---	---	---	25	---	25	2
Total		**16**	**---**	**10**	**26**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination **ESE: End Semester Examination** **ICA : Internal Continuous Assessment**

*** Common Subjects with TE Comp**

TE Semester – VI

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory		Practical		Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
Operating System*	D	3	--	---	3	20	80	---	---	100	3
Object Oriented Modeling & Design*	D	3	---	---	3	20	80	---	---	100	3
Database Management System*	D	3	---	---	3	20	80	---	---	100	3
E-Commerce	D	3	---	---	3	20	80	---	---	100	3
Management Information System*	C	3	---	---	3	20	80	---	---	100	3
Operating System Lab*	D	---	---	2	2	---	---	25	25 **(OR)**	50	1
Object Oriented Modeling & Design Lab*	D	---	---	2	2	---	---	25	25 **(OR)**	50	1
Database Management System Lab*	D	---	---	2	2	---	---	25	25 **(PR)**	50	1
Web Programming Lab*	B	---	---	2	2	---	---	25	---	25	1
Minor Project*	D	---	---	2	2	---	---	50	---	50	2
Seminar – I*	D	---	---	2	2	---	---	25	---	25	2
Total		**15**	**---**	**12**	**27**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination ESE: End Semester Examination ICA: Internal Continuous Assessment

*** Common Subjects with TE Comp**

Software Engineering

COURSE OUTLINE

Course Title	Short Title	Course Code
Software Engineering	**SE**	

Course Description:
The objective of this course is to introduce students the knowledge of Software Development Life Cycle, application of analysis, design, testing principles and project planning & management concepts to develop quality software economically.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	14	42	03

Prerequisite Course(s): Knowledge of programming languages and data structures.

COURSE CONTENT

Software Engineering **Semester-V**

Teaching Scheme

Lecture: 3 Hours/Week

Examination Scheme

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Introduction to Software Engineering (08Hrs, 16 Marks)

a. Nature of Software
b. Software Process
c. Software Engineering Practice
d. Software Myths
e. Generic Process model
f. Process Assessment and Improvement
g. Perspective Process Models
h. Specialized Process Models
i. Personal and Team Process Models
Agile Process models:
j. Agile process
k. Extreme programming

2. Requirements Engineering (08Hrs, 16 Marks)

Requirements Engineering:
a. Eliciting Requirements
b. Building the Requirements Model
c. Negotiating requirements
d. Validating requirements
e. Requirements Analysis

f. Scenario-Based Modeling
g. Requirements modeling strategies
h. Flow-Oriented Modeling
i. Data modeling Concepts
j. Class based modeling
k. SRS.

3. Design Engineering (08Hrs, 16 Marks)

a. Design Process
b. Design Concepts
c. The Design Model

Architectural Design:

d. Software Architecture
e. Architectural Styles
f. Architectural Design

User Interface Design:

a. Rules
b. User Interface Analysis and Design
c. Interface Analysis
d. Interface Design Steps
e. Pattern Based Design
f. Design Patterns
g. Pattern Based software Design
h. Component Level Design patterns
i. User Interface Design patterns
j. WebApp Design patterns

Introduction to UML Diagrams.

4. Software Testing (08Hrs, 16 Marks)

Testing Strategies:

a. A Strategic approach to Software Testing
b. Strategic Issues
c. Testing Strategy for Conventional Software
d. Testing Strategy for Object-Oriented Software
e. Testing strategies for Web App
f. Validation Testing
g. System Testing

Testing Tactics:

h. Testing Fundamentals
i. White Box Testing
j. Basis Path Testing
k. Control Structure Testing
l. Black Box Testing

5. Software Project Planning & Management Concepts (08Hrs, 16 Marks)

a. Management Spectrum
b. People
c. Product

d. Process
e. Project
f. Critical Practices

Estimation for software project:

g. Project Planning Process
h. Software scope and feasibility
i. Resources
j. Decomposition Techniques
k. Empirical Estimation Models
l. Make/Buy Decision

Project Scheduling:

a. Task set for Software project
b. Defining a task network
c. Scheduling
d. Earned Value Analysis

Product Metrics:

e. A framework for product metrics
f. Software Quality
g. Software Quality Factors

Text Books:

1. Pressman R., "Software Engineering, A Practitioners Approach", 7th Edition, Tata McGraw Hill.

Reference Books:

1. Rajib Mall, "Software Engineering", 3rd Edition, PHI.
2. Pankaj Jalote, "An Integrated Approach to Software Engineering", 3rd Edition, Springer.
3. Sommerville, "Software Engineering", 8th Edition, Pearson.
4. Fairly R. , "Software Engineering", Tata McGraw Hill.
5. Davis A. , "Principles of Software Development", Tata McGraw Hill.
6. Shooman, M.L., "Software Engineering", Tata McGraw-Hill.

Formal Language and Automata Theory

COURSE OUTLINE

Course Title	Short Title Course Code
Formal Language and Automata Theory	**FLAT**

Course Description:
The objective of this course is to introduce the students the knowledge of automata Theory, principles of Grammars, Push down Automata, Turing Machines and enable them to apply these concepts for solving real world problems.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	14	42	03

Prerequisite Course(s): Knowledge of Discrete Structure & Graph Theory and Data Structures.

COURSE CONTENT

Formal Language and Automata Theory **Semester-V**

Teaching Scheme	**Examination Scheme**
Lecture: 3 hours / week	**End Semester Examination (ESE) : 80 Marks**
	Paper Duration (ESE) : 03 Hours
	Internal Sessional Exam (ISE) : 20 Marks

1. Finite State Machines: **(08 Hrs, 16 Marks)**

Mathematical Preliminaries:

a. Sets , Relations and Functions
b. Alphabets, Words / Strings, their Properties and operations
c. Graphs and trees
d. Basic machine

Finite State Machines:

e. State tables, Transition graph
f. Adjacency matrix
g. Description of a Finite automaton
h. Transition Systems
i. Properties of Transition functions
j. Acceptability of a string by a FA
k. Deterministic and Non-deterministic FSM's
l. Equivalence of DFA and NFA
m. Moore and Mealy Models
n. Minimization of Finite Automata
o. FSM with Epsilon moves

2. Regular Expressions: **(08 Hrs, 16 Marks)**

a. Definition, Identities for Regular Expressions
b. Finite Automata and Regular Expressions

   Transition System Containing ^-moves, NDFAs with ^-moves and Regular Expressions, Conversion of Nondeterministic Systems to Deterministic Systems
c. Building RE
d. Construction of Finite Automata Equivalent to a Regular Expression
e. Conversion of RE to FA
f. Converting FA to RE
g. Equivalence of two FA
h. Pumping lemma for regular sets
i. Applications of Pumping lemma
j. Closure properties of Regular sets

(08 Hrs, 16 Marks)

3. Grammars:

a. Definition
b. Derivation trees
c. Leftmost and Rightmost Derivations
d. Ambiguous grammar
e. Removal of ambiguity
f. Chomsky hierarchy
g. Construction of Reduced Grammar
h. Eliminating Useless symbols
i. Eliminating Epsilon productions
j. Eliminating Unit productions

Normal Forms for Context – free Grammars

k. Chomsky Normal Form
l. Greibach Normal Form
m. Reduced Forms – CNF and GNF
n. Reduction to CNF and GNF
o. Pumping Lemma for Context – free Languages
p. Decision Algorithms for Context- free Languages

4. Pushdown Stack Memory Machines & Production Systems **(08 Hrs, 16 Marks)**

Pushdown Stack Memory Machines:

a. Definition, PDM examples
b. Acceptance by PDA
c. Power of PDM
d. Deterministic and Non-deterministic PDM
e. Construction of PDA from CFG
f. Construction of CFG from PDA

Production Systems:

a. Definition, Post canonical system
b. PMT systems
c. Markov algorithm

5. Turing Machine: **(08 Hrs, 16 Marks)**

a. Turing Machine Model
b. Representation of Turing Machines
c. Language Acceptability By Turing Machines
d. Design of Turing Machines
e. Techniques for TM Construction
f. Variants of Turing Machines
g. Composite and Iterated TM
h. Universal TM
i. TM limitations
j. The Halting problem

Text Books -

1. E V Krishnamurthy, S.K.Sen, "Introductory Theory of Computer Science", Second Edition, EWP.
2. John E. Hopcroft, Rajeev Motwani, Jeffery D. Ullman, "Introduction to Automata Theory, Languages and Computation", Third Edition, Pearson.
3. K.L.P.Mishra, N. Chandrasekaran, "Theory of Computer Science Automaton, Languages and Computation", Third Edition, PHI.

Reference Books -

1. Daniel Cohen, "Introduction to computer Theory", Wiley India.
2. John Martin, "Introduction to Languages and the Theory of Computation", TMH.
3. Lewis H., Papadimitriou C., "Elements of Theory of Computation", Second Edition, Pearson.
4. Moret B., "The Theory of Computation", Pearson Education.

Computer Network

COURSE OUTLINE

Course Title	Short Title	Course Code
Computer Network	**CN**	

Course Description:

This course is aimed at introducing the fundamentals of Computer Networking to undergraduate students. The objective of the course is to understand the basics and knowledge about the Computer Network concepts and different protocols.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	**03**	**14**	**42**	**03**

Prerequisite Course(s): Data Communications.

COURSE CONTENT

Computer Network **Semester-V**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week **End Semester Examination (ESE) : 80 Marks**
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. TCP/IP Protocol Suit, Data Link Layer and Ethernet
(08 Hours, 16 marks)

TCP/IP Protocol Suit: Physical and Data Link Layers, Network Layer, Transport Layer, Application Layer. Addressing: Physical Addresses, Logical Addresses, Port Addresses, Specific Addresses.
Data Link Layer: Framing: Fixed size and variable size framing.
Ethernet: IEEE Standards: Data Link Layer, Physical Layer. Standard ETHERNET: MAC Sublayer, Physical Layer. Changes in the standard: Bridged Ethernet, Switched Ethernet, Full-Duplex Ethernet. Fast Ethernet: MAC Sublayer, Physical Layer. Gigabit Ethernet: MAC Sublayer, Physical Layer, Ten-Gigabit Ethernet.

2. Network Layer: Logical Addressing, Internet Protocol and Address Mapping
(08 Hours, 16 marks)

Logical Addressing: IPv4 Addresses: Address Space, Notations, Classful Addressing, Classless Addressing, Network Address Translation (NAT).
Internet Protocol: IPv4: Datagram, Fragmentation, Checksum, Options. IPv6: Structure, Address Space, Advantages, Packet Format, Extension Headers, Transition from IPv4 to IPv6: Dual Stack, Tunneling, Header Translation.
Address Mapping: Mapping Logical to Physical Address: ARP, Mapping Physical to Logical Address: RARP, BOOTP and DHCP.

3. Network Layer: Error Reporting, Delivery, Forwarding and Unicast 7 Mulicast Routing Protocols (08 Hours, 16 marks)

Error Reporting: ICMP: Types of Messages, Message Format, Error Reporting, Query, Debugging Tools.

Delivery: Direct Versus Indirect Delivery.

Forwarding: Forwarding Techniques, Routing Table.

Unicast Routing Protocols: Optimization, Intra and Interdomain Routing, Distance Vector Routing, Link State Routing, Path Vector Routing.

Multicast Routing Protocols: Source-Based Tree and Group-Shared Tree, MOSPF, Core-Based Tree (CBT).

4. Transport Layer: UDP and TCP

(08 Hours, 16 marks)

Transport Layer: Transport-layer services: Process-to-Process Communication, Addressing: Port Numbers, Encapsulation and Decapsulation, Multiplexing and Demultiplexing, Flow Control and Error Control.

User Datagram Protocol (UDP): User Datagram, UDP Services: Process-to-Process Communication, Connectionless Services, Flow Control and Error Control.

Transmission Control Protocol (TCP): Services, Features, Segment, Connection, Flow Control, Error Control and Congestion Control: open-loop congestion control and closed-loop congestion control.

5. Wireless Networks: 802.11 and Network Security

(08 Hours, 16 marks)

Introduction to Wireless Network: Why Wireless? A Network by Any Other Name.

Overview of 802.11 Networks: IEEE 802 Network Technology Family Tree, 802.11 Nomenclature and Design, 802.11 Network Operations, Mobility Support.

Network Security: Introduction to cryptography, symmetric-key and asymmetric-key cryptography. Symmetric-Key cryptography: Introduction, traditional ciphers, simple modern ciphers: XOR Cipher, Rotation Cipher, Substitution Cipher: S-box, Transposition Cipher: P-box. Asymmetric-Key cryptography: RSA, Diffie-Hellman algorithms.

Text Books:

1. B. A. Forouzan, "Data Communications and Networking", TMH, Fourth Edition.
2. A. S. Tanenbaum, "Computer Networks", Pearson Education, Fourth Edition.
3. Matthew S. Gast, "802.11 Wireless Networks: The Definitive Guide", O'Reilly, Second Edition.

Reference Books:

1. B. A. Forouzan, “TCP/IP Protocol Suite", TMH, Fourth Edition.
2. W.R. Stevens, “Unix Network Programming”, Vol.1, Pearson Education.
3. S. Keshav, “An Engineering Approach to Computer Networking”, Addison Wesley.
4. Comer, “Internetworking with TCP/IP", Vol. 1, Pearson Education, Fourth Edition.
5. W. Stallings, “Data and Computer Communications", Pearson Education, Fifth Edition.

System Programming

COURSE OUTLINE

Course Title	Short Title	Course Code
System Programming	**SP**	

Course Description:
The objective of this course is to introduce the students to the fundamentals of System Programming. In this basic system programs are studied in order to understand the working of system software.

	Hours per week	No. of Weeks	Total Hours	Semester Credits
Lectures	**03**	**14**	**42**	**03**

Prerequisite Course(s): Discrete Structure and Graph Theory, Data Structures.

COURSE CONTENT

System Programming **Semester-V**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week **End Semester Examination (ESE) : 80 Marks**
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Introduction to System Programs and Assembler: (08 Hours, 16 marks)

a. Introduction to system programming, Types of software and application software, System programming and system programs, Need of system software. Assemblers, Loaders, Compilers, Interpreters, Macros, Operating system and formal system, Translators and its types.
b. Assemblers: Structure of assembler, basic function, Machine dependent and machine independent features of assembler, Types of assemblers – single pass, multi-pass, cross assembler.
c. General design procedure of assembler, Design of Pass-I and Pass-II assembler (with reference to 8086 assembler).
d. Operating System:- concept, services, types (brief introduction only).

2. Macro processor & Loader: (08 Hours, 16 marks)

a. Macros and Macro Processors: Definition and function of Macro Processor, Macro expansion, Features of macro facility.
b. Design of macro processor – single pass and two pass macro processor, detailed design of two pass macro processor.
c. Loaders and Linkage Editors: Basic loader functions, Relocation and linking concepts, various loader schemes (Compile and go loader, Absolute loader, Relocating loader, general loading scheme) with their advantages and disadvantages.

3. Loader, Linker & Grammar: (08 Hours, 16 marks)

a. Design of direct linking loaders, specification of problem, specification of data structures, format of databases.
b. Design of a linker, A linker for MS DOS, Linking for overlays.
c. Other loader schemes – Binders, Linking loaders, Overlays, Dynamic binders.
d. Grammar and scanner, Programming language grammar, Derivation, Reduction and Syntax tree, Ambiguity, Regular grammar and Regular expression.

4. Parser and Parsing Techniques (08 Hours, 16 marks)

a. Parsing Techniques: - Concept, Top Down and Bottom up Parsing.
b. Top Down Parsing :- limitations of Top Down Parsing -Recursive descent and Predictive Parsing
c. Bottom Up Parsing:- Concept, Shift Reduce Parser, LR Parser, LALR, SLR Parser
d. Operator Precedence Parser, Syntax directed translation (Concept and introduction only).
e. Introduction to software development tools LEX & YACC.

5. Compiler & Inter Process Communication (08 Hours, 16 marks)

a. Overview of compilation process, Basic functions of complier, Machine dependent and machine independent features of compiler.
b. Types of compilers – single pass, multi-pass, cross compiler and pseudo code compiler,
c. Phase structure of compiler.
d. Introduction to inter process communication in windows(DLL, DDE, OLE, Clipboard:- concept and introduction only).

Reference Books:

1. John J. Donovan, "System Programming", 2nd Edition, TATA Mc GRAW HILL.
2. D. M. Dhamdhere, "System Programming and Operating Systems", Second Revised Edition, TATA Mc GRAW HILL.
3. Aho Alfred V, Sethi Rav and Ullman D, "Compiler Principles Techniques and Tools", 2nd Edition, Pearson Education.

Principles of Management

COURSE OUTLINE

Course Title	Short Title	Course Code
Principles of Management	**POM**	

Course Description:
The objective of this course is to introduce the students to the Knowledge of Functions of Management and Project management, life-cycle of project, its scheduling and total quality management enable them to Understood and gain for further study.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	14	42	03

COURSE CONTENT

Principles of Management **Semester- V**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week **End Semester Examination (ESE) : 80 Marks**
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Basic Concepts of Management (08 Hours, 16 marks)

a. Management :Definition, classification, Characteristics and Importance of management, Principles of Management
b. Management objectives, Types of objectives
c. Functions of managers, Managerial accounting
d. Development of management thoughts : Functional approach to management by Henry Foyal
e. Scientific Management Approach by Taylor, Gilbreth, Gantt
f. Human Relation Approach by Elton Mayo,Follet
g. Schools of management Thoughts
h. Tools of Management science, Managerial economics

2. Functions of Management and Organisations

(08 Hours, 16 marks)

a. Functions of Management: Planning, Organising
b. Staffing - Concept, Nature, Importance, Steps, Concept of Knowledge worker
c. Directing– Concept, Nature, Importance
d. Controlling-Concept, Nature, Importance, Process of controlling Leadership theories, characteristic and styles of leaderships
e. Management by objectives: steps in setting up M.B.O, Problem in the approach of M.B.O., Management of participation, management by exception, quantitative and qualitative objectives
f. Organisation and its Concept: Nature, Importance, Principles, Centralization, Decentralization
g. Organization Structures- Line and Staff, Functional, Organizations.

3. Human Resource Management

(08 Hours, 16 marks)

a. Function and objective Personnel Management
b. Manpower Planning, Selection and Recruitment of Employees
c. Needs & Types of Training, Objective and Benefits of training, Training for Craftsman, supervisor and Executive
d. Motivation and motivators: motivations, perspective: self-motivation
e. Motivation: the carrot and the sticks, kinds of Motivation, Herzberg's motivation, Hygien Theory
f. Personal management: concept, principles of good personal policy
g. Communication in industry, suggestion system, discipline in industry, promotion, transfer, layout and discharge

4. Project and Quality Management

(08ours, 16 marks)

a. Introduction, Project Management Terminology, Concept of project Management
b. Role and Responsibilities of Project Manager
c. Types of project, Project Life Cycle Phase
d. Project Planning, Project Scheduling, Project Monitoring and Control
e. Basic tools and Techniques for Project Scheduling
f. Total quality management: Introduction, factors affecting quality,
g. product quality analysis, product quality analysis, causes of quality failure
h. elements of T.Q.M , requirements of T.Q.M, Aims of T.Q.M., quality circles, ISO 9000

5. Industrial Psychology, Ethics and MIS

(08 Hours, 16 marks)

a. Industrial Psychology: Definition and Concepts, Industrial psychology Vs Personal Management
b. Aims and Objectives of Industrial Psychology, Scope
c. Individual difference in behavior, Group Dynamics
d. Theory X and Y, Working Environmental Conditions, Industrial Fatigue
e. Professional and Business Ethics: Concepts, Ethics and Morals, Business Ethics, Professional Ethics
f. Need and Importance of ethics, Ethical problems and business, Ethical Issues, How to make business ethical
g. Definition, Evolution of MIS, Need/Objective/Functions of an MIS, Need for Information, Qualities of Good information
h. Information as an Organizational Resource, Management Information Categories, Application of MIS

Text Books:

1. T.R.Banga & S.C.Sharma , "Industrial Organization and Management Economics" Twenty-Third Edition, Hanna Publishers.

2. O.P.Khanna, "Industrial Organization and Management Economics", Dhanpat Rai Publications, 2006.

Reference Books:

1. Koontz and Weihrich, "Management –A Global Perspective", Tenth Edition, Mc Graw-Hill International Editions.
2. Tritaphy and Reddy, "Principles of Management", Second edition, TMH.
3. Hill and Steven, "Principles of Management", McGraw Hill, Special Indian Edition, 2007.
4. M.S.Mahajan," Industrial Engineering and Production Management" Dhanpat Rai and Co.
5. W.S.Jawadekar, "Management Information System", TMH.

Software Engineering Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code

Software Engineering **SE**

Course Description:
This laboratory provides students an ability to apply analysis & design concepts to develop quality software economically.

Laboratory	Hours/Week	No. of Weeks	Total Hours	Semester Credits
	02	14	28	01

Prerequisite Course(s) : Knowledge of Object Oriented Concepts and any system programming language.

LAB COURSE CONTENT

The Software Engineering Lab must include any five of following software Mini-Projects covering Problem Definition, Analysis & Design using a CASE Tool and Documentation for each.

1. ATM System
2. Library Management System
3. Inventory Control System
4. Railway Reservation System
5. College Admission System
6. University Result Management System
7. Vehicle Navigation System
8. Hospital Management System
9. Banking System
10. Web based/Online Auction System

Guidelines for ICA:
Students must submit ICA in the form of journal. Each assignment should be well documented. Faculty in charge will assess the assignments continuously and grade or mark each assignment on completion date declared for each assignments.

Guidelines for ESE:
The oral examination will be based on the assignments performed by the candidates as part of ICA. Questions will be asked during the oral examination to judge the understanding of the student. It is expected that student knows theoretical (Software Engineering) aspect of the problem.

