NORTH MAHARASHTRA UNIVERSITY,

JALGAON (M.S.)

First Year Engineering

(Common for All)

Faculty of Science and Technology

'A' Grade
NAAC Re-Accredited
(3rd Cycle)

SYLLABUS STRUCTURE

Semester – I & II

W.E.F. 2018 – 19

Subject Group Code and Subject Groups

Sr. No.	GROUP	Category	Breakup of Credits (Total 160)
1	**A**	Humanities and Social Sciences including ManagementCourses (HSMC)	**10**
2	**B**	Basic Science Courses (BSC)	**26**
3	**C**	Engineering Science Courses including workshop, drawing,basics of electrical/mechanical/computer etc. (ESC)	**26**
4	**D**	Professional Core Courses (PCC)	**53**
5	**E**	Professional Elective Courses relevant to chosen specialization/branch (PEC)	**18**
6	**F**	Open subjects – Electives from other technical and /oremerging subjects (OEC)	**12**
7	**G**	Project work, seminar and internship in industry or appropriate work place/ academic and research institutions in India/abroad (PROJ)	**15**
8	**H**	Mandatory Courses (MC) [Environmental Sciences, Induction program, Indian Constitution, Essence of Indian Traditional Knowledge]	
		Total	**160**

Syllabus Structure for First Year Engineering (Semester – I) (Computer, IT, Electrical, E & TC, Instrumentation) (w.e.f. 2018 – 19)
(As per AICTE Guidelines)

(As per AICTE Guidelines)	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory		Practical		Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
Physics	B	3	1	-	4	40	60	-	-	100	4
Mathematics - I	B	3	1	-	4	40	60	-	-	100	4
Basic Electrical & Electronics Engineering	C	3	1	-	4	40	60	-	-	100	4
Programming for Problem Solving	C	3	-	-	3	40	60	-	-	100	3
Physics Lab	B	-	-	2	2	-	-	25	-	25	1
Basic Electrical & Electronics Engineering Lab	C	-	-	2	2	-	-	25	25 (OR)	50	1
Programming for Problem Solving Lab	C	-	-	2	2	-	-	25	25 (PR)	50	1
Induction Program*	H	-	-	-	-	-	-	-	-	-	-
		12	**3**	**6**	**21**	**160**	**240**	**75**	**50**	**525**	**18**

*** 3-week long Induction Program for students entering the institution, right at the start.**

ISE: Internal Sessional Examination ESE: End Semester Examination ICA: Internal Continuous Assessment

Syllabus Structure for First Year Engineering (Semester – I) (Mechanical, Civil