Reference Books:

1. Timonthy C. Lethbridge and Robert Laganiere, "Object Oriented Software Engineering – A Practical Software Development using UML and JAVA", 2nd Edition, Tata McGraw-Hill.

2. Mike O'Docherty, "Object-Oriented Analysis & Design – Understanding System Development with UML 2.0", Wiley.

Note:-

- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

Linux Lab

LAB COURSE OUTLINE

Course Title | Short Title | Course Code
Linux | **Linux**

Course Description:

This laboratory provides students with a basic knowledge of the linux programming environment. So that students able to use basic commands of linux as well as they will able to perform basic operations.

Laboratory	Hours / Week	No. of Weeks	Total Hours	Semester Credits
	02	14	28	01

Total Semester Credits: 01

Prerequisite Course(s): Fundamental knowledge of Operating system.

LAB COURSE CONTENT

Outline of Content:

Teacher should facilitate learning following lab experiments:

Group A

1. **Installation of Linux OS.**
   Installing latest version of Linux. Observing each step of installation and notice the differences.
2. **Study and execution of various Linux Commands.**
   Studying various basic commands of Linux. Use of commands.
3. **Study of vi editor.**
   Studying basic working and use of vi editor.
4. **Configuration of Linux Server (any two)**
   It shows step by step Configuration of various types of servers
   1) Web Server
   2) Mail Server
   3) Proxy Server
   4) Telnet Server
   5) FTP Server
5. **Shell script for finding out factorial of a number.**
   To calculate the Factorial of number.
6. **Shell script for finding out file type and displaying list of a directory.**
   To find out file type and displaying list of directory.
7. **Shell Script for File Handling.**
   Demonstrates the various file operations such as :
   1) Create a File.
   2) Read a File.
   3) Add a record into a File.
   4) Delete a record from File.
   5) Delete a file.
   6) Update a File.

Group B

1 **Write shell script for displaying user process and system related information using environment variables.**
Displays a user process and system related information using environment variables.

2 **Write a shell script to find the largest among the 3 given numbers.**
To find out largest number among 3 given numbers.

3 **Write a shell script to reverse the contents of a String.**
To print contents of string in reverse order.

4 **Write a shell script to print date and time.**
To print date and time along with greetings depend on time.

5 **Shell script to perform arithmetic operations.**
To perform arithmetic operations such as – Addition, Subtraction, Multiplication, Division **.**

Guidelines for ICA:
Students must submit ICA in the form of journal. Each assignment should be well documented. Faculty in charge will assess the assignments continuously and grade or mark each assignment on completion date declared for each assignments.

Reference Books:

1. Stevens Richard W, Rago Stephen A "Advanced programming in the unix environment", Pearson 2008.
2. Gopalan N P,Sivaselvan B "Beginners guide to unix", PHI Learning: New Delhi, 2009.
3. Richard Blum, Christine Bresnahan, "Linux Command Line and Shell Scripting Bible, 2nd Ed ", Wiley India, 2011.
4. Dayanand Ambawade, Deven N. Shah, "Linux Lab: Hands on Linux", Dreamtech Press
5. "Linux Administration", Kogent Learning Solutions Inc.
6. Evi Nemeth, Garth Snyder, Trent R. Hein, Ben Whaley, "Unix and Linux System Administration Handbook" 4th Edition, Pearson.
7. Neil Matthew, Richard Stones ,"Beginning Linux Programming", 4th Edition, Wiley.
8. K. L. JAMES, "Linux -Learning the Essentials", PHI,2011.

Note:

- Concerned faculty should suitably frame at least **10 practical** assignments **(SIX from PART – A and FOUR from PART – B)** out of the above list.
- Every assignment should include syntax, use of commands/functions used for coding & print out of code with proper comments and output.
- Every student is required to submit the assignments in the form of journal.
- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

Computer Network Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Computer Network	**CN**	

Course Description:

This laboratory provides students with a comprehensive study of the Computer Networking and protocols. Classroom lectures stress the strengths of Computer Networks, which provide students with the means of writing efficient, maintainable, and portable code and simulating protocols and networks.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**02**	**14**	**28**	**01**

Total Semester Credits: 01

Prerequisite Course(s): Fundamental knowledge of Computers and Data Communication, C, C++ and Java Programming.

LAB COURSE CONTENT
Outline of Content:

(Note: Minimum SIX Experiments from PART A and TWO from PART B.)

PART - A

1. Implementation of Character count/Bit-Stuffing/Byte stuffing framing methods.
2. Implementation of Dijkastra's Shortest Path Network routing algorithm.
3. Implementation of TCP checksum.
4. Socket programming for TCP.
5. Socket programming for UDP.
6. Encryption/Decryption using XOR symmetric-key cryptography algorithm.
7. Encryption/Decryption using RSA asymmetric-key cryptography algorithm.
8. Implementation of RLE data compression algorithm.

PART – B

1. Simulate the Ethernet LAN for wired networks.
2. Simulate the point-to-point wired network.
3. Simulate any Wireless network.

Guidelines for ICA:

Students must submit ICA in the form of journal. Each assignment should be well documented. Faculty in charge will assess the assignments continuously and grade or mark each assignment on completion date declared for each assignments.

Guidelines for ESE:

ESE will be based on the practical assignments submitted by the students in the form of journal. In the ESE, the students may be asked to perform the practical assignment with minor modification.

Evaluation will be based on the paper work of algorithm, understanding of the logic and the syntax, quality of the program, execution of the program, type of input and output for the program.

NOTE: -

- Concerned faculty should use any network simulator software like NS-2/NS-3/ OPNET/ NetSim/ OMNeT++ to perform **PART-B** assignments.
- Concerned faculty should suitably frame at least **08 practical** assignments **(SIX from PART – A and TWO from PART – B)** out of the above list.
- Every assignment should include, theory, algorithm, print out of code with proper comments and output. Every student is required to submit the assignments in the form of journal.
- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

System Programming Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
System Programming	**SP**	

Course Description:

The objective of this course is to introduce the students to the fundamentals of System Programming. In this basic system programs are studied in order to understand the working of system software.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**02**	**14**	**28**	**01**

Total Semester Credits: 01

Prerequisite Course(s): Fundamental knowledge of Discrete Structures and Graph Theory, Data Structures.

LAB COURSE CONTENT
Outline of Content:

1. **Develop an application to simulate pass-I of Two Pass Assembler.**
   To analyse the source program for finding Pseudo–opcode, Machine opcode, Literals and symbols.
2. **Develop an application simulate pass- II of Two pass Assembler.**
   To analyse the output of pass-I to generate the machine operation code.
3. **Develop an application to create simple text editor.**
   Develop a text editor for creation, opening, editing and saving the content into a file.
4. **Develop an application for simulating Lexical Phase of compiler.**
   Develop a Lexical Analyser for generating keywords, symbols, operators and identifires within the source code.
5. **Develop an application for simulating Syntax Analysis Phase of compiler.**
   Develop a Syntax Analyser for generating a Parse tree from source code.
6. **Develop an application for simulating Pass-I of Macro Processor.**
   Develop Pass-I of Macro processor for recognizing macro definition specified within a program.
7. **Develop an application for simulating Pass-II of Macro Processor.**
   Develop Pass-II of an Macro processor for expanding a macro definition specified within a program
8. **Develop an application for simulation of any one of parsing techniques.**
   Develop a parser from the grammar specified within a source code.

Guidelines for ICA:

Students must submit ICA in the form of journal. Each assignment should be well documented. Faculty in charge will assess the assignments continuously and grade or mark each assignment on completion date declared for each assignments.

Guidelines for ESE:

- ESE will be based on the practical assignments submitted by the students in the form of journal.
- In the ESE, the students may be asked to perform the practical assignment with minor modification.

Note:

- Concerned faculty should suitably frame at least **06 practical** assignments out of the above list.
- Every assignment should include theoretical concept, algorithm, print out of code with proper comments and output.
- Every student is required to submit the assignments in the form of journal.
- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

Java Programming Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Java Programming	**JPL**	

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**02**	**14**	**28**	**01**

Group-A

1 **Write a program that demonstrates string operations.**

2 **Write a program that demonstrate package creation and use in program.**

3 **Write a program to demonstrate the abstract class and abstract method**.

4 **Write a Java program that illustrates the concepts of Java class that includes**

(a) constructor with and without parameters.
(b) Overloading methods.
(c) Overriding methods

5 **Write a Java program to demonstrate inheritance by creating suitable classes.**

6 **Create a Java package, interface and implement in Java program.**

7 **Write a program to demonstrate**

- Use of implementing interfaces.
- Use of extending interfaces.

Group- B

1 **Write a program to implement the concept of threading.**

2 **Write a program to demonstrate the predefined and User defined exception handling.**

3 **Write a program using Applet**

- to display a message in the Applet.
- for configuring Applets by passing parameters.

4 **Write programs for using Graphics class**

- to display basic shapes and fill them.
- draw different items using basic shapes
- set background and foreground colors.

5 **Write a program in Java that demonstrates JDBC**

6 **Write a program that demonstrates JDBC on applet/application**

Guidelines for ICA:
Students must submit ICA in the form of journal. Each assignment should be well documented. Faculty in charge will assess the assignments continuously and grade or mark each assignment on completion date declared for each assignments.

Reference Books:

1. Herbert Schildt, "Java2:The Complete Reference" , Tata Mc GrawHill, 5th edition.
2. E. Balagurusamy , "Programming with Java A primer", 3rd Edition.
3. Horstman Cay and Cornell Gary, "Core JavaTM2", Vol.1, Pearson education.
4. Kathey Sierra and Bert Bates, "Head First Java", SPD Publication.
5. Steven Holzner, "JAVA 2 Programming Black Book", Wiley India.

Note:

- Concerned faculty should suitably frame at least **08 practical** assignments **(FIVE from PART – A and THREE from PART – B)** out of the above list.
- Every assignment should include algorithm, print out of code with proper comments and output.
- Every student is required to submit the assignments in the form of journal.
- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

Industrial Training / EDP / Special Study

COURSE CONTENT

Industrial Training / EDP / Special Study **IT/EDP/SS**
Course Title Short Title Course Code

Semester-V **Examination Scheme**
Total Semester Credits: 02 **Internal Continuous Assessment (ICA): 25 Marks**

Industrial Training

- Student shall undergo industrial training for a minimum period of **two weeks** during summer vacations between fourth semester and fifth semester.
- The industry in which industrial training is taken should be a medium or large scale industry
- The paper bound report on training must be submitted by the student in the beginning of Fifth semester along with a certificate from the company where the student took training.
- Every student should write the report separately.
- Institute / Department/T&P Cell have to assist the students for finding Industries for the training.
- Students must take prior permission from Department before joining for Industrial Training.

OR

EDP (Entrepreneurship Development Program)

- Student has to participate in Entrepreneurship Development Program for a minimum period of **One week** during summer vacations between fourth semester and fifth semester.
- Every student must submit the paper bound report based on the program in the beginning of Fifth semester along with a certificate (Course / Program completion) from the program organizers.
- Every student should write the report separately.
- Institute / Department may arrange Entrepreneurship Development Program at their campus.
- Students must take prior permission from Department before attending any Entrepreneurship Development Program.

OR

Special Study

- Student has to submit name of three topics of his interest to the department.
- Special study in a group shall not be allowed.
- The three-member committee appointed by Head of Department shall allot one topic out of the three topics submitted by the student.
- Every student must submit the paper bound report based on special study at the end of Firth semester.
- Department should allot guide to all such students, for monitoring their progress and guide them for literature survey / report writing etc.
- Evaluation of special study shall be done based on presentation made by student, followed by brief question answer session.

Evaluation of Industrial Training / EDP / Special Study

ICA: The Internal Continuous Assessment shall be based on the active participation of the students in the training / EDP / Special study and based on knowledge / skill acquired by the student. The three-member committee appointed by Head of Department shall assess the reports and award marks based on following:

(a) Report	10 marks.
(b) Presentation	10 marks.
(c) Viva-voce at the time of presentation	05 marks.
Total:	**25 marks.**

NORTH MAHARASHTRA UNIVERSITY, JALGAON (M.S.)

Third Year Engineering

(Information Technology)

Faculty of Engineering and Technology

COURSE OUTLINE

Semester – VI

W.E.F 2014 – 2015

Operating System

COURSE OUTLINE

Course Title	Short Title	Course Code
Operating System	**OS**	

Course Description:
The objective of this course is to introduce the students to the concepts of Operating Systems functions, types and their working details.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	**14**	**42**	**03**

Prerequisite Course(s): Computer Organization, System Programming.

COURSE CONTENT

Operating System **Semester-VI**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Operating System Overview

(08 Hours, 16 marks)

a. Introduction: Computer system organization, Architecture, Evolution of OS, Need of OS, User view and System view of OS.
b. Types of Operating System: Batch, Timesharing, Multiprogramming, Multitasking, RTOS, Distributed.
c. Operating System Services and Components: Different OS services and OS components, System calls and its types.
d. Operating System Structures: Monolithic, Layered, Kernel, Microkernel, Virtual Machine.
e. Threads: Overview, Benefits, Models (Introduction Only).

2. Process and Process Management

(08 Hours, 16 marks)

a. Process Concept: The process, Process states, Process Control Block, Context Switching, SPOOLING, CPU & I/O burst.
b. Scheduling: Concept, Objectives, Queuing diagram.
c. Types of Schedulers: Long term Scheduler, Middle term Scheduler, Short term Scheduler.

d. Scheduling Algorithm (For Uniprocessor System): FCFS, SJF (preemptive & non preemptive), Priority (preemptive & non preemptive), Round Robin, MLQ with and without feedback.

e. IPC: Concept and Types.

f. Critical Section: Critical section problem, Solution to critical section problem, Mutual exclusion with busy waiting, TSL, Peterson's solution for two processes, Dijkstra's semaphore.

g. Problem in Concurrent Programming: Producer-Consumer problem, Readers–Writers problem, Dinning Philosopher problem, Monitors.

3. Deadlocks

(08 Hours, 16 marks)

a. Deadlock: System Model, Deadlock Characterization, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

b. Memory Management: Memory Management Requirements.

c. Memory Partitioning: Fixed and Dynamic Partitioning.

d. Memory Allocation: Allocation strategies (First Fit, Best Fit and Worst Fit), Fragmentation, Swapping, Paging and Segmentation.

e. Virtual Memory Management: Background, Demand Paging, Page Replacement (FIFO, LRU, Optimal LRU), Thrashing.

4. Storage Management

(08 Hours, 16 marks)

a. File concept: File Organization, Access Methods and Directory Structure.

b. Allocation of Disk Space: Contiguous allocation, Non-contiguous allocation (chaining and indexing).

c. Disk Scheduling: FCFS, SSTF, SCAN, C-SCAN, LOOK.

5. Secondary Storage Structure, Protection and Security, Introduction to UNIX.

(08 Hours, 16 marks)

a. Disk Management: Disk formatting, Boot block, Bad blocks.

b. Swap Space Management: Swap Space Use, Swap Space.

c. System Protection: Goals of protection, Domain of protection, Threats, Security attacks.

d. Introduction to UNIX: History, System architecture.

e. Internal Representation of File: Inode, Structure of regular file, Super block, Pipes (No Algorithms).

f. Process Control: Process creation, Process States and Transitions, Process system calls (exec, fork).

Text Books:

1. A. Silberschatz, P. B. Galvin, G. Gagne, “Operating Systems Concepts”, 7th/ 8th edition, John Wiley Publications, 2008.
2. William Stalling, “Operating System Internals and Design Principles”, 6th edition, Pearson Publication, 2013.

Reference Books:

1. Maurice J. Bach, “The Design of the Unix Operating System”, 1st edition, PHI.
2. Dhananjay M. Dhamdhere, “Operating Systems-A Concept-Based Approach”, 3rd edition, TMH, 2012.
3. A. S. Tanenbaum, “Modern Operating System”, 2nd edition, Pearson publication”, 2001.
4. H. M. Deitel, P. J. Deitel, D. R. Choffnes, “Operating System”, 3rd edition, Pearson publication, 2013.
5. Rajiv Chopra, “Operating Systems-A Practical Approach”, 1st edition, S. Chand Publication, 2009.
6. Sibsankar Haldar, Alex A. Arvind, “Operating Systems”, 1st edition, Pearson Publication, 2009.

Object Oriented Modeling & Design

Course Title
Object Oriented Modeling and Design

Short Title Course Code
OOMD

Course Description:
The objective of this course is to introduce students the knowledge about Modeling and Design of Software firmware and business processes. It introduces UML 2.0 and its diagrams as a modeling tool for large and complex systems. It also gives understanding of the concepts being modeled in UML.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	14	42	03

Prerequisite Course(s): Knowledge of software engineering and object oriented concepts.

COURSE CONTENT

Object Oriented Modeling and Design **Semester-VI**

Teaching Scheme

Lecture: 3 hours / week

Examination Scheme

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Introduction of Object Oriented Modeling (08 Hrs, 16 Marks)

Introduction:

a. What is object-oriented?
b. What is Object oriented development? : Modeling Concept , Not Implementation , Object- Oriented Methodology , Three Models
c. Object oriented themes

Why We Model:

d. The Importance of Modeling
e. Principles of Modeling
f. Object-Oriented Modeling

4+1 View architecture,

Architectural approaches: Use case driven, Architecture-centric, Iterative and Incremental,

Rational Unified Process:

g. Characteristics of the process

Phases and Iterations:

h. Inception Phase
i. Elaboration Phase
j. Construction Phase
k. Transition Phase
l. Iterations
m. Process Workflows
n. Artifacts
o. Other Artifacts

2. Introduction to UML (08 Hrs, 16 Marks)

a. An Overview of the UML: Visualizing, Specifying, Constructing, Documenting
b. Background , UML Basics

c. Introducing UML 2.0

A Conceptual Model of the UML:

d. Building Blocks of the UML
e. Rules of the UML
f. Common Mechanisms in the UML: Specifications, Adornments, Common divisions
g. Extensibility Mechanisms: stereotypes, tagged values, constraints

Object Constraint Language:

h. OCL Basics, OCL Syntax, Advanced OCL Modeling

3. Class Diagram and Composite Structure Diagram (08 Hrs, 16 Marks)

Object Diagram:

a. **Terms and Concepts:**
Common Properties, Contents, Common Uses
b. **Common Modeling Techniques:** Modeling Object Structures

Class Diagram:

c. Classes, Attributes, Operations, Abstract Classes
d. **Relationships:** Dependency, Association, Aggregation, Composition, Generalization, Association Classes, Association Qualifiers
e. **Advanced Relationships:**
Stereotypes on Dependency, Stereotypes and Constraints on Generalization, Constraints on Association, Realization
f. Interfaces
g. Templates
h. Class Diagram: Common Properties, Contents, Common Uses
i. Common Modeling Techniques : Modeling Simple Collaborations, Modeling a Logical Database Schema
j. Forward and Reverse Engineering

Composite Structures Diagram:

k. Connectors, Ports, Structured classes and Properties

4. Behavioral Diagrams (08 Hrs, 16 Marks)

a. **Use case Diagram**
Names, Use Cases and Actors, Use Cases and Flow of Events, Use Cases and Scenarios, Use Cases and Collaborations, Organizing Use Cases, Common Properties, Contents, Common Uses
b. **Sequence Diagram**
c. **Communication Diagram**
d. **Timing Diagram**
e. **State chart Diagram:**
Behavioral State Machines, States, Composite States, Submachine States, Transitions, Activities, Protocol State Machines ,Pseudo States , Event Processing
f. **Activity Diagram:**
Common Properties, Contents, Action States and Activity States, Transitions, Branching, Forking and Joining, Swimlanes, Object Flow, Common Uses

5. Package Diagram, Component Diagram, Deployment Diagram (08 Hrs, 16 Marks)

Package Diagram:

a. **Terms and Concepts**
Names, Owned Elements, Visibility, Importing and Exporting
b. **Common Modeling Techniques:** Modeling Groups of Elements, Modeling Architectural Views

Component:

c. **Terms and Concepts**
Names, Components and Classes, Components and Interfaces, Kinds of Components

Component Diagram:

d. Common Properties, Contents, Common Uses
e. **Common Modeling Techniques:** Modeling Source Code, Modeling an Executable Release, Modeling a Physical Database, Modeling Adaptable Systems
f. Forward and Reverse Engineering

Deployment:

g. **Terms and Concepts**
Names, Nodes and Components, Connections

Deployment Diagram:

h. Common Properties, Contents, Common Uses
i. **Common Modeling Techniques:** Modeling an Embedded System, Modeling a Client/Server System, Modeling a Fully Distributed System
j. Forward and Reverse Engineering

Text Books:

1. James Rumbaugh , Michael Blaha , William Premerlani, Frederick Eddy, William Lorensen ,"Object- Oriented Modeling and Design", Pearson Education.
2. Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language User Guide", Pearson Education.
3. Dan Pilone, Neil Pitman, "UML 2.0 in a Nutshell", SPD ,O'Reilly.

Reference Books:

1. Martin Fowler, "UML Distilled: A Brief Guide to the Standard Object Modeling Language", Third Edition ,Addisioh Wesley.
2. Tom Pender, "UML 2 Bible", Wiley.
3. Meilir Page-Jones, "Fundamentals of Object Oriented Design in UML", Pearson Education.
4. Pascal Roques, "Modeling Software Systems Using UML2", Wiley.
5. Atul Kahate, "Object Oriented Analysis & Design", The McGraw-Hill Companies.
6. Mark Priestley, "Practical Object-Oriented Design with UML", TATA McGraw-Hill.
7. Craig Larman, "Appling UML and Patterns: An introduction to Object–Oriented Analysis and Design and Iterative Development", Pearson Education.
8. Mike O'Docherty, "Object-Oriented Analysis & design understanding system development with UML 2.0", John Wiley and Sons.

Database Management System

COURSE OUTLINE

Course Title
Database Management System

Short Title Course Code
DBMS

Course Description:
The objective of this course is to introduce the students to Learn and practice data modeling using the entity-relationship and developing database designs, apply normalization techniques to normalize the database, learn techniques for controlling the consequences of concurrent data access also understand the needs of Object based Database and Database System Architecture.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	14	42	03

Prerequisite Course(s): Knowledge of data structures.

COURSE CONTENT

Database Management System **Semester-VI**

Teaching Scheme

Lecture: 3 hours / week

Examination Scheme

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1) Introduction to DBMS (08 Hrs, 16 Marks)

a. Database-System Applications
b. Purpose of Database Systems
c. View of Data: Data Abstraction ,Instances and Schemas, data independence
d. Data Models: Relational Model , Entity-Relationship Model ,Object-Based data model, Semistructured Data Model
e. Database Languages
f. Data Storage and Querying
g. Transaction Management
h. Database Architecture
i. Database Users and Administrators

Database Design and E-R Model

j. Overview of the Design Process
k. The Entity Relationship Model: Entity Sets , Relationship Sets, Attributes, Constraints
l. Entity-Relationship Diagram: Basic Structure , Mapping Cardinality, Roles, Weak Entity sets
m. Extended E-R Features: Specialization, Generalization, Attribute Inheritance, Constraints on Generalizations, Aggregation

2) Structured Query Language (08 Hrs, 16 Marks)

a. Introduction to relational Model: structure of relational Databases, Database Schema, Keys, Schema Diagrams
b. Overview of the SQL Query Language
c. SQL Data Definition

d. Basic Structure of SQL Queries
e. Additional Basic Operations
f. Set Operations
g. Null Values
h. Aggregate Functions
i. Nested Subqueries
j. Modification of the Database

Intermediate SQL:

k. Joined Expressions: Join Conditions , Outer Joins
l. Views
m. Integrity Constraints

3) Formal Relational Query Languages (08 Hrs, 16 Marks)

The Relational Algebra:

a. Fundamental Operations:
The select Operation, The Project Operation, The Union Operation, The Set-Difference Operation, The Cartesian-Product Operation, The Rename Operation, Formal definition of Relational Algebra
b. Additional Algebra Operations:
The Set-Intersection Operation, The Natural-Join Operation, The Assignment Operation, Outer Join Operations
c. Extended Relational-Algebra Operations:
Generalized Projection, Aggregation

The Tuple Relational Calculus:

d. Formal Definition
e. Example Queries

The Domain Relational Calculus:

f. Formal Definition
g. Example Queries

Functions and Procedures

Triggers

4) Relational Database Design and Transaction Management (08 Hrs, 16 Marks)

Relational Database Design:

a. Features of Good Relational Designs
b. Atomic Domains and First Normal Form
c. Decomposition Using Functional Dependencies:
Keys and Functional Dependencies, Boyce-Codd Normal Form, BCNF and Dependency Preservation, Third Normal Form
d. Decomposition Using Multivalued Dependencies: Multivalued Dependencies, Fourth Normal Form

Transaction Management:

e. Transaction Concept
f. A simple Transaction Model
g. Transaction Atomicity and Durability

Concurrency Control:

h. Lock-Based Protocols: Locks, Granting of Locks, The Two Phase Locking protocol
i. Timestamp–Based Protocols: Timestamps , The Timestamps-Ordering Protocol

Recovery System:

j. Failure Classification
k. Storage
l. Recovery and Atomicity: Log records, Database Modification, Concurrency Control and Recovery ,Transaction Commit , Using the Log to Redo and Undo Transactions

5) Object–Based Databases and Database- System Architectures (08 Hrs, 16 Marks)
Object–Based Databases

a. Overview,
b. Complex Data Types
c. Structure Types and Inheritance in SQL
d. Table Inheritance
e. Array and Multiset Types in SQL: Creating and Accessing Collection Values, Querying Collection-Valued Attributes
f. Object–Identity and Reference Types in SQL
g. Persistent Programming Languages: Persistence of Objects, Object Identity and Pointers

Database-System Architectures

h. Centralized and Client–Server Architectures
i. Server System Architectures
j. Parallel Systems
k. Distributed Systems

Text Book:

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", 6th Edition, McGraw-Hill.

Reference Books:

1. R. Ramkrishnan , J. Gehrke, "Database Management Systems", 3rd Edition, McGraw-Hill.
2. C. J. Date, "Introduction to Database Management Systems", 8th Edition, Pearson.
3. V.K.Jain, " Database Management System", Dreamtech Press (Wiley India).
4. Atul Kahate, "Introduction to Database Management System", 3rd Edition, Pearson.
5. G. K. Gupta, "Database Management Systems", McGraw–Hill.
6. S. K. Singh, "Database Systems Concepts, Design and Applications", Pearson.
7. Bipin Desai, "Introduction to database management systems", Galgotia.

E-Commerce

COURSE OUTLINE

Course Title	Short Title	Course Code
E- Commerce	**E-Com**	

Course Description:

The aim of this course is to equip students with the range of technical and business skills needed to study and understand e-commerce concepts and practices in a business environment. The student gains an overview of all aspects of E-Commerce. The course provides different types of e-commerce, concepts of C2C, P2P, M-Commerce business models. Major security threats in the e-commerce environment along with technology solutions are discussed. Later part of course is devoted to e-commerce payment, marketing communications, ethical issues in e-commerce and online content.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	**15**	**45**	**03**

Prerequisite Course(s): Principles of Management

COURSE CONTENT

E-commerce **Semester-IV**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Introduction to E-Commerce and Business Models

(08 Hours, 16 marks)

I. Introduction to E-Commerce

a. What is E-Commerce
b. The difference between E-commerce and E-business
c. Why study E-Commerce?
d. Eight unique features of E-Commerce technology
e. Types of E-commerce

II. E-commerce Business Models

a. Introduction
b. Eight Key Elements of a Business Model
c. Business Models in Emerging E-commerce Areas

2. Security Issues and Technology Solutions

(08 Hours, 16 marks)

I. Major Security Threats in the E-Commerce Environment

a. Malicious Code
b. Unwanted Programs
c. Phishing and Identity Theft
d. Hacking and Cybervandalism
e. Credit Card Fraud/Theft
f. Spoofing (Pharming) and Spam (Junk) Web Sites
g. Denial of Service (DoS) and Distributed Denial of Service (DDoS) Attacks
h. Sniffing
i. Insider Attacks
j. Poorly Designed Server and Client Software

II. Technology Solution

a. Protecting Internet Communications
b. Securing Channels of Communication
c. Protecting Servers and Clients

3. Management Policies And E-Commerce Payment Systems

(08 Hours, 16 marks)

I. Management Policies, Business Procedures, and Public Laws

a. A Security Plan: Management Policies
b. The Role of Laws and Public Policy

II. E-Commerce Payment Systems

a. Online Credit Card Transactions
b. Digital Wallets
c. Digital Cash
d. Online Stored Value Systems
e. Digital Accumulating Balance Payment Systems
f. Digital Checking Payment Systems
g. Wireless Payment Systems

4. Communication and Online Marketing

(08 Hours, 16 marks)

I. Marketing Communications

a. Online Advertising
b. E-mail Marketing and the Spam Explosion
c. Online Catalogs
d. Social Marketing: Blogs, Social Networks and Games
e. Targeted Marketing: Getting Personal
f. Mixing Offline and Online Marketing Communications

II. Understanding the Costs and Benefits of Online Marketing Communications

a. Online Marketing Metrics: Lexicon
b. How Well Does Online Advertising Work?
c. The Costs of Online Advertising

d. Software for Measuring Online Marketing Results

5. Ethical Issues and Online Content

(08 Hours, 16 marks)

I. Understanding Ethical Issues in E-commerce

a. A Model for Organizing the Issues
b. Basic Ethical Concepts: Responsibility, Accountability, and Liability
c. Analyzing Ethical Dilemmas
d. Candidate Ethical Principles

II. Online Content

a. Content Audience and Market: Where Are the Eyeballs and the Money?
b. Media Industry Structure
c. Media Convergence: Technology, Content, and Industry Structure
d. Online Content Revenue Models and Business Processes
e. Key Challenges Facing Content Producers and Owners

Text Book:

1. Kenneth C. Laudon, Carol Guercio Traver, "E-Commerce - Business, Technology, Society 2008", Fourth Edition, Pearson Education.

Reference Books:

7. Harvey M. Deitel, Paul J. Deitel, Kate Steinbuhler, "E-Business and E-Commerce for Managers", Prentice Hall.
8. Greenstein, Feinnon, " Electronic Commerce", Tata McGraw Hill Edition.
9. Ravi Kalakota, et al, "Electronic Commerce – A Manager's Guide", Addison Wesley Longman.

Management Information System

COURSE OUTLINE

Course Title	Short Title	Course Code
Management Information System	**MIS**	

Course Description:

This course provides an introduction to information systems for business and management. It is designed to familiarize students with organizational and managerial foundations of systems, the technical foundation for understanding information systems, the role of information systems in enhancing business processes and management decision making across the enterprise, and the process of building and managing systems in organizations. The course will focus on topics such as Management of the Digital Firm, Internet and Internet technology, the Electronic Business and Electronic Commerce, the Information Technology (IT) Infrastructure, the Ethical and Security Issues related to Information Systems, and the Enterprise Applications. The course will provide students with information systems knowledge that is essential for creating successful and competitive firms.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	14	42	03

Prerequisite Course(s): Principles of Management.

COURSE CONTENT

Management Information Systems **Semester-VI**

Teaching Scheme
Lecture: 3 hours / week

Examination Scheme
End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Information Systems

(08 Hours, 16 marks)

i. Introduction

a) Data Vs Information
b) Functions of Management
c) Managerial Roles
d) Levels of Management
e) Classification of Information System
f) Framework for Information System

ii. Systems

a) System concepts
b) System and their Environments
c) How system works
d) System approach for problem solving

2. E Business Enterprise:

(08 Hours, 16 marks)

i. E Business Technology

a) Introduction to E Business
b) Models of E Business
c) Internet and WWW
d) Security in E Business
e) Electronic Payment System
f) Web Enabled Business Management
g) Enterprise Portal
h) MIS in Web Environment

ii. Organization of Business in Digital Firm

a) E Business
b) E Commerce
c) E Communication
d) E Collaboration
e) Real Time Enterprise

3. Applications To Functional Business Areas

(08 Hours, 16 marks)

i. Operational Information System

a) Accounting / Finance
b) Marketing
c) Production
d) Human Resource

ii. Tactical Information System

a) Accounting / Finance
b) Marketing
c) Production
d) Human Resource

iii. Strategic Information System

a) Accounting / finance
b) Marketing
c) Production
d) Human Resource

4. DSS, EMS And ES:

(08 Hours, 16 marks)

i. Decision Support System

a) Characteristics of Decision Making Process
b) Features of DSS
c) Development of DSS
d) Benefits and Risks of DSS
e) GDSS

ii. Enterprise Management System

a) ERP System
b) ERP Model and Modules
c) Benefits of ERP
d) Supply Chain Management
e) Customer Relationship Management

iii. Expert Systems

a) Characteristics
b) How an Expert System Works
c) Advantages
d) Expert System and DSS
e) Expert Systems and AI.

5. Information Security and Information Technology

(08 Hours, 16 marks)

i. Information Security Challenges in E Enterprise

a) Risks
b) Common Threats
c) Common Controls
d) Protection of information system

ii. IT: Impact on Society

a) Impact of IT on Privacy
b) Ethics
c) Technical Solution for Privacy Protection
d) Intellectual Property
e) Copyright and Patents
f) Impact of IT on the Workplace
g) Impact of quality on Life

Text Books:

1. Robert Schultheis and Mary Sumner, "Management Information Systems The Managers View", 4th Edition Tata McGraw Hill
2. Waman S. Jawadekar, "Management Information Systems", 4th Edition Tata McGraw Hill.

Reference Books:

1. Sahil Raj "Managament Information Systems" PearsonEducation
2. Kenneth C Laudon and Jane Laudon, "Management Information System", Pearson Education
3. James A. O'Brien, "Management Information Systems", Tata McGraw Hill
4. S. Sadagopan, "Management Information System", PHI.

Operating System Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Operating System	**OS**	

Course Description:

This laboratory provides students with a comprehensive study of the operating system functions, its working details and implementation of various algorithms used in the operating systems.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**02**	**14**	**28**	**03**

Total Semester Credits: 03

Prerequisite Course(s): C Programming, Basic Knowledge of Linux Operating System.

LAB COURSE CONTENT

Outline of Content:

(Note: Minimum FOUR Experiments each from group A and B)

Group A

1. **Study of Commercial and Open Source Operating Systems (01 each) and Design structure of these of Operating Systems.**
   a. Study the basic structures.
   b. Study the File systems.
   c. Study the Security aspects of Operating Systems.
   d. e. g. Windows OS, Linux OS.
2. **Write a program to implement Command Interpreter using system calls.**
   Implementation of Command Interpreter using various system calls showing working of Command Line Interpreter.
3. **Write a program to implement concept of Threading.**
   Demonstrate the concept of Threading in process. (Without using System Call/ Kernel Functions).
4. **Write a program to implement CPU Scheduling algorithms**
   Demonstrate the working of CPU Scheduling algorithms (any two).
   a. FCFS
   b. SJF(Preemptive & non-preemptive)
   c. Round Robin
   d. Priority(Preemptive & non-preemptive)

5. **Write a program to implement algorithmic solution for Critical Section Problem**
   Demonstrate solution to overcome the critical section problem.

Group B

1. **Write a program to implement Memory Management algorithms – best fit, first fit, worst fit**
   Demonstrate the working of Memory Management algorithms (any two).
   a. First Fit
   b. Best Fit
   c. Worst Fit
2. **Write a program to implement Page Replacement algorithms**
   Demonstrate the working of Page Replacement algorithms (any two).
   a. FIFO(First In First Out)
   b. LRU(Least Recently Used)
   c. Optimal
3. **Write a program to implement Inter process communication**
   Demonstrate the working of Inter Process Communication (any one).
   a. Full Duplex pipes
   b. Half Duplex pipes
4. **Write a program for Banker's algorithm**
   Demonstrate the working of Banker's algorithm.
5. **Write a program to demonstrate disk scheduling algorithms**
   Demonstrate the working of the Disk Scheduling algorithms (any two).
   a. FCFS
   b. SSTF
   c. SCAN
   d. C-SCAN

Guidelines for ICA:
Students must submit ICA in the form of journal. Each assignment should be well documented. Faculty in charge will assess the assignments continuously and grade or mark each assignment on completion date declared for each assignments.

Guide lines for ESE:-

- ESE will be based on the practical assignments submitted by the students in the form of journal.
- In the ESE, the students may be asked to perform the practical assignment with minor modification.
- Evaluation will be based on the paper work of algorithm, understanding of the logic and the syntax, quality of the program, execution of the program, type of input and output for the program.

Reference Books:

1. A. Silberschatz, P. B. Galvin, G. Gagne, "Operating Systems Concepts", 7th/ 8th edition, John Wiley Publications, 2008.

2. William Stalling, “Operating System Internals and Design Principles”, 6th edition, Pearson Publication, 2013.
3. Maurice J. Bach, “The Design of the Unix Operating System”, 1st edition, PHI.
4. Dhananjay M. Dhamdhere, “Operating Systems-A Concept-Based Approach”, 3rd edition, TMH, 2012.
5. A. S. Tanenbaum, “Modern Operating System”, 2nd edition Pearson publication, 2001.
6. H. M. Deitel, P. J. Deitel, D. R. Choffnes, “Operating System” 3rd edition, Pearson publication, 2013.
7. Rajiv Chopra, “Operating Systems-A Practical Approach”, 1st edition, S. Chand Publication, 2009.
8. Sibsankar Haldar, Alex A. Arvind, “Operating Systems”, 1st edition, Pearson Publication, 2009.

Note:-

- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

Object Oriented Modeling & Design Lab

LAB COURSE OUTLINE

Course Title	Short Title Course Code
Object Oriented Modeling and Design	**OOMD**

Course Description:
The objective of this course is to introduce the students to learn how to understand the requirements of a system, its analysis, its scope, good design and good modeling practices and to document them. Students are being able to discuss the pros and cons of system design and issues in modeling large and complex systems. It explores UML 2.0 Basic and advanced concepts and notation for the same & diagrams for modeling different aspects of a system throughout the SDLC lifecycle.

Laboratory	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	02	14	28	01

Total Semester Credits: 01
Prerequisite Course(s): Knowledge of software engineering.

LAB COURSE CONTENT
Outline of Content:
(Note: Minimum Six Experiments out of eight)

To meet above objectives teachers will help students choose a following system for modeling. The students will try and identify scope of such a system as realistically as possible. Students will learn to draw, discuss different UML 2.0 diagrams, concepts, notation, advanced notation, forward and reverse engineering aspects. As far as possible draw as many diagrams for one single system, unless they are not applicable for the chosen system in which case other systems may be chosen for specific diagrams.

1. Design ATM system using Structural and Behavioral UML diagram.
2. Design Coffee vending machine using Structural and Behavioral UML diagram.
3. Design College Admission Process using Structural and Behavioral UML diagram.
4. Design Library Management system using Structural and Behavioral UML diagram.
5. Design Hospital Management system using Structural and Behavioral UML diagram.
6. Design Railway Reservation system using Structural and Behavioral UML diagram.
7. Design Online Shopping system using Structural and Behavioral UML diagram.
8. Design Hotel Management system using Structural and Behavioral UML diagram.

Guidelines for ICA:
Students must submit ICA in the form of journal. Each assignment should be well documented. Faculty in charge will assess the assignments continuously and grade or mark each assignment on completion date declared for each assignments.

Guide lines for ESE:-

- ESE will be based on the practical assignments submitted by the students in the form of journal.

Reference Books:

1. Pascal Roques, "Modeling Software Systems Using UML 2", Wiley.
2. Russ Miles and Kim Hamilton, "Learning UML 2.0, SPD", O'Reilly.
3. Craig Larman, "Applying UML and patterns: An introduction to Object-Oriented Analysis and Design and Iterative Development", Pearson Education.
4. Mike O'Docherty "Object-Oriented Analysis & design understanding system development with UML 2.0", John Wiley and Sons.
5. Jim Arlow, Ila Neustadt, "UML 2 and the Unified Process: Practical Object-Oriented Analysis and Design", 2nd Edition, Addison-Wesley Professional.
6. Mark Priestley, "Practical Object-Oriented Design with UML", TATA McGraw-Hill.

Note:-

- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

Database Management System Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Database Management System	**DBMS**	

Course Description:

The objective of this course is to introduce the students to learn and practice Structure Query Language for creation, Manipulation, controlling database, apply normalization techniques to normalize the database also learn different types of Join, view, PL/SQL, Trigger, Stored Procedure, Stored function and enable them to apply these concepts for solving real world problems.

Laboratory	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	02	14	28	01

Total Semester Credits: 01

Prerequisite Course(s): knowledge of Data Structures

LAB COURSE CONTENT

Outline of Content:

(Note: Group A is Mandatory and Minimum Three experiments from Group B.)

GROUP A

1. Creating a sample database using any client server RDBMS (Oracle/ Open Source Database) package using SQL DDL queries. This will include constraints (Primary key, Foreign key, Unique, Not Null, and Check) to be used while creating tables.
2. SQL DML queries: Use of SQL DML queries to retrieve, insert, delete and update the database created in experiment No. 1.
3. SQL Queries: The queries should involve SQL feature such as aggregate functions, group by, having, order by the database created in experiment No. 1.
4. SQL Queries: The queries should involve Set Operations and Set Comparisons the database created in experiment No. 1.
5. Screen design and Report generation: Sample forms and reports should be generated using any front end tools.

GROUP B

1. Write a program to demonstrate different types of JOIN.
2. Write a program to demonstrate use of Trigger.
3. Write a program to demonstrate view.
4. Write a program to demonstrate PL/SQL block.
5. Write a program to demonstrate stored function.
6. Write a program to demonstrate stored procedure.

Guidelines for ICA:
Students must submit ICA in the form of journal. Each assignment should be well documented. Faculty in charge will assess the assignments continuously and grade or mark each assignment on completion date declared for each assignments.

Guide lines for ESE:-

- ESE will be based on the practical assignments submitted by the students in the form of journal.
- In the ESE, the students may be asked to perform the practical assignment with minor modification.
- Evaluation will be based on the paper work understanding of the logic and the syntax, quality of the program, execution of the program, type of input and output for the program.

Reference Books:

1. Rick F. Van der Lans, "Introduction to SQL", Pearson education.
2. B. Rosenzweig, E. Silvestrova, "Oracle PL/SQL by Example", Pearson education.
3. Steven Feuerstein, "Oracle PL/SQL Programming", SPD, O'Reilly.
4. Dr. P. S. Deshpande, "SQL& PL/SQL for Oracle 10g Black Book", Dreamtech Press
5. M. McLaughlin, "Oracle Database 11g PL/SQL Programming", TMH.
6. J. J. Patrick, "SQL Fundamentals", Pearson Education.

Note:-

- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

Web Programming Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Web Programming	**WPL**	

LAB COURSE CONTENT

Teacher should facilitate learning following lab experiments:

(Part A)

1. **Develop a complete web page using HTML basic tags, CSS, Table and Layout**
   - A simple web page that includes basic tags such as head, body, text formatting tags, lists, paragraph, image tags, css, table and layout etc.
2. **Design a page web using JavaScript to demonstrate, if statement, if...else statement and Switch statement**
   - A simple web page that include JavaScript statements such as if, if...else and switch.
3. **Design a page web using JavaScript to demonstrate, Alert box Alert box with line breaks, Confirm box and Prompt box**
   - A simple web page that include JavaScript alert box, alert box with line breaks, confirm box and prompt box.
4. **Design a page web using JavaScript to demonstrate, Call a function ,Function with an argument, Function that returns a value**
   - A simple web page that include JavaScript call a function, function with arguments, function that return a value.
5. **Design a page web using JavaScript to demonstrate, For loop, While loop, Do While loop, Break a loop, Break and continue a loop**
   - A simple web page that include JavaScript for loop, while loop , do while loop, break a loop, break and continue a loop.
6. **Design a page web using JavaScript to demonstrate, Acting to the onclick event, Acting to the onmouseover event, onblur , onchange, ondblclick, onkeydown, onkeypress, onkeyup, onresize, onunload**
   - A simple web page that include JavaScript events like onclick, onmouseover, onblur, onchange, ondblclick, onkeydown, onkeypress, onkeyup, onresize, onunload etc.
7. **Design a page web using JavaScript to demonstrate, Sort an array (alphabetically and ascending), Sort numbers (numerically and ascending), Sort numbers (numerically and descending)**
   - A simple web page that include JavaScript to sort an array alphabetically and ascending, sort numbers numerically and ascending and sort numbers numerically and descending.
8. **Design a page web using PHP to demonstrate, variables, echo/print, data types, string functions and operators**
   - A simple web page that include PHP variables, echo/print, data types, string functions and operators.
9. **Design a page web using PHP to demonstrate, if-else-elseif, switch, for loop, while loop, functions and arrays**
   - A simple web page that include PHP if-else-elseif, switch, for loop, while loop, functions and arrays.
10. **Design a page web using PHP to demonstrate, form handling, form validation and form URL/E-mail**
    - A simple web page that include PHP form handling, form validation and form URL/E-mail**.**

(Part B)

1 **Web server installation and configuration**
   - Installation and configuration of any web server like IIS, Apache, WAMP, XAMP etc.

2 **Design a page web using PHP to demonstrate, date, file, file upload, cookies and sessions**
   - A simple web page that include PHP date, file, file upload, cookies and sessions.

3 **Design a page web using PHP to demonstrate, MySQL connect, create DB/Table, insert into, select, where, order by, update and delete**
   - A simple web page that include PHP MySQL connect, create DB/Table, insert into, select, where, order by, update and delete.

4 **Design a Website with the help of HTML and JavaScript with not less than 15 full size pages for a selected topic (Commercial, Institute, Portal or decided jointly by the student and teacher)**
   - Design a website on the above listed topics with the help of HTML and JavaScript.

5 **Design a Website with the help of HTML and PHP for a selected topic (Banking, Commercial, Institute, Portal or decided jointly by the student and teacher)**
   - Design a website on the above listed topics with the help of HTML and PHP.

Guidelines for ICA:
Students must submit ICA in the form of journal. Each assignment should be well documented. Faculty in charge will assess the assignments continuously and grade or mark each assignment on completion date declared for each assignments.

Reference Books:

1. "Web Technologies HTML, JavaScript, PHP, Java, JSP, XML and AJAX", Black Book, Kogent Learning Solutions Inc., dreamtech press, 2014.
2. Chris Bates, "Web Programming: Building Internet Applications", Third Edition, Wiley India, 2012.
3. Jon Duckett, "Beginning HTML, XHTML, CSS, and JavaScript", John Wiley & Sons publication, 2010.
4. Thomas A. Powell, "HTML & CSS: The Complete reference", Fifth edition, TMH 2010.

Note:
- Concerned faculty should conduct at least 07 practical assignments from part A and 03 from part B out of the above list.
- Every assignment should include print out of program with proper comments and output.
- Every student is required to submit the assignments in the form of journal.
- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

Minor Project

COURSE CONTENT

Minor Project **MIP**

Course Title Short Title Course Code

Semester-VI

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**02**	**10**	**20**	**02**

Examination Scheme
Internal Continuous Assessment (ICA): 50 Marks

- Every student shall undertake the Minor Project in semester VI.
- Each student shall work on an approved project, a group of **05 students (maximum)** shall be allotted for the each minor project.
- Minor project may involve design or investigation of a technical problem that may take design, experimental or analytical character or combine element of these areas. The project work shall involve sufficient work so that students get acquainted with different aspects of design or analysis.
- Each student is required to maintain separate log book for documenting various activities of minor project.
- The three-member committee appointed by Head of the department shall be constituted for finalizing the topics of minor project. Maximum four minor project groups shall be assigned to one teaching staff.
- Assessment of the project for award of ICA marks shall be done jointly by the guide and departmental committee as per the guidelines given in **Table-A.**
- Before the end of semester, student shall deliver a seminar and submit the seminar report (paper bound copy)in following format:
    - Size of report shall be of minimum 25 pages.
    - Student should preferably refer minimum five reference books / magazines/standard research papers.
    - Format of report
        - Introduction.
        - Literature survey.
        - Theory (Implementation, Methodology, Applications, Advantages, Disadvantages. etc)
        - Future scope.
        - Conclusion.

Assessment of Minor Project

Name of the Project: _____

Name of the Guide: _____

Table-A

SN	Exam Seat No	Name of Student	Project Selection	Documentation	Design /Simulation/Logic	PCB/hardware/programming	Result Verification	Presentation	Total
			5	10	10	10	10	5	50

Seminar-I
COURSE CONTENT

Seminar-I **S-I**
Course Title Short Title Course Code
Semester-VI

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**02**	**10**	**20**	**02**

Examination Scheme
Internal Continuous Assessment (ICA): 25 Marks

1. For Seminar-I every student will individually study a topic assigned to him / her and submit a report and shall deliver a short lecture / Seminar on the topic during the term.
2. The three-member committee appointed by Head of the department shall be constituted for finalizing the topics of Seminar-I. Seminar shall be related state of the art topic of his choice approved by the committee.
3. Seminar topic should not be repeated and registration of the same shall be done on first come first serve basis.
4. Topic of Seminar shall be registered within a two week from commencement of VI Semester and shall be approved by the committee.
5. Maximum six seminar supervision shall be allotted to each teacher.
6. Before the end of semester, student shall deliver a seminar and submit the seminar report (paper bound copy).

7. **ASSESSMENT OF SEMINAR-I**

Assessment of the Seminar-I for award of ICA marks shall be done by the guide and a departmental committee jointly, as per the guidelines given in **Table- B**

Title of Seminar: _____
Name of Guide: _____

Table-B

SN	Exam Seat No	Name of Student	Topic Selection	Literature survey	Report writing	Depth of understanding	Presentation	Total
			5	5	5	5	5	25

NORTH MAHARASHTRA UNIVERSITY,

JALGAON (M.S.)

Third Year Engineering

(Mechanical Engineering) Faculty of

Engineering and Technology

Course Outline

Semester- V &VI

TE Semester - V

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
		Theory		PR	Total						
		TH Hr/W	Tut Hr/W	PR Hr/W	Total	ISE	ESE	ICA	ESE	Total	
Heat Transfer	D	3	---	---	3	20	80	---	---	100	3
Internal Combustion Engine	D	3	---	---	3	20	80	---	---	100	3
Machine Design - I	D	3	---	---	3	20	80	---	---	100	3
Theory of Machine - II	D	3	---	---	3	20	80	---	---	100	3
Industrial Safety and Engineering	C	3	---	---	3	20	80	---	---	100	3
Heat Transfer Lab.	D	---	---	2	2	---	---	25	25	50	1
Internal Combustion Engine Lab.	D	---	---	2	2	---	---	25	---	25	1
Machine Design - I Lab.	D	---	---	2	2	---	---	25	25	50	1
Theory of Machine - II Lab.	D	---	---	2	2	---	---	25	25	50	1
Computer Graphics Lab.	B	1	---	2	3	---	---	50	---	50	2
Ind Training /EDP/ Special Study	D	---	---	---	---	---	---	25	---	25	2
Total	16	---	10	26	100	400	175	75	750	23	

TE Semester - VI

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
		Theory		PR	Total						
		TH Hr/W	Tut Hr/W	PR Hr/W	Total	ISE	ESE	ICA	ESE	Total	
Machine Design - II	D	3	--	---	3	20	80	---	---	100	3
Numerical Analysis and Computational Methods	D	3	---	---	3	20	80	---	---	100	3
Metrology and Quality Control	D	3	---	---	3	20	80	---	---	100	3
Turbomachinery	D	3	---	---	3	20	80	---	---	100	3
Project and Business Management	C	3	---	---	3	20	80	---	---	100	3
Machine Design – II Lab.	D	---	---	2	2	---	---	25	25	50	1
Turbomachinery Lab.	D	---	---	2	2	---	---	25	25	50	1
Metrology and Quality Control Lab.	D	---	---	2	2	---	---	25	25	50	1
Programing in C++ Lab.	B	---	---	2	2	---	---	25	---	25	1
Minor Project	D	---	---	2	2	---	---	50	---	50	2
Seminar-I	D	---	---	2	2	---	---	25	---	25	2
Total	15	---	12	27	100	400	175	75	750	23	

ISE: Internal Sessional Examination **ESE:** End Semester Examination **ICA:** Internal Continuous Assessment

Note : Out of 3 practical ESE heads, at least 1 head should be practical**.**

Course Outline

Heat Transfer HT

Course Title: Short Title Course Code

Branch - Mechanical / Automobile Engineering **Year – Third Year**

Course Description: This course introduces undergraduate students to Heat Transfer. The background required includes a sound knowledge of Mathematics (Calculus), Engineering Thermodynamics, Applied Thermodynamics and Fluid Mechanics of second year Level. The course aims at imparting knowledge of Heat Transfer and modes of Heat Transfer.

Teaching Scheme:

	Hours Per Week	No. of Weeks	Total Hours	Semester Credits
Lectures	**3**	14	40	3
Practical	**2**	14	28	1

Examination scheme:

End semester exam (ESE) 80 Marks Duration: 03 hours

Internal Sessional exam (ISE) 20 Marks

Purpose of Course: Degree Requirement

Prerequisite Course(s): Mathematics (Calculus) at first year level and Engineering Thermodynamics, Applied Thermodynamics and Fluid Mechanics at Second Year Level.

Outline of Content: This course contains:

UNIT-I

1.	**Heat Conduction**	**No. of Lectures - 8 Marks : 16**
	a	Concepts and Mechanism of heat flow: Steady and unsteady state heat transfer, Modes of heat transfer, their physical mechanism.
	b	Laws of heat transfer, thermal conductivity, heat transfer coefficient, radiation heat transfer coefficient.
	c	Isotropic and an-isotropic materials, Insulation materials, Thermal resistance and thermal conductance.
	d	Generalized one dimensional heat conduction equation and reduction to Fourier, Poisson and Laplace equations, Boundary conditions, Steady state heat conduction without heat generation in plane wall, cylinder and sphere, Therma contact resistance, critical thickness of insulation on cylindrical bodies.

UNIT-II

2.	**Heat Transfer in Extended Surfaces**	**No. of Lectures - 8 Marks : 16**
	a	Steady state heat conduction with heat generation in plane and composite wall, hollow cylinder, hollow sphere.
	b	Extended Surface: Types of fins, governing equation for pin fin for infinite long fin and fin with negligible heat loss, Fin performance, fin efficiency, fin effectiveness, overall fin effectiveness, approximate solution of fins.
	c	Error in temperature measurement by thermometer.

UNIT-III

3.	**Convection Heat Transfer**	**No. of Lectures - 8 Marks : 16**
	a	Principle of heat convection: mechanism, natural and forced convection.
	b	Non Dimensional Numbers, Dimensional analysis for Natural and Forced Convection.
	c	convection boundary layers: laminar, turbulent, momentum and energy equation, Laminar flow over bodies, turbulent flow inside circular and non-circular ducts, Reynolds Colburn analogy for flow over flat plate and flow inside

		tube, coefficient of friction and friction factor
	d	Heat transfer in fully developed flow, Natural convection over vertical planes, use of empirical correlation for convection, Principle of condensation and boiling (No numerical treatment).

UNIT-IV

4.	**Radiation Heat Transfer**	**No. of Lectures - 8 Marks : 16**
	a	Thermal radiation: Concept, Black body radiation, Spectral and total emissive power, Stefan Boltzmann law, Radiation laws.
	b	Irradiation and radiosity, Surface absorption, reflection and transmission, emissivity.
	c	Radiation view factor, Properties of view factor, (*No numerical treatment on view factor*), radiation heat exchange between two diffuse gray surface, radiation shield.

UNIT-V

5.	**Heat Exchangers**	**No. of Lectures - 8 Marks : 16**
	a	Classification of heat exchangers, temperature distribution in parallel, counter flow arrangement, condenser and evaporator, Overall heat transfer coefficient, fouling factor.
	b	Log-mean temperature difference method and NTU –effectiveness method of analysis for rating and sizing of heat exchangers.
	c	Requirement of good heat exchanger and heat exchanger and design and selection, practical applications, heat pipe.

- **Note-** Use of Heat transfer data book is allowed in the examination.
- **Note for paper setter:**

Paper setter should provide the required data for numerical problems in question paper itself.

Experiment must be set simultaneously and the no. of student in each group working on a setup should not exceed 05 (five) student.

References

1. J.P.Holman 1992 “Heat Transfer”Mc Graw Hill VII Edition.
2. P.Kothandaraman”Fundamentals of Heat and Mass Transfer”.
3. R.K.Rajput”Heat and Mass Transfer”, S.Chand & Company Ltd., New Delhi.
4. D.S.Kumar “Heat and Mass Transfer” D.S.Kumar S.K.Kataria & Sons, Delhi.
5. P.K.Nag “Heat Transfer” Tata McGraw Hill Publishing Company Ltd., New Delhi.
6. Sachdeva R.C., “Fundamentals of Heat and Mass Transfer” Wiley Eastern Limited, Third Edition.
7. Sukhatme S.P, “A Text Book on Heat Transfer” (1989), IIIrd Edition, Orient Longmans Ltd., New Delhi.
8. Arora S.C. & Domkundwar S., “A Course in Heat and Mass Transfer” (1994), Dhanpat Rai & Sons, IVth Edition.
9. Chapman A.J., “Heat Transfer” (1989), IVth Edition.
10. Yunus A. Cengel, “Heat Transfer –A Practical Approach” (Tata McGraw Hill)
11. M. M. Rathore “Engineering Heat and Mass Transfer”, 2nd Edition, Laxmi Publications, New Delhi.
12. M. Thirumalseshwar,”Fundamentals of Heat and Mass Transfer” Pearson Education.
13. R. Rudramoorthy, K. Mayilsomy, “Heat Transfer”, Pearson Education.

Lab - Course Outline

Heat Transfer **HT LAB**

Course Title: Short Title Course Code

Branch - Mechanical / Automobile Engineering **Year – Third Year**

Course Description:

This lab includes different practical of Heat Transfer. The course aims at imparting knowledge of Heat Transfer and its modes.

Teaching Scheme:

	Hours Per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**2**	14	28	1

Evaluation scheme:

Internal Continuous Assessment (ICA) 25 Marks 50 Marks

End Semester exam (ESE) (Practical) 25 Marks

Prerequisite Course(s): Mathematics (Calculus) at first year level and Engineering Thermodynamics, Applied Thermodynamics and Fluid Mechanics at Second Year Level.

Outline of Content: This course contains:

1. Determination of thermal conductivity of metal rod.
2. Determination of thermal conductivity of insulating powder.
3. Determination of thermal conductivity of composite wall.
4. Determination of heat transfer coefficient in natural convection.
5. Determination of heat transfer coefficient in forced convection.
6. Determination of temperature distribution, fin efficiency in natural and forced convection.
7. Determination of emissivity of a test surface.

8. Determination of Stefan Boltzmann constant.
9. Study of pool boiling phenomenon and determination of critical heat flux.
10. Determination of LMTD, overall heat transfer coefficient and effectiveness of heat exchanger in parallel and counter flow arrangement.
11. Determination of heat transfer from a heat pipe.
12. Calibration of thermocouple.

Note: Lab file should contain at list EIGHT experiments from above mentioned list.

ESE (Practical Examination)

The Practical Examination will comprise of performing the experiment and viva on the Practical's.

Instructions for practical Exam. :-

1. Five experiments should be selected for Practical Examination.

2. The Number of Students for each Practical set up should not be more than 5 Students.

3. Oral will be based on the Practical Performed in the examination and the experiments included in the Journal.

Internal Combustion Engine (Theory)

Internal Combustion Engine	**ICE**	
Course Title	Short Title	Course Code

Branch- Mechanical Engineering **Year- Third Year**

Course Description:
This course provides the knowledge of Internal Combustion Engine. Course includes different engine cycles its performance analysis, Various systems in IC Engine such as fuel feed, lubrication, cooling, ignition, supercharging and turbo charging. Fundamental of combustion in I C Engine, types and design of combustion chambers. Various emission control norms.

Teaching Scheme:

Lecture hours per Week	No. of Weeks	Total hours	Semester Credits
03	14	40	03

Examination Scheme:

End semester exam (ESE)	80 Marks	Duration: 03 Hours
Internal Sessional Exam (ISE)	20 Marks	

Prerequisite Course(s): Mathematics (calculus), Basic thermodynamics cycles, various ideal gas processes, Engineering Thermodynamics, Applied Thermodynamics.

Objectives:

1. Analysis of air standard cycles in the regard of I C Engine.
2. Understanding of induction system along with fuel feed system.
3. To impart insight in various operating systems like cooling, lubrication, Ignition system.
4. To be familiar with combustion chamber design and pollution control norms.
5. Performance analysis of I C Engine.

Unit. I

1	**BASIC CONCEPTS AND ENGINE CYCLES No. of Lect.-8, Marks-16**
	a)**Introduction**: Classification, engine components and their functions, Terminology, Work (indicated and brake), mean effective pressure, torque and power (brake and indicated), mechanical efficiency, thermal and volumetric efficiencies of engine, air fuel ratio, specific fuel consumption. **b) Air Standard Cycles**: Assumptions, Otto, Diesel, Dual Combustion cycle, derivation of their efficiency equation, work done and mean effective pressure. Comparison on the basis of heat input, compression ratio, Maximum pressure and temperature, Actual cycle, deviation from theoretical cycles. Pumping losses, time losses.

Unit. II

2	**FUEL FEEDING SYSTEMS No. of Lect.-8, Marks-16**
	a) Charge, intake valve and manifold, valve timing diagram, valve overlap, choked flow. **Carburetion**: Requirement, types of carburetors according to fluid flow, simple carburetor, Air fuel ratio calculation, effect of altitude, disadvantages of simple carburetor, compensating devices for starting, economy range, acceleration, compensating jet etc. additional systems in modern carburetors, Solex carburetor. Disadvantages of carburetion and gasoline injection, MPFI. **b) Fuel feeding systems in CI engines**: Requirement, classification, fuel feed pump, jerk type injection fuel pump, distributor type pump, injection pump governor, fuel injector and nozzles.

Unit. III

3	**OPERATING SYSTEM No. of Lect.-8, Marks-16**
	a) Cooling systems: requirement, types of cooling systems, thermostat and additives. **b) Lubrication**: Mechanism of lubrication, different methods, important properties of lubricating oils. **c) Ignition Systems**: requirement, battery ignition, magneto ignition, electronic ignition system, Ignition timing, spark timing advance. **d) Starting methods of engines**: Types of superchargers, Super charging, effect of

	super charging, limitations and advantages of supercharging, and turbo charging of engines.

Unit. IV

4	**COMBUSTION IN SI AND CI ENGINES No. of Lect.-8, Marks-16**
	a) Homogeneous and heterogeneous mixtures, **Combustion in SI engines**: Stages in combustion, Ignition lag, velocity of flame propagation, factors influencing flame speed, rate of pressure rise, Detonation, factors affecting the detonation, pre-ignition. Rating of SI engines fuels, Dopes, combustion chamber of SI engines. **b) Combustion in CI engine**; stages of combustion, factors affecting the delay period. Diesel knock, Effect of engine variables on Diesel knock , Rating of CI engine fuels: Cetane number, performance number, comparison of knock in SI and CI engines. Combustion chamber for CI engines.

Unit. V

5	**ENGINE TESTING AND PERFORMANCE No. of Lect.-8, Marks-16**
	a) Measurement of indicated power, brake power, Morse test, energy balance and efficiency calculations. **b)** BIS specification. Recent trends in internal combustion engines. Engine emission, air pollution due to engines, various Euro norms, Unburnt hydrocarbon emission in two stroke and CI engines, CO and Nox emission, particulate traps, EGR, emission control methods catalytic converters (Introductory), crank blow by losses

TERM WORK-

Practical: 2Hrs/week **ICA: 25 Marks**

Minimum **EIGHT** experiment should be performed form the following lists:

1) Study of cooling systems.
2) Study of lubrication systems.
3) Study of simple and Solex carburetors.
4) Study of fuel pump and fuel injector.
5) Trial on a petrol engine and calculation of air/fuel ratio, volumetric,

thermal and mechanical efficiencies.

6) Trial of a Diesel engine and calculation of air/fuel ratio, volumetric, thermal and mechanical efficiencies.

7) Morse test and determination of bsfc and isfc.

8) Study of combustion chambers of SI engines.

9) Study of combustion chambers of CI engines.

10) Study and demonstration of mechanical and Pneumatic governors.

11) Study and analysis of exhaust emission from the engine (PUC).

RECOMMENDED BOOKS:

1) V. Ganeshan, "Internal Combustion Engines", 2/e, Tata McGraw Hill, New Delhi.

2) R. K. Rajput , "Internal Combustion Engines"', Laxmi Publications, New Delhi.

3) W. W. Pulkrabek , "Fundamentals of Internal Combustion Engines", Prentice Hall of India (P) Ltd., New Delhi.

4) E. F. Obert , "Internal Combustion Engines and Air Pollution", Harper and Row, New York.

5) Ferguson C. R , "Internal Combustion Engines", Wiley Inc. New York.

6) Sharma R.P. and Mathur M.L., "Internal Combustion Engines", Standard Publications, New Delhi.

7) Domkundwar, ., "Internal Combustion Engines", Dhanpat Rai & Co. New Delhi.

8) Willard W Pulkrabek. "Internal Combustion Engines", Pearson Education

9) Shyam K. Agrawal, "Internal Combustion Engines", New Edge International Publication.

10) K.K. Ramalingam, "Internal Combustion Engines", Scitech Publication.

Course Outline

Machine Design - I **MD-I**

Course Title: Short Title Course Code

Branch - Mechanical Engineering **Year – Third Year**

Course Description: This course introduces undergraduate students to Machine Design. The background required includes a sound knowledge of Mathematics (Calculus), Engineering Mechanics, SOM and TOM.

Objective: - The course aims at to familiarize the various steps involved in the Design Process to understand the principles involved in evaluating the shape and dimensions of a component to satisfy functional and strength requirements. To learn to use standard practices and standard data learn to use catalogues and standard machine components

Teaching Scheme

	Hours Per Week	No. of Week	Total Hours	Semester Credits
Lecture	03	14	40	3
Practical	02	14	28	1

Examination scheme:

End semester exam (ESE)	80 Marks	Duration: 04 hours
Internal Sesstional exam (ISE)	20 Marks	
Internal Continues Assessment (ICA)	25 Marks	
End Semester Exam (ESE) oral	25 Marks	

Purpose of Course: Degree Requirement

Course Description: A degree holder engineer is expected to design and draw simple machine components. Fundamental knowledge of Mathematics, Applied Mechanics, Strength of Materials,

Engineering Materials and Theory of Machines, Manufacturing Process are essential. Subject aims at developing analytical abilities to give solutions to engineering design problems.

Objectives:

Students should be able to:

1. Analyze the various modes of failure of machine components under different load patterns.
2. Design and prepare part and assembly drawings.
3. Use design data books and different codes of design.
4. Select standard components with their specifications from manufacturer's catalogue

UNIT:-I

1.	**Introduction and Design of Simple Machine Parts No. of Lectures – 08 Marks: 16**	
	a	Introduction of Machine Design, Basic procedure of Machine Design, Requisites of design engineer, Design of machine elements, Sources of design data, Use of standards in design, Selection of preferred sizes.
	b	Simple Stress, Thermal Stresses, Impact Stress, tortional stress, Poisson's Ratio, Volumetric Strain, Young's Modulus, Maximum principal Stress Theory, Maximum shear stress theory, Maximum principal strain Theory, Maximum strain energy Theory, Maximum Distortion energy Theory . Stress Concentration – Causes & Remedies.
	c	Design of Simple parts – Knuckle joint & Cotter joint

Numerical Should be asked on Preferred sizes and Theories of Failure (b,c)

UNIT:-II

2.	**Design of Shafts, Keys and Couplings No. of Lectures – 08 Marks: 16**	
	a	*Shafts :*-Material, Design on the basis of strength considering shaft subjected to, twisting moment only, bending moment only, Combine twisting and bending moment, axial load in addition to twisting and bending. Design on the basis of

		rigidity. A.S.M.E. code for shaft design,
	b	*Keys:-*Classification of keys, Design considerations in parallel and tapered sunk keys, Design of square, flat and Kennedy keys, Splines.
	c	*Couplings:-*Design considerations, Classification, Design of Rigid, Muff coupling, Flange coupling and Flexible bushed pin coupling.

*Numerical Should be asked on Shafts, coupling (*Flange coupling and Flexible bushed pin coupling) *(a,c)*

UNIT: - III

3.	**Design of Temporary and Permanent Joints No. of Lectures – 08 Marks: 16**	
	a	Threaded Joints:- Different Forms of Threads, Bolts of uniform strength, Locking devices, I.S.O. metric screw threads, Stresses in threaded joint, eccentrically loaded bolted joint, Torque requirement for bolt tightening.
	b	Welded Joints: - Types of welding and joints, strength of transverse and parallel fillet welded section, axially loaded unsymmetrical welded section, eccentrically loaded joint.

Numerical should be asked on eccentrically loaded bolt joint and axially loaded unsymmetrical welded section, eccentrically loaded joint. *(a,b)*

UNIT:-IV

4.	**Design of Energy Storing Elements No. of Lectures – 08 Marks: 16**	
	a	Flywheel: - Function and material, Torque Analysis, coefficients of fluctuation of energy, Solid disk Flywheel, Rimmed Disk flywheel, stresses in flywheel rim.
	b	Spring:- Types, Applications and materials of springs, Stress and deflection equations for helical springs, Style of ends, Wahl's Stress Factor, Design of helical compression and tension springs, Springs in series and parallel, Concentric helical springs, leaf spring, Shot peening

Numerical should be asked on Solid Disk and Rimmed Disk Flywheel and Design of Helical springs and Leaf spring. *(a,b)*

UNIT: - V

5.	***Design for Fluctuating Loads and Statistical consideration in Design*** **No. of Lectures – 08 Marks: 16**	
	a	*Design for Fluctuating Loads:* Stress concentration - causes and remedies, Fluctuating stresses, Fatigue failure, Endurance limit, Notch sensitivity, Reversed stresses, Solderberg and Goodman diagrams, Fatigue design of components under combined stresses such as shafts, bolts and springs.
	b	*Statistical consideration in design:* - Design and natural tolerances –Design for assembly- Statistical analysis of tolerances – Mechanical reliability and factor of safety.

Numerical should be asked on Fatigue design of components under combined stresses such as shafts, bolts and springs. *(a)*

Recommended Books:

[1] Shigley J.E. and Mischke C.R., "Mechanical Engineering Design", Tata McGraw Hill Publication Co. Ltd.

[2] Spotts M.F. and Shoup T.E. , "Design of Machine Elements", Prentice Hall International.

[3] Bhandari V.B., "Design of Machine Elements", Tata McGraw Hill Publication Co. Ltd.

[4] FArzdak Haideri, "Machine Desig", Nirali Prakashan, Pune.

[5] Willium C. Orthwein, "Machine Components Design", West Publishing Co. and Jaico Publications House.

[6] Design Data", P.S.G. College of Technology, Coimbatore.

[7] Juvinal R.C., "Fundamentals of Machine Components Design", John Wiley and Sons.

[8] Hall A.S., Holowenko A.R. and Laughlin H.G., "Theory and Problems of Machine Design", Schaum's Outline Series.

[9] A. H. Burr and J. B. Cheatham, Mechanical Analysis and Design, 2 nd Ed., Prentice Hall.

Lab - Course Outline

Machine Design-I **MD-I LAB**

Course Title: Short Title Course Code

Branch - Mechanical / Automobile Engineering **Year – Third Year**

Course Description:

This lab includes different practical of Heat Transfer. The course aims at imparting knowledge of Machine Design procedure for different elements.

Teaching Scheme:

	Hours Per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	02	14	28	1

Evaluation scheme:

Internal Continuous Assessment (ICA) 25 Marks
End Semester exam (ESE) (Oral) 25 Marks

Prerequisite Course(s): Fundamental knowledge of Mathematics, Applied Mechanics, Strength of Materials, Engineering Materials and Theory of Machines, Manufacturing Process are essential. Subject aims at developing analytical abilities to give solutions to engineering design problems.

Outline of Content: This course contains:

Term Work:

1. Term work shall consist of "ONE" design project. The design project shall consist of assembly drawing with a part list and overall dimensions and the other sheet involving drawing of individual components using AUTO CAD on A3 size paper. Manufacturing tolerances, surface finish symbols and geometric tolerances should be specified so as to make it working drawing. A design report giving all necessary calculations of the design of the components and assembly should be submitted in a separate file.
2. Design projects should include selection of prime mover and design of mechanical systems comprising of machine elements: Design data book shall be used extensively for the selection of the components.

3. Total five assignments (One on each unit - only Numerical)

ESE (Practical Examination)

The Oral Examination will be based on the all five units of Machine Design – I.

Recommended Books:

[1] Shigley J.E. and Mischke C.R., "Mechanical Engineering Design", Tata McGraw Hill Publication Co. Ltd.

[2] Spotts M.F. and Shoup T.E. , "Design of Machine Elements", Prentice Hall International.

[3] Bhandari V.B., "Design of Machine Elements", Tata McGraw Hill Publication Co. Ltd.

[4] FArzdak Haideri, "Machine Desig", Nirali Prakashan, Pune.

[5] Willium C. Orthwein, "Machine Components Design", West Publishing Co. and Jaico Publications House.

[6] Design Data", P.S.G. College of Technology, Coimbatore.

[7] Juvinal R.C., "Fundamentals of Machine Components Design", John Wiley and Sons.

[8] Hall A.S., Holowenko A.R. and Laughlin H.G., "Theory and Problems of Machine Design", Schaum's Outline Series.

[9] A. H. Burr and J. B. Cheatham, Mechanical Analysis and Design, 2 nd Ed., Prentice Hall.

Course Outline

Theory of Machines – II TOM-II

Course Title: Short Title Course Code

Branch - Mechanical / Automobile Engineering **Third Year** **First**

Branch Year Semester

Course Description:

The course under Theory of Machine-II has been designed to cover the concepts of force analysis, construction, working and applications of important components of machines. The students will understand the overall working of machines and able to understand constructional and working features of important machine elements. The students should be able to understand the basic theoretical and numerical methods, which is the pre-requisites to design and selection of these components of machines for different applications.

Course Objectives:

1. To understand various types of machine components, its working & applications.
2. To understand the force analysis of power train components gears.
3. To study the need and different methods of balancing of rotating and reciprocating masses.
4. To aware about the speed regulating components such as governors, flywheel, etc.
5. To describe graphical and analytical methods.

Course Outcomes:

Development of concepts and logics about machine components.
Development of problem solving approach by graphical and analytical methods.
Understanding of functional requirements of machine components for designing purpose.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	3	14	40	3

Examination scheme:		
End semester exam (ESE)	80 Marks	Duration : 03 hours
Internal Sessional exam (ISE)	20 Marks	

Purpose of Course: Degree Requirement

Prerequisite Course(s): Mathematics (Calculus), Engineering Drawing & Element of Mechanical Engineering, Engineering Mechanics at first year level and Theory of Machine-I at Second Year Level.

Course Contents:

UNIT-I

1.	**Flywheel and CAM**	**No. of Lectures - 8 Marks : 16**
	a	Turning moment diagram and fluctuation of the crankshaft speed, D' Alemberts principle Equivalent offset inertia force
	b	Determination of flywheel size for different types of engine and machine.
	c	Types of cams and followers, Analysis of motion of follower
	d	Determination of cam profile for given follower motion
	e	Analysis of cam with specified counters – Circular arc cam, Tangent cam

UNIT-II

2.	**Brakes & Dynamometer**	**No. of Lectures - 8 Marks : 16**
	a	**Brakes:** Types of brakes, Force analysis of brakes, external and internal expanding shoe brakes, block brakes.
	b	Band brakes, Band and block brakes, Breaking torque.
	c	**Dynamometer:** Absorption dynamometers: Prony brakes, Rope brake, Band brake
	d	Transmission dynamometer- belt transmission type, Fluid coupling

UNIT-III

3.	**Governor & Gyroscope**	**No. of Lectures - 8 Marks : 16**
	a	**Governor**: Types of governors – Watt, Porter, Proell, Hartnell, Sensitiveness of governors, Hunting, Isochronisms, Stability.
	b	Effect of governor, Power of governor, Controlling force.
	c	**Gyroscope**: Angular velocity and acceleration, Gyroscopic forces and couple, Gyroscopic effect on naval ships
	d	Gyroscopic stabilization, Stability of two wheel vehicle.

UNIT-IV

4.	**Balancing**	**No. of Lectures - 8 Marks : 16**
	a	Balancing of rotating masses in one and several planes.
	b	Balancing of reciprocating masses in single and multi-cylinder engine, radial and V-types.
	c	Primary and secondary balancing analysis, Concept of direct and reverse cranks.
	d	Balancing of locomotive engines and effect of partial balancing. , Static and dynamic balancing machine.

UNIT-V

5.	**Gears**	**No. of Lectures - 8 Marks : 16**
	a	**Spur Gears**:- Terminology used in gears, conjugate action,.
	b	Involute and cycloidal profile, Path of contact, Arc of contact, Contact ratio.
	c	Interference, Undercutting, Methods to avoid undercutting and interface, Gear standardization,
	d	Effect of center distance variation on the velocity ratio for involute profile tooth gears, Friction between gear teeths.

References:

1. Theory of Machines, S. S. Rattan, Tata McGraw Hill, New Delhi.
2. Theory of Mechanisms & Machines, Jagdish Lal, Metropolitan Book Co.
3. Theory of Machines, Longman's Green & Co., London.
4. Theory of Machines, W. G. Green, Blackie & Sons, London.
5. Theory of Machines, V.P. Singh, Dhanpat Rai & Co.
6. Theory of Machines – II, H. G. Phakatkar, Nirali Publication.
7. Theory of Machines and Mechanisms, Shigley, J.E and Uicker, J.J, McGraw45 Hill International Book Co.
8. Mechanisms and Machines theory, Rao J.S. and Dukkipati R.V, Wiley Eastern Ltd.
9. The Theory of Machines through solved problems , J.S.Rao. New age international publishers.
10. A text book of Theory of Machines, Dr.R.K.Bansal. Laxmi Publications
11. Theory of Machines, Sadhu Singh, Pearson Publication.
12. Theory of machine, P. L. Ballaney, Khanna publication.

Lab - Course Outline

Theory of Machines -II **TOM-II LAB**

Course Title: Short Title Course Code

Branch - **Mechanical / Automobile Engineering** Year – **Third Year**

Course Description:

This lab includes drawing sheets related to cam profile & balancing of rotating & reciprocating masses. Experiments on determination of characteristic curves of the centrifugal governor and verification of principle of working of gyroscope are also included. In addition study of gear boxes and Balancing machine.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Evaluation Scheme:

Internal Continuous Assessment (ICA)		: 25 Marks
End Semester exam (ESE) ORAL		: 25 Marks

Prerequisite Course(s): Engineering Mathematics, Theory of machine-I

Outline of Content:

This practical contains

1. To determine the characteristic curves of the centrifugal governor and find its coefficient of insensitivity and stability.
2. To study various types of gear boxes.
3. To verify the principle of working of gyroscope.
4. To study the static & dynamic balancing machine & balancing of masses in different planes.
5. To study graphical methods and prepare drawing sheets for – Drawing sheet 1:- Balancing of rotating masses and reciprocating masses. (2 Problems)
6. To study graphical methods and prepare drawing sheets for Drawing sheet 2: Draw cam profile for various types of follower motion.

Guide lines for ESE:-

ESE (Oral Examination)

The Oral Examination will comprise of viva on the above six experiments.

Course Outline

Industrial Engineering & Safety	**IES**	
Course Title	Short Title	Course Code
Mechanical Engineering	**Third Year**	**First**
Branch	Year	Semester

Course Description:
The course is intended to:

- build up necessary background for understanding the Industrial knowledge
- understand the applications of knowledge and correlation of various departments
- get acquainted with various acts, role of consultant and safety auditor
- acquire managerial skills of handling Industrial environment and human behavior
- develop awareness about industrial Engineering and safety Engineering

(Course outcomes)

Student will be able to:

- seek opportunity to work in the field of Industrial Engineering and safety
- contribute in a better way towards enhancing the productivity
- play the role of industrial and safety manager effectively

Teaching scheme:

	Hours per Week	**No. of Weeks**	**Total Hours**	**Semester Credits**
Lecture	3	14	40	3

Examination scheme:

End semester exam (ESE)	80 Marks	Duration: 03 hours
Internal Sessional exam (ISE)	20 Marks	20 Marks

Outline of Content: This course contains:

Unit - I

1	**No. of Lectures – 08,**	**Marks: 16**
	a	Introduction to Industrial Engineering, origin & growth, contribution of Taylor, Tools & Techniques of Industrial Engineering.
	b	Work study- Method Study- Aims, objectives, scope & applications.
	c	Select criteria for selecting assignments; record charting symbols. Flow process chart, multiple activity chart. Examine- questioning technique, Develop motion economy, work place layout, improvement and working condition, implement and maintain
	d	Work Measurement Aims objectives scope and application
	e	Stop watch study- equipment and procedure, rating allowance and standard time; activity sampling- principle, procedure and applications.

Unit-II.

2	**No. of Lectures – 08, Marks: 16**	
	a	Criteria for plant location, site selection, types of plant layout, planning for utilities
	b	Material Handling- necessity of material handling, procedure for analyzing material handling system, methods and equipment of material handling. Effect of layout and material handling system on productivity and profitability
	c	Safety in material handling & factory operation.

Unit-III

3	**No. of Lectures – 08, Marks: 16**	
	a	Definition, concept, Aims, objectives and Scope of Industrial Psychology.
	b	Individual and Group, Individual differences in behavior
	c	Group Dynamics, Theory X and Y
	d	Hawthorne Experiment, Morale
	e	Motivation, Working Environmental Conditions
	f	Industrial Fatigue

Unit-IV

4	**No. of Lectures – 08, Marks: 16**	
	a	Definition of safety, safety engineering, human factor engineering, anthropometry
	b	Principles of safety management ,industrial hygiene and occupational health
	c	Safety education and training: Importance of training – identification of training needs, training methods, motivation communication, safety campaign
	d	Safety performance monitoring, safety audit ,accident investigation and reporting

Unit-V

5	**No. of Lectures – 08, Marks : 16**	
	a	Safety in chemical industries, food processing ,textile, explosives
	b	Safety in mines, nuclear plants ,cement plants
	c	Safety in hydro and thermal power plants, ship building and repair
	d	Safety in mechanical ,electrical industries' equipments"
	e	Disaster management

References:-

1) Maynard, Industrial Engineering. Hand book, McGraw Hill book company
2) ILO, Introduction to Work Study
3) Krishnan N.V. "Safety Management in Industry" Jaico Publishing House,
4) Khanna O.P. , Industrial Engineering. and Management, Dhanpat Rai Publication, New Delhi.
5) Factory Act -1948
6) Indian Boiler Act- 1923 (Revised 1983)
7) L.C. Jhamb " A text book of Industrial Engineering", Everest Publishing House, India.
8) Charles D Fleddermann, "Engineering Ethics", Prentice Hall, New Mexico, (1999.
9) M.Mahajan "Industrial Engineering and Production Management". Dhanpat Rai & CO (P)LTD Publication, New Delhi

Lab - Course Outline Cover Page

Computer Graphics **CG**

Course Title Short Title Course Code

Branch - Mechanical / Automobile Engineering **Year – Third Year**

Course Description: This course includes design and drafting related to mechanical elements. Lab's related to elementary level knowledge of drafting and Auto-LISP program. Sketching and computer aided design tools are used to create the various types of views needed for design and documentation.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	01	14	14	01
Practical	02	14	28	01

Purpose of Course: Degree Requirement

Prerequisite Course(s): Engineering Graphics, Essential Computer Knowledge Required.

Outline of Content: This course contains:

AUTOCAD

1	**No. of Lectures – 07**	
	a	Introduction to CAD. Advantages and Applications of CAD. Difference between conventional drafting methods and CAD.
	b	Introduction to Auto-cad (Latest Version). Details of various menu bars and tool bars, Drawing Area etc.
	c	Draw Toolbar- Line, Arc, Rectangle, Circle, Polygon, Text, Boundary Hatching etc.
	d	Modify Toolbar – Copy, Move, Erase, Mirror, Chamfer, Fillet, Array, Trim etc.
	e	Dimension Toolbar – Linear, Angular, Radius, Diameter, etc
	f	Properties Toolbar – Line Types, Colors, Line Weight, Text, etc
	g	Settings - Snap settings, Grid settings, parameter settings, print settings, etc

AUTO-LISP

2	**No. of Lectures – 07**	
	a	Introduction to Auto-LISP. Advantages and Applications of Auto-LISP .
	b	Auto-LISP commands
	c	Auto-LISP Programs for simple geometric shapes-line, circle, rectangle, pentagon, etc
	d	Auto-LISP Programs for elements geometric shapes such as circle in rectangle, triangle in rectangle, etc.
	e	Auto-LISP Programs for simple machine elements. (Nut, Bolt, Stud, Flange, etc)
	f	Auto-LISP Programs for simple machine elements. (Nut, Bolt, Stud, Flange, etc)
	g	Auto-LISP Programs for simple machine elements (Nut, Bolt, Stud, Flange, etc)

Course Objectives:

This course includes design and drafting related to mechanical elements. This lab related to elementary level knowledge of drafting and Auto-LISP program. Sketching and computer aided design tools are used to create the various types of views needed for design and documentation.

Course Outcomes: Upon successful completion of these practical the student will be able to

1. Demonstrate and understand the basic concepts of geometric modeling and computer graphics.
2. Design and Drafting of mechanical elements.
3. Programs for mechanical elements in Auto-LISP.

Assignment:

1. Two assignments on AutoCAD (preferably latest version).
2. Two assignments on Auto LISP (such as Design and drafting of any mechanical component through Auto LISP)

REFERENCES:

1. AutoCAD reference manual
2. Auto-LISP Developer's Guide
3. George Omura, ABCs of Auto LISP, BPB. Publication
4. H.G. Phakatkar, Engineering Graphics, Nirali publication

COURSE CONTENT

Industrial Training / EDP / Special Study	**IT/EDP/SS**	
Course Title	Short Title	Course Code

Semester-V **Examination Scheme**

Total Semester Credits: 02 **Internal Continuous Assessment (ICA): 25 Marks**

Industrial Training

- Student shall undergo industrial training for a minimum period **of two weeks** during summer vacations between fourth semester and fifth semester.
- The industry in which industrial training is taken should be a medium or large scale industry
- The paper bound report on training must be submitted by the student in the beginning of Fifth semester along with a certificate from the company where the student took training.
- Every student should write the report separately.
- Institute / Department/T&P Cell have to assist the students for finding Industries for the training.
- Students must take prior permission from Department before joining for Industrial Training.

OR

EDP (Entrepreneurship Development Program)

- Student has to participate in Entrepreneurship Development Program for a minimum period of **One week** during summer vacations between fourth semester and fifth semester.
- Every student must submit the paper bound report based on the program in the beginning of Fifth semester along with a certificate (Course / Program completion) from the program organizers.
- Every student should write the report separately.
- Institute / Department may arrange Entrepreneurship Development Program at their campus.
- Students must take prior permission from Department before attending any Entrepreneurship Development Program.

OR

Special Study

- Student has to submit name of three topics of his interest to the department.
- Special study in a group shall not be allowed.
- The three-member committee appointed by Head of Department shall allot one topic out

of the three topics submitted by the student.

- Every student must submit the paper bound report based on special study at the end of Firth semester.
- Department should allot guide to all such students, for monitoring their progress and guide them for literature survey / report writing etc.
- Evaluation of special study shall be done based on presentation made by student, followed by brief question answer session.

Evaluation of Industrial Training / EDP / Special Study

ICA: The Internal Continuous Assessment shall be based on the active participation of the students in the training / EDP / Special study and based on knowledge / skill acquired by the student. The three-member committee appointed by Head of Department shall assess the reports and award marks based on following:

(a) Report		10 marks.
(b) Presentation		10 marks.
(c) Viva-voce at the time of presentation		05 marks.
	Total:	**25 marks.**

Course Outline

Machine Design II **MD-II**

Course Title Short Title Course Code

Branch- Mechanical Engineering **Year- Third Year**

Course Description:

This course provides the knowledge of machine design. Course includes Design of Clutches, Design of Gears, Design of bearing & pressure vessels etc.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	03	14	40	3
Practical	02	14	28	1

Examination Scheme:

End semester exam (ESE) 80 Marks Duration: 04 Hours

Internal Sessional Exam (ISE) 20 Marks

Prerequisite Course(s): This course is aimed at introducing the Design of various mechanical components e.g. - clutches, gears, pressure vessels, bearing etc to the undergraduate students. The background expected familiar with Strength of Material, Theory of machine & Machine Drawing etc.

Objectives:

1 Analyze the various modes of failure of machine components under different load patterns.

2 Design and prepare part and assembly drawings.

3 Use design data books and different codes of design.

4 Select standard components with their specifications from manufacturer's catalogue.

UNIT-I

Friction Clutches	**No. of Lect.-8, Marks-16**
a)	**Friction Clutches:** Classification and selection friction clutches, Torque transmitting capacities and Design of single-plate, multi-plate, cone and centrifugal clutches, Type of friction materials-their advantages, limitation and selection criteria.
b)	**Aesthetic and Ergonomic considerations in Design** Aesthetic considerations- Basic type of product form, design features like shape, colour, materials and finishes, quality etc. Ergonomic considerations- Man-Machine closed loop system, design of display panels, design of controls etc.

UNIT-II

Pressure Vessels	**No. of Lect.-8, Marks-16**
a)	**Design of Cylinders and pressure vessels:** Thick and thin cylinders- Thin cylindrical and spherical vessels- Lame's equation- Clavarino's and Birnie's equation- Auto frottage and compound cylinders- Gasketed joints in cylindrical vessels. Unfired pressure vessels- Classification of pressure vessels as per I.S. 2825- categories and type of welded joints- weld joints efficiency- Corrosion, erosion and protection vessels, stresses induced in pressure vessels, material of construction. Thickness of cylindrical and spherical shells and design of end closures as per code- Nozzle and Opening in pressure vessels- Reinforcement of opening in shell and end closures. Area compensation method.

UNIT-II

Spur and Helical Gear Drives	**No. of Lect.-8, Marks-16**
a)	Classification of gears, Selection of type of gears, Standard system of gear tooth. **Spur Gears:** Number of teeth and face width, Type of gear tooth failure, Desirable properties and selection of gear material, Force analysis, Beam strength (Lewis) equation, Velocity factor, Service factor, Load concentration factor, Effective load on gear, Wear strength equation, Estimation of module based on beam and wear strengths, Estimation of dynamic tooth load by velocity factor and Buckingham's equation,
b)	**Helical Gears:** Transverse and normal module, Virtual number of teeth, Force analysis, Beam and Wear strengths, Effective load on gear tooth, Estimation of dynamic load by velocity factor and Buckingham's equation, Design of helical gears.

UNIT-IV

Bevel and Worm Gear Drives	**No. of Lect.-8, Marks-16**
a)	**Bevel Gears** Straight tooth bevel gear terminology and geometric relationship, Formative number of teeth, Force analysis, Design criteria of bevel gears, Beam and wear strengths, Dynamic tooth load by velocity factor and Buckingham's equation , Effective load, Design of straight tooth bevel gears, Selection of material for bevel gears,
b)	**Worm Gear** Worm and worm gear terminology and geometrical relationship, Standards dimension, Force analysis of worm gear drives, Friction in worm gears and its efficiency, Worm and worm-wheel material, Beam strength and wear strength of worm gears, Thermal consideration in worm gear drive, Methods of Gears lubrication.

UNIT-V

Rolling Contact Bearings	**No. of Lect.-8, Marks-16**
a)	**Rolling contact Bearings** Type of rolling contact bearing, Static and dynamic load carrying capacities, Striback's equation, Equivalent bearing load, Load-life relationship, Selection of bearing life, Selection of rolling contact bearings from manufacturer's catalogue. Design for cyclic loads and speed, Bearing with probability of survival other than 90%, Lubrication and mounting of bearing, Type of failure in rolling contact bearing- causes and remedies.
b)	**Statistical consideration in design** Frequency distribution-Histogram and Frequency polygon – Normal distribution. Standard variable – population combinations.

RECOMMENDED BOOKS:

1) Shigley J.E. and Mischke C.R., "Mechanical Engineering Design" McGraw Hill Pub. Co. Ltd.
2) Spott's M.F. and Shoup T.E. "Design of Machine Elements", Printice Hall International.
3) Bhandari V.B., "Design of Machine elements", Tata McGraw Hill Pub. Co. ltd.
4) Black P.H. and O. Eugene Adams, "Machine Design", McGraw Hill Book Co. Ltd.
5) Willium C. Orthwine, "Machine Component Design", West Pub. Co. an Jaico Pub. House.
6) "Design Data", P.S.G. College of Technology, Coimbatore.
7) Juvinal R.C. "Fundamental of Machine Component Design ", John Wiely and sons.
8) Hall A.S., Holowenko A.R. and Laughlin H.G., "Theory and Problems of Machine Design", Schaum's Outline Series.
9) P.Kannaiah, "Machine Design", Scitech Publication

Lab - Course Outline

Machine Design-II	**MD-II LAB**
Course Title:	Short Title Course Code

Branch - Mechanical / Automobile Engineering **Year – Third Year**

Course Description:

This lab includes different practical of Machine Design. The course aims at imparting knowledge of Machine Design procedure for different elements.

Teaching Scheme:

	Hours Per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	02	14	28	1

Evaluation scheme:

Internal Continuous Assessment (ICA) 25 Marks

End Semester exam (ESE) (Oral) 25 Marks

Prerequisite Course(s): Fundamental knowledge of Mathematics, Applied Mechanics, Strength of Materials, Engineering Materials and Theory of Machines, Manufacturing Process are essential. Subject aims at developing analytical abilities to give solutions to engineering design problems.

Outline of Content: This course contains:

TERM WORK-

Practical: 2Hrs/week **ICA: 5 Marks**
ESE: 25 marks

1. Term work shall consist of "ONE" design project. The design project shall consist of two imperial size sheets- one involving assembly drawing with a part list and overall dimension and the other sheet involving drawing with of individual components & also using AUTO CAD on A3 size paper. Manufacturing tolerances, surface finish symbols and

geometric tolerances should be specified so as to make it working drawing. A design report giving all necessary calculation of the design of the components and assembly should be submitted in a separate file.

Design projects should be in the form of 'Design of Mechanical System' comprising of machine elements studied and topics covered in the syllabus.

Design data book shall be used extensively for the selection of the component.

2. Total five assignments (One on each unit - only Numerical)

ESE **(Practical Examination)**

The Oral Examination will be based on the all five units of Machine Design **–II.**

RECOMMENDATION

As far as possible, preference should be given to prepare drawing sheets using computer.

RECOMMENDED BOOKS:

1) Shigley J.E. and Mischke C.R., "Mechanical Engineering Design" McGraw Hill Pub. Co. Ltd.

2) Spott's M.F. and Shoup T.E. "Design of Machine Elements", Printice Hall International.

3) Bhandari V.B., "Design of Machine elements", Tata McGraw Hill Pub. Co. ltd.

4) Black P.H. and O. Eugene Adams, "Machine Design", McGraw Hill Book Co. Ltd.

5) Willium C. Orthwine, "Machine Component Design", West Pub. Co. an Jaico Pub. House.

6) "Design Data", P.S.G. College of Technology, Coimbatore.

7) Juvinal R.C. "Fundamental of Machine Component Design ", John Wiely and sons.

8) Hall A.S., Holowenko A.R. and Laughlin H.G., "Theory and Problems of Machine Design", Schaum's Outline Series.

9) P.Kannaiah, "Machine Design", Scitech Publication

Course Outline

Numerical Analysis & Computational Methods **NACM**

Course Title **Short title** **Course ode**

Branch: Mechanical Engineering Third Year

Course Description:

Course Objectives:

1. To introduce numerical methods for solving linear and non-linear equations.
2. To apply the knowledge of these methods to solve practical problems with suitable software.
3. To introduce numerical methods for evaluating definite integrals.

Course Outcome

At the end of the course the students are able to-

1. Identified, classified and choose the most appropriate numerical method for solving the problem.
2. Developed Numerical skills to Mechanical Engineering Problems.

Teaching Scheme

	Hrs per week	No. of weeks	Total hour	Semester Credits
Lecture	03	14	40	03
Tutorial	--	--	--	--

Examination Scheme:

End semester scheme(ESE)	**80 marks**	**Duration : 03 Hrs.**
Internal Sessional Examination (ISE)	**20 marks**	

Purpose of Course: Degree Requirement

Prerequisite Courses: Fundamental knowledge about the mathematics.

Outline of the content: This course contains:

Unit- I

1.	Title: Software development & Solution of transcendental equation **No. of Lecture:08 ,Marks: 16**	
	a	Software development principles, mathematical modeling problem solving, Algorithm, Flowchart, Errors, Graphical method,
	b	Solution of transcendental equation - Bisection method, False position method, successive approximation method, Newton-Raphson method, Horner's method, rate of convergence

Unit- II

2.	Title: Numerical Integration & Solution of ordinary Differential Equation **No. of Lecture:08 ,Marks: 16**	
	a	Numerical Integration Trapezoidal rule, Simpson's 1\3 rd rule, Simpson's 3\8 th rule, Gauss Quadrature method: 2 point.
	B	Solution of ordinary Differential Equation Taylor's series method, Euler's method, Improved & modified Euler's method, Fourth order Range- Kutta method.

Unit- III

3	Title: Interpolation & Curve Fitting **No. of Lecture:08 ,Marks: 16**	
	a	Interpolation Linear and quadratic interpolation, Lagrange's interpolation, Newton's forward interpolation, Newton's backward interpolation, Newton's divided difference interpolation, Stirling interpolation,
	b	Curve fitting Linear & quadratic regression, Logarithmic curve fitting, Exponential curve fitting.

Unit- IV

4.	Title: Solution of Linear Algebraic Equation & Iterative method **No. of Lecture:08 ,Marks: 16**	
	a	Solution of Linear Algebraic Equation - Gauss elimination method, Gauss Jordan method LU- decomposition method.
	b	Iterative method - Jacobi iteration method, gauss seidel interactive method, Cholesky method.

Unit- V

5	Title: Finite Element Analysis & FDM **No. of Lecture:08 ,Marks: 16**	
	a	Finite Element Method: Introduction, Steps used in finite element Analysis , general approach, interpolation function, & Finite element application on one dimension, Solution of elliptical equations for various boundary conditions, Solution of parabolic equation by explicit, implicit
	b	Introduction to Finite Difference method, Comparison with Finite Element Analysis, crank-Nicholson method,

References:

1 Chapra, Canale," Numerical Method for Engineer",McGraw Hill Co.

2 Joh. H. Mathews," Numerical Methods", Pearson Education

3 P. Kandaswamy," Numerical Methods",S. Chand & Co. New Delhi

4 J. N. Reddy," Finite Element Method",McGraw Hill Co.

5 S. S. Shastri," Introductory Method of Numerical Analysis ", Prentice Hill India.

6 Belegundupatla," Introduction to Finite Element Method",Prentice Hill India.

Course Outline

Metrology and Quality Control **MQC**
Course Title: Short Title Course Code

Branch - Mechanical Engineering **Year** **Third Year**

Course Description: This course introduces undergraduate students to Metrology and Quality Control. The background required includes a sound knowledge to Measurements, (calculus), applied thermodynamics, Industrial management at second year level.

Course Objective: The course aims at imparting knowledge of metrology and quality control. The course aims at to familiarize to understand the principles metrology of screw threads, gear measurement, study of measuring machines, recent trends in engineering metrology. To learn to use standard practices and standard data, learn to use statistical concept, control chart for variables, control chart for attributes, acceptance sampling

Teaching Scheme

	Hours Per Week	**No. of Week**	**Total Hours**	**Semester Credits**
Lecture	03	14	42	3
Practical	02	14	28	

Examination scheme:
End semester exam (ESE) 80 Marks Duration: 03 hours
Internal Sectional exam (ISE) 20 Marks
Internal Continues Assessment (ICA) 25 Marks
End Semester Exam (ESE) 25 Marks
Practical Examination

Purpose of Course: Degree Requirement

1.	**Metrology**	**No. of Lectures – 08, Marks: 16**
	a	Definition: Measurement, precision, accuracy, sensitivity, Classification of method of measurement
	b	Linear Measurement:-Standards, line standards, end standards, classification of standards, precision measurement, precision measuring instruments and their characteristics, slip gauge
	c	Straightness, flatness and squareness:-Surface plates, measurement of straightness, flatness testing, squareness testing, roundness testing, machine tool metrology, Measurement by light wave interference:- Basic principle, sources of light, optical

		flats, fringe patterns and their interpretation, testing of flat, convex and concave and irregular surface, checking of slip gauges.

UNIT:-II

2.	**Design of gauges &Metrology**	**No. of Lectures – 08, Marks: 16**
	a	Design of gauges:- Types of gauges, limits, fits, tolerences, Taylor's principle
	b	Comparators:-Characteristics, application, types, construction and working of different mechanical, optical, electrical, pneumatic comparators
	c	Angle measurement:-Sine bars, Sine centers, Use of sine bar, angle gauges, autocollimator angle dekkor, constant deviation prism, Measurement of surface finish:-Types of Surface texure, elements of surface texture, measuring surface finish by stylus probe, Tomlinson & Taly-surf

UNIT: - III

3.	**Metrology of Screw thread, Gear & recent trend in metrology.** **No. of Lectures – 08, Marks: 16**
a	Metrology of screw threads:-Terminology, errors and their effects, thread gauges, measurement of elements of external and internal threads, Gear measurement:-calipers measurements, involute testing, roller measurements, tool makers microscope, profile projectors
b	Study of measuring machines:-Universal measuring machine, coordinate measuring machine, Errors in CMM, electronic inspection and measuring machine, Recent trend in engineering metrology:-precision instrument based on laser, probes, telemetric systems, Isometric viewing of surface defects, Machine vision

UNIT:-IV

4.	**Quality control**	**No. of Lectures – 08, Marks: 16**
	a	Introduction to quality :- factors controlling quality of design and conformance, balance between cost of quality and value of quality, Introduction to quality tools: Demings PDCA,PDSA cycles & Juran triology approach, Seven quality tools, Pareto

		analysis, cause &effect diagram, brainstorming, concurrent engineering
	b	Total quality management:, zero defect concept 5S,Kaizen,Kanban,,Poka yoke, TPM ,ISO 9000&TQM, Quality assurance ;-QFD, difference between inspection, quality control and quality assurance, quality survey

UNIT: - V

5.	**Statistical Quality Control**	**No. of Lectures – 08, Marks: 16**
	a	Statistic concept:-Concept of variation, variable & attribute data, the frequency distribution, quantitative description of distribution, normal curve, concept of six sigma, Control chart for variables:-definition of control chart, objective of control chart chart, R chart, Problems on X & R chart
	b	Control chart for attributes:-practical limitations of the control charts for variables charting chart chart, Problems on P & C chart
	c	Acceptance sampling:-Sampling inspection Vs hundred percent inspection, basic concept of sampling inspection, OC Curve, conflicting interests of consumer and producer, producer's and consumer's risk, AQL LTPD, Sampling plans

Recommended Books :

[1] R.K.Jain: Engineering Metrology: Khanna Publishers.
[2] Handbook to industrial metrology: ASTME: Printice Hall Pub
[3] G.M.Juran: Handbook of quality control, McGraw Hill Pub.
[4] M.Mahajan: Statistical quality control
[5] K.C.Jain:TQM & ISO 9000;Khanna publishers
[6] I.C.Gupta: A textbook of Engg Metrology: Khanna Publishers.
[7] M.Mahajan : A textbook of metrology :Dhanpat rai & co.

Lab - Course Outline

Metrology and Quality Control	**MQC**	
Course Title	Short Title	Course Code
Branch- Mechanical/Automobile Engineering	**Year**	**Third Year**

Course Description:
This lab includes performance practical and study practical related to metrology and quality control

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Evaluation Scheme:

Internal Continuous Assessment (ICA) 25 Marks

End Semester Exam (ESE) (Oral) 25Marks

Prerequisite Course(s): General mathematics, 11t^{h} Physics & 12th physics

Outline of content:

This practical contains following experiments

1 Determination of linear/angular dimensions of part using precision & non precision instrument.

2 Machine tool alignment tests on any machine tool like Lathe,Drilling,Milling.

3 Interferometer-Study of surfaces using optical flat.

4 Surface finish measurement.

5 Measurement of roundness/circularity using mechanical comparator.

6 Measurement of screw parameters

7 Measurement of Gear parameters i) gear tooth thickness ii)constant chord iii)PCD

8Study and applications of tool makers microscope

9 Use of profile projector

10 Study and use of control charts

Note: Any EIGHT practical from Mechanical Measurement and Metrology Lab shall be conducted during 14 weeks available during semester.

ESE (Practical Examination)

- **The Practical Examination will comprise of performing the experiment and viva on the practical's.**

Course Outline

Turbo Machinery **Turbo M/C**

Course Title Short Title Course Code

Branch: - Mechanical Engineering **Year** **Third Year**

Course Description:-

This course introduces undergraduate students to Turbo Machinery. The background required includes a sound knowledge to Mathematics (Calculus), Engineering Thermodynamics, Applied Thermodynamics and Fluid Mechanics at Second Year Level. The Course aims at imparting knowledge of Turbo Machinery.

Teaching Scheme:-

	Hours per week	**No. of weeks**	**Total Hours**	**Semester Credits**
Laboratory	3	14	42	3
Practical	2	14	28	1

Evaluation Scheme:-

End Semester exam (ESE) 80 Marks Duration: 03 hours

Internal Sessional exam (ISE) 20 Marks

Prerequisite Course (S):- Mathematics (Calculus) at first year level and Engineering Thermodynamics, Applied Thermodynamics and Fluid Mechanics at Second Year Level.

Outline of Content:- The Course Contains :

UNIT-I

1.	**Steam Turbines**	**No. of Lectures-08 Marks-16**
	a	Types of turbines, Constructional details impulse turbine.
	b	Compounding of turbine, Velocity diagrams, Output efficiency.
	c	Reaction turbine, Velocity, Diagrams, Degree of reaction.
	d	Governing of turbines, Application of turbines, Losses in turbines.

UNIT-II

2.	**Gas Turbines**	**No. of Lectures-08 Marks-16**
	a	Theory and fundamentals of gas turbines, principles, classification.
	b	Joule's cycles, Assumptions for simple gas turbines, Cycle analysis, Work ratio, Concept of maximum and optimum pressure ratio, Actual cycle.
	c	Effect of operating variable on thermal efficiency, Regeneration, Intercooling, reheating, their effects on performance.
	d	Closed cycle and semiclosed cycles gas turbine plant, Applications of gas turbines.

UNIT-III

3.	**JET PROPULSION**	**No. of Lectures-08 Marks-16**
	a	Introduction, Theory of jet propulsion, Types of Jet Engines.
	b	Energy flow through Jet Engines, Thrust, Thrust power, and Propulsive efficiency.

	c	Turbo jet, Turbo Prop, Turbo fan engines, Pulse jet and ram jet engines.
	d	Performance characteristics of these engines, Thrust segmentation application of jet engines, Concept of rocket propulsion.

UNIT-IV

4.	**HYDRAULIC TURBINES**	**No. of Lectures-08**	**Marks-16**
	a	Impulse momentum principle, Fixed and moving flat plate and curve vanes, Series of plates & vanes, Velocity triangles and their analysis, Work done, Efficiency etc.	
	b	Classification of hydraulic turbines, Heads & various efficiencies.	
	c	Impulse turbine: Main components and constructional features of pelton wheel,	
	d	Velocity diagrams & work done, Condition for max. hyd. Efficiency, Number of buckets, Jets, Non dimensional parameters (speed ratio, jet ratio).	

UNIT-V

5.	**HYDRAULIC TURBINES (REACTION TYPE)**	**No. of Lectures-08**	**Marks-16**
	a	Reaction turbine, Main components & Constructional Features.	
	b	Types of reaction turbine (Francis, Kaplan), Velocity Digrams.	
	c	Unit quantities, Selection of turbine considering various factors, Specific speed, Types of characteristic curves.	

	d	Draft tube types, Efficiency, Cavitations, Governing mechanisms for pelton wheel, Francis, Kaplan turbines.

References:-

1. Domkundwar, “Thermal Engineering”, Dhanpat Rai and Co Ltd. Delhi
2. P L Ballaney , “Thermal Engineering”. Khanna Publications, Delhi.
3. R K Rajput , “Thermal Engineering”, Laxmi Publication ltd. New Delhi.
4. Dr. R. K. Bansal, “Fluid Mechanics and Hydraulic M/c”, Laxmi publication Ltd. New Delhi.
5. Dr. Jagdish Lal, “Hydraulic Machine”. Metro politan book co. pvt Ltd. Delhi
6. Dr Modi seth, “Hydraulics & Fluid Machine”. Standard book house Delhi.
7. R. Yadav “Steam & Gas turbine”, Central Publications, Allahbad.
8. J. K. Jain “Gas Turbine Theory & Jet Populsion”, Khanna Publications, New Delhi.
9. Cohen, Roger “Gas Turbine theory”, Longman Publications.
10. Gopalkrishnan “A Treatise on Turbomachines”, Scitech Pub. (India)pvt.Ltd,Chennai
11. Kadambi V. & Prasrd M, “Turbo Machinery”, New Age International Publication New Delhi.

Lab: - Course Outline

Turbo Machinery **Turbo M/C Lab**

Course Title Short title Course code

Branch: - Mechanical Engineering

Course Description:-

This lab includes different practical of Turbo Machinery. The Course aims at imparting knowledge of Turbo Machinery.

Teaching Scheme:-

	Hours per week	**No. of weeks**	**Total Hours**	**Semester Credits**
Laboratory	2	14	28	1

Evaluation Scheme:-

Internal Continuous Assessment (ICA) 25 Marks

End Semester exam (ESE) (ORAL) 25 Marks

Prerequisite Course (S) :- Mathematics (Calculus) at first year level and Engineering Thermodynamics, Applied Thermodynamics and Fluid Mechanics at Second Year Level.

Outline of Content:- This Course Contains:

1. Study of steam turbine power plant.
2. Study of steam turbine systems.
    a) Methods of compounding
    b) Methods of governing
    c) Losses in steam turbine
    d) Lubrication system.
3. Trial on steam turbine.
4. Study of gas turbines.
5. Study of hydraulic turbines.
6. Trial on pelton wheel.
7. Trial on Francis turbine.
8. Trial on Kaplan turbine.
9. Trial on gas turbine plant.
10. Study of various jet propulsion devices / engine.
11. Visit to hydraulic power plant.

Note: Lab file should contain at list EIGHT experiments from above mentioned list.

ESE (Oral Examination)

The Oral Examination will comprise of viva on the above Eight Experiments.

Course Outline

Project and Business Management	**PBM**	
Course Title	Short title	Course Code
Branch: Mechanical Engineering	**Year**	**Third Year**

Course Description: This course introduces undergraduate students to imparting knowledge of project & business management. The background required a sound knowledge of network technique, organization structure, Financial and material management.

Course Objectives

1. To provide about project and its management.
2. To develop knowledge about organization and impart knowledge about functioning of management.
3. To develop knowledge about financial management techniques.

Course Outcome

At the end of the course the students are able to-

1. Develop knowledge of project management and statistical tools used in its.
2. Helped to understand the various functions of management along with its types.
3. Develop knowledge about Capital cost and cost control.

Teaching Scheme

	Hrs per week	No. of weeks	Total hour	Semester Credits
Lecture	03	14	40	03

Examination Scheme:

End semester scheme(ESE)	**80 marks**	**Duration : 03 Hrs.**
Internal Sessional Examination (ISE)	**20 marks**	

Purpose of Course: Degree Requirement

Prerequisite Courses: Fundamental knowledge about the mathematics.

Outline of the content: This course contains:

Unit- I

1.	Title: **Project Management**	**No. of Lecture:08 ,Marks: 16**
	a	Introduction to project management, Concept of project management, Managerial function at different organizational levels, Types of projects,
	b	Project identification, scheduling, Monitoring, Control, Basic tool & techniques for projects scheduling Bar chart, Project life cycle curves, Line balancing, Problems on Line balancing.

Unit- II

2.	Title: **Project statistic technique**	**No. of Lecture:08 ,Marks: 16**
	a	Introduction of Network technique, Fundamental concept and network models, construction of network diagrams,
	b	Application of network analysis, definition of PERT and CPM, comparison between CPM and PERT, Critical path method with problem, programme evaluation and review techniques with problem, time cost problem (crash) with PERT.

Unit- III

3	**Business management**	**No. of Lecture:08 ,Marks: 16**
	a	Introduction to management, Concept of management, The function of management, importance of management Forms of business organsation, Concept of Ownership Organization, Types of ownership, Individual Ownership, Partnership organization, joint stock companies, types of stock companies,
	b	Co-operative Organisations, various types of co-operative societies, Public sector organization,State ownership, public cooperation, choice of form of organisation, comparative evaluation of different forms of business ownership.

Unit- IV

4.	Title: **Financial Management**	**No. of Lecture:08 ,Marks: 16**
	a	Introduction, Definition of financial management, functions of financial management, Sources of Funds, Capital, classification of capital, working capital, need for working capital, assessment of working capital, Factors affecting working capital, Sources of finance (Shares, debentures, loans from banks, trade credit public deposits financial institutions).
	b	Cost and cost control: Elements of cost, direct cost, indirect cost, variable and fixed cost, cost control technique, marginal costing, break even analysis.

Unit- V

5	Title: **Material & Purchase Management**	**No. of Lecture:08 ,Marks: 16**
	a	Scope of material management, function of material management, objectives of scientific purchasing, functions of purchase department, , 5R's Of Buying, Methods of buying, source selection (vendor),vendor rating, just in time purchasing
	b	Inventory management, Objective of inventory management, types of inventory, selective inventory technique (ABC,VED), Inventory model (Economic lot size with fixed price, EOQ with quantity discount).

References:

1) L.C.Jhamb ,"Production(Operation)Management", Everest publishing house
2) Chary," Theory And Problems in Production and Operations Management",2nd Reprint, Tata McGraw Hill Publishing Co. New Delhi., 1996.
3) Nair,N.G.,"Production & Operations Management",Tata McGraw Hill Publishing Co. New Delhi.,1997.
4) Chadra Presanna,"Fundamentals of Financial Management" Tata McGraw Hill New Delhi.,1994.
5) Kolter Philip,"Marketing Management",Prentice-hall of India,1988.
6) Vyuptakesh Sharan.,"Fundamental of Financial Management", Pearson Education
7) Martand telsang,"industiral engineering and production management",1st Edition reprint 2013- S.chand & company ltd. New Delhi.2013
8) S.M.Inamdar, "Cost and Management Acounting"
9) M.K.Khan &P.K.Jain,"Financial Management", Tata McGraw Hill Publishing Co. New Delhi.
10) J.P.Bose, S.Talukdar, "Business Management", New Central Agencies (P) Ltd.

Lab - Course Outline

COMPUTER PROGRAMMING IN C / C++ **C/C++**

Course Title Short title Course code

Branch - Mechanical / Automobile Engineering **Year – Third Year**

Course Description:

This course provides students with a comprehensive study of the C /C++ programming language. Introduction to program design and problem solving using the C /C++ programming language. Programming topics include control structures, functions, arrays, pointers, and file I/O.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Prerequisite Course(s): Algebra and Trigonometry

Outline of Content: This course contains

a) One assignment on introduction to computer

b) To develop and Run "C/C++" programs for machine elements like

(Any two on C and two on C++)

a) Design of knuckle joint or turnbuckle joint

b) Design of power screw

c) Design of helical spring

d) Design of splines

e) Design of muff coupling

f) Theories of failure etc.

Recommended Books:

1) Balgurusamy, "Programming in C" Tata McGraw Hill Publication Co. Ltd.

2) Y. Kanitkar, “Let us C” BPB Publications.

3) M. P. Grover and Zimmer, “CAD/CAM” PHI Pvt. Ltd.

4) Shigley J.E. and Mischke C.R. “Mechanical Engineering Design” McGraw Hill Publication Co. Ltd.

5) Spotts M.F. and Shoup T.E. “Design of Machine Elements” Prentice Hall International.

6) Bhandari V.B. “Design of Machine Elements” Tata McGraw Hill Publication Co. Ltd.

7) Balgurusamy, “Object Oriented Programming with C++” Tata McGraw Hill, New Delhi

8) Ravi Chandran, “Programming in C++” Tata McGraw Hill Publication Co. Ltd.

COURSE CONTENT

Minor Project **MIP**

Course Title Short Title Course Code

Semester-VI

Laboratory	**Hours per Week**	**No. of Weeks**	**Total Hours**	**Semester Credits**
	2	**10**	**20**	**2**

Examination Scheme **Internal Continuous Assessment (ICA): 50 Marks**

- Every student shall undertake the Minor Project in semester VI.
- Each student shall work on an approved project, a group of **05 students (maximum)** shall be allotted for the each minor project.
- Minor project may involve fabrication, design or investigation of a technical problem that may take design, experimental or analytical character or combine element of these areas. The project work shall involve sufficient work so that students get acquainted with different aspects of fabrication, design or analysis.
- Each student is required to maintain separate log book for documenting various activities of minor project.
- The three-member committee appointed by Head of the department shall be constituted for finalizing the topics of minor project. Maximum four minor project groups shall be assigned to one teaching staff.
- Assessment of the project for award of ICA marks shall be done jointly by the guide and departmental committee as per the guidelines given in **Table-A.**
- Before the end of semester, student shall deliver a seminar and submit the seminar report (paper bound copy)in following format:
    - Size of report shall be of minimum 25 pages.
    - Student should preferably refer minimum five reference books / magazines/standard research papers.

- Format of report
  - Introduction.
  - Literature survey.
  - Theory (Implementation, Methodology, Applications, Advantages, Disadvantages. etc)
  - Future scope.
  - Conclusion.

Assessment of Minor Project

Name of the Project: _____

Name of the Guide: _____

Table-A

SN	Exam Seat No	Name of Student	Project Selection	Documentation	Design /Simulation/Logic	PCB/hardware/programming	Result Verification	Presentation	Total
			5	10	10	10	10	5	50

COURSE CONTENT

Seminar-I **S-I**

Course Title Short Title Course Code

Semester-VI

Laboratory	**Hours per Week**	**No. of Weeks**	**Total Hours**	**Semester Credits**
	2	**10**	**20**	**2**

Examination Scheme **Internal Continuous Assessment (ICA): 25 Marks**

1. For Seminar-I every student will individually study a topic assigned to him / her and submit a report and shall deliver a short lecture / Seminar on the topic during the term.
2. The three-member committee appointed by Head of the department shall be constituted for finalizing the topics of Seminar-I. Seminar shall be related state of the art topic of his choice approved by the committee.
3. Seminar topic should not be repeated and registration of the same shall be done on first come first serve basis.
4. Topic of Seminar shall be registered within a two week from commencement of VI Semester and shall be approved by the committee.
5. Maximum six seminar supervision shall be allotted to each teacher.
6. Before the end of semester, student shall deliver a seminar and submit the seminar report (paper bound copy).

ASSESSMENT OF SEMINAR-I

Assessment of the Seminar-I for award of ICA marks shall be done by the guide and a departmental committee jointly, as per the guidelines given in **Table- B**

Title of Seminar: _____

Name of Guide: _____

Table-B

SN	Exam Seat No	Name of Student	Topic Selection	literature survey	Report writing	Depth of understanding	Presentation	Total
			5	5	5	5	5	25

LOAD DESTRIBUTION OF MECHANICAL ENGINEERING DEPARTMENT

Academic Year: 2017-2018 FOR: - First Semester

Date: 01/08/2017

Sr. No.	NAME	CLASS	SUBJECT	Theory (Hr)	Tutorial (Batch X Hr)	Practical (Batch X Hr)	Total Load
1	Dr. S. P. Shekhawat	SE(A)	ET	03	-----	03*02=06	12
		SE(B)	ET	03	-----	-----	
2	Mr. N. K. Patil	BE (B)	OR	03	-----	-----	10
		BE (IND)	ERT	03	-----	-----	
		BE	SEMINAR	-----	-----	02	
		BE	PROJECT	-----	-----	02	
3	Mr. K. Shrivastava	FE (B)	ICEEM	03	------	------	18
		TE (A)	HT	03	------	04*02=08	
		BE	SEMINAR	-----	-----	02	
		BE	PROJECT	-----	-----	02	
4	Mr. M.V. Rawlani	BE (A)	OR	03	-----	-----	10
		BE (IND)	ORT	03	-----	-----	
		BE	SEMINAR	-----	-----	02	
		BE	PROJECT	-----	-----	02	
5	Mr. P. G. Damle	TE(A)	MD-I	03	-----	04*02=08	18
		TE(B)	MD-I	03	-----	-----	
		BE	SEMINAR	-----	-----	02	
		BE	PROJECT	-----	-----	02	
6	Mr. D. B. Sadaphale	SE (A)	FM	03	01*01=01	-----	18
		SE (B)	FM	03	01*01=01	03*02=06	
		BE	SEMINAR	-----	-----	02	
		BE	PROJECT	-----	-----	02	
7	Mr. P. N. Ulhe	SE(A)	SOM	04	01*01=01	-----	13
		SE(B)	SOM	03	01*01=01	-----	
		BE	SEMINAR	-----	-----	02	
		BE	PROJECT	-----	-----	02	
8	Mr. P. M. Solanki	TE (A)	CG	01	-----	-----	16
		BE (A)	CAD/CAM	03	-----	04*02=08	
		BE	SEMINAR	-----	-----	02	
		BE	PROJECT	-----	-----	02	
9	Mr. P. D. Patil	SE (A)	SS-III	01	-----	-----	23
		SE (B)	SS-III	01	-----	03*02=06	
		BE (B)	CAD/CAM	03	-----	04*02=08	
		BE	SEMINAR	-----	-----	02	
		BE	PROJECT	-----	-----	02	

10	Mr. M. V. Kulkarni	TE (B)	HT	03	-----	04*02=08	18
		SE (Elect.)	PPE	03	-----	-----	
		BE	SEMINAR	-----	-----	02	
		BE	PROJECT	-----	-----	02	
11	Mr. A. R. Bhardwaj	SE (A)	ME-I	03	-----	-----	07
		BE	SEMINAR	-----	-----	02	
		BE	PROJECT	-----	-----	02	
12	Mr. D. C. Talele	TE(A)	TOM-II	03	-----	-----	18
		TE(B)	TOM-II	03	-----	04*02=08	
		BE	SEMINAR	-----	-----	02	
		BE	PROJECT	-----	-----	02	
13	Dr. P.P. Bornare	TE(A)	ICE	03	-----	-----	18
		TE(B)	ICE	03	-----	04*02=08	
		BE	SEMINAR	-----	-----	02	
		BE	PROJECT	-----	-----	02	
14	Mrs. J. R. Surange	SE (A)	MSM	03	-----	03*02=06	16
		SE (B)	ME-I	03	-----	-----	
		BE	SEMINAR	-----	-----	02	
		BE	PROJECT	-----	-----	02	
15	Mr. C. K. Mukherjee	TE (A)	I&SE	03	-----	-----	07
		BE	SEMINAR	-----	-----	02	
		BE	PROJECT	-----	-----	02	
16	Mr. A. V. Rajput	BE (A)	AE- I	03	-----	04*02=08	18
		BE (B)	AE- I	03	-----	-----	
		BE	SEMINAR	-----	-----	02	
		BE	PROJECT	-----	-----	02	
17	Mr. A. J. Puri	SE (B)	MSM	03	-----	03*02=06	16
		TE (B)	I&SE	03	-----	-----	
		BE	SEMINAR	-----	-----	02	
		BE	PROJECT	-----	-----	02	
18	Mr. T.G. Patil	BE (A)	RAC	03	-----	04*02=08	18
		BE (B)	RAC	03	-----	-----	
		BE	SEMINAR	-----	-----	02	
		BE	PROJECT	-----	-----	02	
19	Mr. Jayesh A. Gosavi	BE (B)	RAC	-----	-----	04*02=08	08

20	Mr. Sameer Ahmad Farooque	TE(B)	MD-I	-----	-----	02*02=04	12
		BE (B)	AE- I	-----	------	04*02=08	
21	Mr. Ashwin P. Thakkar	SE (A)	FM	-----	01*01=01	03*02=06	08
		SE (B)	FM	-----	01*01=01	-----	
22	Mr. Smith M. Arbat	TE (A)	CG	-----	-----	04*02=08	17
		TE (B)	CG	01	-----	04*02=08	
23	Mr. M.M. Gosavi	SE (A)	SS-III	-----	-----	03*02=06	14
		TE(A)	ICE	-----	-----	04*02=08	
24	Mr. Mahesh A. Marathe	SE (Elect.)	PPE	-----	-----	03*02=06	12
		SE (B)	ET	-----	-----	03*02=06	
25	Miss. Chetana S. Chopade	SE(A)	SOM	-----	01*01=01	-----	14
		SE(B)	SOM	-----	01*01=01	-----	
		TE(B)	MD-I	-----	-----	02*02=04	
		TE(A)	TOM-II	-----	-----	04*02=08	

Mr. D.C. Talele
Time Table I/C

Prof. Dr. S.P. Shekhawat
HOD

LOAD DESTRIBUTION OF MECHANICAL ENGINEERING DEPARTMENT

Academic Year: 2017-2018 FOR: - Second Semester

Date: 03/01/2018

Sr. No.	NAME	CLASS	SUBJECT	Theory (Hr)	Tutorial (Batch X Hr)	Practical (Batch X Hr)	Total Load
1	Dr. S. P. Shekhawat	SE(A)	TOM-I	02	-----	01*02=02	10
		SE(B)	TOM-I	02	-----	01*02=02	
		T.E.	SEMINAR-I	-----	-----	02	
2	Mr. N. K. Patil	FE(A)	IMEED	04	-----	02*02=04	20
		SE(A)	TOM-I	02	-----	-----	
		SE(B)	TOM-I	02	-----	-----	
		T.E.	MQC	-----	-----	01*02=02	
		T.E.	SEMINAR-I	-----	-----	02	
		TE	MINOR PROJECT	-----	-----	02	
		BE	PROJECT	-----	-----	02	
3	Mr. K. Shrivastava	FE (C)	IMEED	04	------	03*02=06	20
		TE (B)	TURBO M/C	04	------	01*02=02	
		T.E.	SEMINAR-I	-----	-----	02	
		BE	PROJECT	-----	-----	02	
4	Mr. M.V. Rawlani	FE (D)	IMEED	04	------	03*02=06	19
		TE (A)	NACM	03	------	------	
		T.E.	SEMINAR-I	-----	-----	02	
		TE	MINOR PROJECT	-----	-----	02	
		BE	PROJECT	-----	-----	02	
5	Dr. P. G. Damle	TE(A)	MD-II	03	-----	04*02=08	26
		TE(B)	MD-II	03	-----	04*02=08	
		T.E.	SEMINAR-I	-----	-----	02	
		BE	PROJECT	-----	-----	02	
6	Mr. D. B. Sadaphale	BE (A)	PPE	03	-----	02*02=04	18
		BE (B)	PPE	03	-----	02*02=04	
		T.E.	SEMINAR-I	-----	-----	02	
		BE	PROJECT	-----	-----	02	
7	Mr. P. N. Ulhe	BE(A)	MV	04	-----	01*02=02	18
		BE(B)	MV	04	-----	01*02=02	
		T.E.	SEMINAR-I	-----	-----	02	
		TE	MINOR PROJECT	-----	-----	02	
		BE	PROJECT	-----	-----	02	
8	Mr. P. M. Solanki	FE (B)	IMEED	04	------	03*02=06	25
		BE (A)	FEA&ST	03	-----	04*02=08	
		T.E.	SEMINAR-I	-----	-----	02	
		BE	PROJECT	-----	-----	02	
9	Mr. P. D. Patil	FE (E)	IMEED	04	------	03*02=06	19

		TE (A)	MQC	03	-----	01*02=02	
		T.E.	SEMINAR-I	-----	-----	02	
		BE	PROJECT	-----	-----	02	
10	Mr. M. V. Kulkarni	FE (F)	IMEED	04	------	03*02=06	19
		TE (A)	TURBO M/C	03	------	01*02=02	
		T.E.	SEMINAR-I	-----	-----	02	
		BE	PROJECT	-----	-----	02	
11	Mr. A. R. Bhardwaj	SE (B)	ME-II	04	-----	-----	
		T.E.	SEMINAR-I	-----	-----	02	10
		TE	MINOR PROJECT	-----	-----	02	
		BE	PROJECT	-----	-----	02	
12	Mr. D. C. Talele	BE (B)	FEA&ST	03	-----	04*02=08	15
		T.E.	SEMINAR-I	-----	-----	02	
		BE	PROJECT	-----	-----	02	
13	Dr. P.P. Bornare	TE(A)	PBM	03	-----	-----	12
		BE(A)	AUTO-II	03	-----	-----	
		T.E.	SEMINAR-I	-----	-----	02	
		TE	MINOR PROJECT	-----	-----	02	
		BE	PROJECT	-----	-----	02	
14	Mrs. J. R. Surange	FE (G)	IMEED	04	------	03*02=06	19
		TE (B)	MQC	03	-----	01*02=02	
		T.E.	SEMINAR-I	-----	-----	02	
		BE	PROJECT	-----	-----	02	
15	Mr. C. K. Mukherjee	SE (A)	MD	01	-----	04*02=08	25
		SE (B)	MD	01	-----	04*02=08	
		TE (B)	NACM	03	-----	-----	
		T.E.	SEMINAR-I	-----	-----	02	
		BE	PROJECT	-----	-----	02	
16	Mr. A. V. Rajput	FE (H)	IMEED	04	------	03*02=06	19
		BE (B)	AE- II	03	-----	-----	
		T.E.	SEMINAR-I	-----	-----	02	
		TE	MINOR PROJECT	-----	-----	02	
		BE	PROJECT	-----	-----	02	
17	Mr. A. J. Puri	SE (A)	ME-II	04	-----	-----	13
		TE (B)	PBM	03	-----	-----	
		T.E.	SEMINAR-I	-----	-----	02	
		TE	MINOR PROJECT	-----	-----	02	
		BE	PROJECT	-----	-----	02	

18	Mr. T.G. Patil	SE (A)	AT	03	01*01=01	01*02=02	16
		SE (B)	AT	03	01*01=01	01*02=02	
		T.E.	SEMINAR-I	-----	-----	02	
		BE	PROJECT	-----	-----	02	
19	Mr. Jayesh A. Gosavi	TE (A)	TURBO M/C	-----	-----	03*02=06	16
		TE (B)	TURBO M/C	-----	-----	03*02=06	
		T.E.	SEMINAR-I	-----	-----	02	
		TE	MINOR PROJECT	-----	-----	02	
20	Mr. Sameer Ahmad Farooque	TE (A)	MQC	-----	-----	03*02=06	14
		TE (B)	MQC	-----	-----	02*02=04	
		T.E.	SEMINAR-I	-----	-----	02	
		TE	MINOR PROJECT	-----	-----	02	
21	Mr. Ashwin P. Thakkar	SE (A)	TOM-I	-----	-----	02*02=04	12
		SE (B)	TOM-I	-----	-----	02*02=04	
		T.E.	SEMINAR-I	-----	-----	02	
		TE	MINOR PROJECT	-----	-----	02	
22	Mr. Smith M. Arbat	FE (I)	IMEED	04	------	04*02=08	16
		T.E.	SEMINAR-I	-----	-----	02	
		TE	MINOR PROJECT	-----	-----	02	
23	Mr. M.M. Gosavi	SE (A)	AT	-----	01*01=01	02*02=04	14
		SE (B)	AT	-----	01*01=01	02*02=04	
		T.E.	SEMINAR-I	-----	-----	02	
		TE	MINOR PROJECT	-----	-----	02	
24	Mr. Mahesh A. Marathe	BE(A)	MV	-----	-----	03*02=06	16
		BE(B)	MV	-----	-----	03*02=06	
		T.E.	SEMINAR-I	-----	-----	02	
		TE	MINOR PROJECT	-----	-----	02	
25	Miss. Chetana S. Chopade	BE(A)	PPE	-----	-----	02*02=04	12
		BE(B)	PPE	-----	-----	02*02=04	
		T.E.	SEMINAR-I	-----	-----	02	
		TE	MINOR PROJECT	-----	-----	02	

Mr. D.C. Talele
Time Table I/C

Prof. Dr. S.P. Shekhawat
HOD

LOAD DESTRIBUTION OF MECHANICAL ENGINEERING DEPARTMENT

Academic Year: 2017-2018 FOR: - First Semester

Date: 01/08/2017

Sr. No.	NAME	CLASS	SUBJECT	Theory (Hr)	Tutorial (Batch X Hr)	Practical (Batch X Hr)	Total Load
1	Dr. S. P. Shekhawat	SE(A)	ET	03	-----	03*02=06	12
		SE(B)	ET	03	-----	-----	
2	Mr. N. K. Patil	BE (B)	OR	03	-----	-----	10
		BE (IND)	ERT	03	-----	-----	
		BE	SEMINAR	-----	-----	02	
		BE	PROJECT	-----	-----	02	
3	Mr. K. Shrivastava	FE (B)	ICEEM	03	------	------	18
		TE (A)	HT	03	------	04*02=08	
		BE	SEMINAR	-----	-----	02	
		BE	PROJECT	-----	-----	02	
4	Mr. M.V. Rawlani	BE (A)	OR	03	-----	-----	10
		BE (IND)	ORT	03	-----	-----	
		BE	SEMINAR	-----	-----	02	
		BE	PROJECT	-----	-----	02	
5	Mr. P. G. Damle	TE(A)	MD-I	03	-----	04*02=08	18
		TE(B)	MD-I	03	-----	-----	
		BE	SEMINAR	-----	-----	02	
		BE	PROJECT	-----	-----	02	
6	Mr. D. B. Sadaphale	SE (A)	FM	03	01*01=01	-----	18
		SE (B)	FM	03	01*01=01	03*02=06	
		BE	SEMINAR	-----	-----	02	
		BE	PROJECT	-----	-----	02	
7	Mr. P. N. Ulhe	SE(A)	SOM	04	01*01=01	-----	13
		SE(B)	SOM	03	01*01=01	-----	
		BE	SEMINAR	-----	-----	02	
		BE	PROJECT	-----	-----	02	
8	Mr. P. M. Solanki	TE (A)	CG	01	-----	-----	16
		BE (A)	CAD/CAM	03	-----	04*02=08	
		BE	SEMINAR	-----	-----	02	
		BE	PROJECT	-----	-----	02	
9	Mr. P. D. Patil	SE (A)	SS-III	01	-----	-----	23
		SE (B)	SS-III	01	-----	03*02=06	
		BE (B)	CAD/CAM	03	-----	04*02=08	
		BE	SEMINAR	-----	-----	02	
		BE	PROJECT	-----	-----	02	

10	Mr. M. V. Kulkarni	TE (B)	HT	03	-----	04*02=08	18
		SE (Elect.)	PPE	03	-----	-----	
		BE	SEMINAR	-----	-----	02	
		BE	PROJECT	-----	-----	02	
11	Mr. A. R. Bhardwaj	SE (A)	ME-I	03	-----	-----	07
		BE	SEMINAR	-----	-----	02	
		BE	PROJECT	-----	-----	02	
12	Mr. D. C. Talele	TE(A)	TOM-II	03	-----	-----	18
		TE(B)	TOM-II	03	-----	04*02=08	
		BE	SEMINAR	-----	-----	02	
		BE	PROJECT	-----	-----	02	
13	Dr. P.P. Bornare	TE(A)	ICE	03	-----	-----	18
		TE(B)	ICE	03	-----	04*02=08	
		BE	SEMINAR	-----	-----	02	
		BE	PROJECT	-----	-----	02	
14	Mrs. J. R. Surange	SE (A)	MSM	03	-----	03*02=06	16
		SE (B)	ME-I	03	-----	-----	
		BE	SEMINAR	-----	-----	02	
		BE	PROJECT	-----	-----	02	
15	Mr. C. K. Mukherjee	TE (A)	I&SE	03	-----	-----	07
		BE	SEMINAR	-----	-----	02	
		BE	PROJECT	-----	-----	02	
16	Mr. A. V. Rajput	BE (A)	AE- I	03	-----	04*02=08	18
		BE (B)	AE- I	03	-----	-----	
		BE	SEMINAR	-----	-----	02	
		BE	PROJECT	-----	-----	02	
17	Mr. A. J. Puri	SE (B)	MSM	03	-----	03*02=06	16
		TE (B)	I&SE	03	-----	-----	
		BE	SEMINAR	-----	-----	02	
		BE	PROJECT	-----	-----	02	
18	Mr. T.G. Patil	BE (A)	RAC	03	-----	04*02=08	18
		BE (B)	RAC	03	-----	-----	
		BE	SEMINAR	-----	-----	02	
		BE	PROJECT	-----	-----	02	
19	Mr. Jayesh A. Gosavi	BE (B)	RAC	-----	-----	04*02=08	08

20	Mr. Sameer Ahmad Farooque	TE(B)	MD-I	-----	-----	02*02=04	12
		BE (B)	AE- I	-----	------	04*02=08	
21	Mr. Ashwin P. Thakkar	SE (A)	FM	-----	01*01=01	03*02=06	08
		SE (B)	FM	-----	01*01=01	-----	
22	Mr. Smith M. Arbat	TE (A)	CG	-----	-----	04*02=08	17
		TE (B)	CG	01	-----	04*02=08	
23	Mr. M.M. Gosavi	SE (A)	SS-III	-----	-----	03*02=06	14
		TE(A)	ICE	-----	-----	04*02=08	
24	Mr. Mahesh A. Marathe	SE (Elect.)	PPE	-----	-----	03*02=06	12
		SE (B)	ET	-----	-----	03*02=06	
25	Miss. Chetana S. Chopade	SE(A)	SOM	-----	01*01=01	-----	14
		SE(B)	SOM	-----	01*01=01	-----	
		TE(B)	MD-I	-----	-----	02*02=04	
		TE(A)	TOM-II	-----	-----	04*02=08	

Mr. D.C. Talele
Time Table I/C

Prof. Dr. S.P. Shekhawat
HOD

LOAD DESTRIBUTION OF MECHANICAL ENGINEERING DEPARTMENT

Academic Year: 2017-2018 FOR: - Second Semester

Date: 03/01/2018

Sr. No.	NAME	CLASS	SUBJECT	Theory (Hr)	Tutorial (Batch X Hr)	Practical (Batch X Hr)	Total Load
1	Dr. S. P. Shekhawat	SE(A)	TOM-I	02	-----	01*02=02	10
		SE(B)	TOM-I	02	-----	01*02=02	
		T.E.	SEMINAR-I	-----	-----	02	
2	Mr. N. K. Patil	FE(A)	IMEED	04	-----	02*02=04	20
		SE(A)	TOM-I	02	-----	-----	
		SE(B)	TOM-I	02	-----	-----	
		T.E.	MQC	-----	-----	01*02=02	
		T.E.	SEMINAR-I	-----	-----	02	
		TE	MINOR PROJECT	-----	-----	02	
		BE	PROJECT	-----	-----	02	
3	Mr. K. Shrivastava	FE (C)	IMEED	04	------	03*02=06	20
		TE (B)	TURBO M/C	04	------	01*02=02	
		T.E.	SEMINAR-I	-----	-----	02	
		BE	PROJECT	-----	-----	02	
4	Mr. M.V. Rawlani	FE (D)	IMEED	04	------	03*02=06	19
		TE (A)	NACM	03	------	------	
		T.E.	SEMINAR-I	-----	-----	02	
		TE	MINOR PROJECT	-----	-----	02	
		BE	PROJECT	-----	-----	02	
5	Dr. P. G. Damle	TE(A)	MD-II	03	-----	04*02=08	26
		TE(B)	MD-II	03	-----	04*02=08	
		T.E.	SEMINAR-I	-----	-----	02	
		BE	PROJECT	-----	-----	02	
6	Mr. D. B. Sadaphale	BE (A)	PPE	03	-----	02*02=04	18
		BE (B)	PPE	03	-----	02*02=04	
		T.E.	SEMINAR-I	-----	-----	02	
		BE	PROJECT	-----	-----	02	
7	Mr. P. N. Ulhe	BE(A)	MV	04	-----	01*02=02	18
		BE(B)	MV	04	-----	01*02=02	
		T.E.	SEMINAR-I	-----	-----	02	
		TE	MINOR PROJECT	-----	-----	02	
		BE	PROJECT	-----	-----	02	
8	Mr. P. M. Solanki	FE (B)	IMEED	04	------	03*02=06	25
		BE (A)	FEA&ST	03	-----	04*02=08	
		T.E.	SEMINAR-I	-----	-----	02	
		BE	PROJECT	-----	-----	02	
9	Mr. P. D. Patil	FE (E)	IMEED	04	------	03*02=06	19

		TE (A)	MQC	03	-----	01*02=02	
		T.E.	SEMINAR-I	-----	-----	02	
		BE	PROJECT	-----	-----	02	
10	Mr. M. V. Kulkarni	FE (F)	IMEED	04	------	03*02=06	19
		TE (A)	TURBO M/C	03	------	01*02=02	
		T.E.	SEMINAR-I	-----	-----	02	
		BE	PROJECT	-----	-----	02	
11	Mr. A. R. Bhardwaj	SE (B)	ME-II	04	-----	-----	
		T.E.	SEMINAR-I	-----	-----	02	10
		TE	MINOR PROJECT	-----	-----	02	
		BE	PROJECT	-----	-----	02	
12	Mr. D. C. Talele	BE (B)	FEA&ST	03	-----	04*02=08	15
		T.E.	SEMINAR-I	-----	-----	02	
		BE	PROJECT	-----	-----	02	
13	Dr. P.P. Bornare	TE(A)	PBM	03	-----	-----	12
		BE(A)	AUTO-II	03	-----	-----	
		T.E.	SEMINAR-I	-----	-----	02	
		TE	MINOR PROJECT	-----	-----	02	
		BE	PROJECT	-----	-----	02	
14	Mrs. J. R. Surange	FE (G)	IMEED	04	------	03*02=06	19
		TE (B)	MQC	03	-----	01*02=02	
		T.E.	SEMINAR-I	-----	-----	02	
		BE	PROJECT	-----	-----	02	
15	Mr. C. K. Mukherjee	SE (A)	MD	01	-----	04*02=08	25
		SE (B)	MD	01	-----	04*02=08	
		TE (B)	NACM	03	-----	-----	
		T.E.	SEMINAR-I	-----	-----	02	
		BE	PROJECT	-----	-----	02	
16	Mr. A. V. Rajput	FE (H)	IMEED	04	------	03*02=06	19
		BE (B)	AE- II	03	-----	-----	
		T.E.	SEMINAR-I	-----	-----	02	
		TE	MINOR PROJECT	-----	-----	02	
		BE	PROJECT	-----	-----	02	
17	Mr. A. J. Puri	SE (A)	ME-II	04	-----	-----	13
		TE (B)	PBM	03	-----	-----	
		T.E.	SEMINAR-I	-----	-----	02	
		TE	MINOR PROJECT	-----	-----	02	
		BE	PROJECT	-----	-----	02	

18	Mr. T.G. Patil	SE (A)	AT	03	01*01=01	01*02=02	16
		SE (B)	AT	03	01*01=01	01*02=02	
		T.E.	SEMINAR-I	-----	-----	02	
		BE	PROJECT	-----	-----	02	
19	Mr. Jayesh A. Gosavi	TE (A)	TURBO M/C	-----	-----	03*02=06	16
		TE (B)	TURBO M/C	-----	-----	03*02=06	
		T.E.	SEMINAR-I	-----	-----	02	
		TE	MINOR PROJECT	-----	-----	02	
20	Mr. Sameer Ahmad Farooque	TE (A)	MQC	-----	-----	03*02=06	14
		TE (B)	MQC	-----	-----	02*02=04	
		T.E.	SEMINAR-I	-----	-----	02	
		TE	MINOR PROJECT	-----	-----	02	
21	Mr. Ashwin P. Thakkar	SE (A)	TOM-I	-----	-----	02*02=04	12
		SE (B)	TOM-I	-----	-----	02*02=04	
		T.E.	SEMINAR-I	-----	-----	02	
		TE	MINOR PROJECT	-----	-----	02	
22	Mr. Smith M. Arbat	FE (I)	IMEED	04	------	04*02=08	16
		T.E.	SEMINAR-I	-----	-----	02	
		TE	MINOR PROJECT	-----	-----	02	
23	Mr. M.M. Gosavi	SE (A)	AT	-----	01*01=01	02*02=04	14
		SE (B)	AT	-----	01*01=01	02*02=04	
		T.E.	SEMINAR-I	-----	-----	02	
		TE	MINOR PROJECT	-----	-----	02	
24	Mr. Mahesh A. Marathe	BE(A)	MV	-----	-----	03*02=06	16
		BE(B)	MV	-----	-----	03*02=06	
		T.E.	SEMINAR-I	-----	-----	02	
		TE	MINOR PROJECT	-----	-----	02	
25	Miss. Chetana S. Chopade	BE(A)	PPE	-----	-----	02*02=04	12
		BE(B)	PPE	-----	-----	02*02=04	
		T.E.	SEMINAR-I	-----	-----	02	
		TE	MINOR PROJECT	-----	-----	02	

Mr. D.C. Talele
Time Table I/C

Prof. Dr. S.P. Shekhawat
HOD

SSBT's College of Engineering & Technology, Bambhori, Jalgaon.
Teaching Load Distribution
Semester I & III (Academic Year: 2016 - 17)

SR. NO	NAME	SUBJECT	MBA-I			MBA-II			TOTAL
			Theory	Lab	Project	Theory	Lab	Project	
1	Dr.V.S.Rana.	Organizational Behavior-I	4						12
		Global Marketing Management				4			
		Field Work / Survey						4	
2	Mr.P.A.Anawade	Quantitative Techniques	4						12
		Consumer Behavior and Service Marketing				4			
		Field Work / Survey						4	
3	Dr. Saroj B.Patil	Corporate Communication Skills	4						16
		Human Capital Mgt & Development				4			
		Strategic Human Resource Management				4			
		Field Work / Survey						4	
4	Mr.H.A.Salunkhe	Corporate Social Responsibility	4						16
		Banking & Investment Management				4			
		Tax Management				4			
		Field Work / Survey						4	
5	Ms.R.A.Modiyani	Business Accounting	4						16
		Strategic Management				4			
		Strategic Financial Management				4			
		Field Work / Survey						4	
6	Mr. Mukesh Ahirrao	Managerial Economics				4			16
		Product and Brand Management				4			
		Tally & Advance Excel	4						
		Field Work / Survey						4	
7	Ms. Faroza Kazi	Management Science	4						16
		Management Information System & ERP				4			
		Labour Laws				4			
		Field Work / Survey						4	
8	Ms.Sanjivani Lokhande	Human Resource Management	4						20
		Industrial Relations & Labour Welfare				4			
		Legal Aspect of Business				4			
		Sales & Distribution Management				4			
		Field Work / Survey						4	
		Total =	**32**	**0**	**0**	**60**	**0**	**32**	**124**

Time Table Incharge **HOD (MBA)**

Semester II & IV (Academic Year: 2016 - 17)

Date: 5.07.2016

SR. NO	NAME	SUBJECT	MBA-I			MBA-II			TOTAL
			T	L	P	Theory	Lab	Project	
1	Dr.V.S.Rana.	Marketing Management	4						12
		Case Studies in Marketing				4			
		Field Work / Survey						4	
2	Er.P.A.Anawade	Operations Management	4						12
		Retail Management And Digital Marketing				4			
		Field Work / Survey						4	
3	Dr. S. B.Patil	IT For Managers	4						12
		e-Commerce & Excellence Management				4			
		Field Work / Survey						4	
4	Dr.H.A.Salunkhe	Financial Management	4						16
		Financial Derivatives				4			
		International Financial Management				4			
		Field Work / Survey						4	
5	Dr.R.A.Modiyani	Management Accounting	4						16
		Current Business Scenario				4			
		Case Studies in Financial Management				4			
		Field Work / Survey						4	
6	Mr. M.B. Ahirrao	Global Economics Scenario	4						16
		Entrepreneurship & Project Management				4			
		Marketing Research and Business Analytics				4			
		Field Work / Survey						4	
7	Ms. F.A. Kazi	Management Science	4						16
		International Human Resource Management				4			
		Cases in Human Resource Management				4			
		Field Work / Survey						4	
8	Ms.S. B. Lokhande	Organizational Behavior – II	4						16
		Indian Commercial Laws				4			
		Performance & Compensation Management				4			
		Field Work / Survey						4	
		Total =	**32**	**0**	**0**	**52**	**0**	**32**	**116**

Time Table I/C **HOD - MBA** **PRINCIPAL**

Internal Continuous Evaluation System in place

The internal continuous evaluation system in place at this college level is done as per University guidelines currently enforce/ received before the start of term. The schedule for, performance of practicals is notified on the departmental lab notice board. This schedule is batchwise and it also indicates the completion/ submission date of practical, drawing and assignment sheets. It is meant for those subjects for whom term work marks are to be sent to the University.

The attendance record of the students is maintained in ERP software and in the register meant for this purpose. This register also evaluates the performance of the students under the following headings:

a) Attendance in class/practical
b) Performance in class/practical
c) Class tests/ viva voce
d) Assignment/ Journal

The above are quantified and marks are awarded in the next week, displayed and consolidated at the end of term. At term end the term work assessment programme is displayed and the work is evaluated by two faculty members who are appointed by the Principal and the term work marks are forwarded to the University under the signature of both the examiners.

Students' assessment of Faculty, System in place.

During the 5th week of the term the feedback by the students is taken subject wise for the staff who teach them. A set of questionnaire is circulated them and feedback is obtained. This feedback is taken by academic monitoring committee comprising of three HOD's and Coordinator of Academic and Research and Development. The feedback is submitted to the Principal and he apprises the faculty member about their weak points and they are given the opportunity to improve upon their deficiencies and their weak points during the term itself.

Also during the term, students are free to pass on the difficulties through suggestion boxes kept at various location and if they are related to their academic difficulties, their difficulties are solved and the concerned faculty is advised by the Principal with sole aim of improvement in academics. Personal hearing is given by Coordinator of Academics and Research and Development and the Principal.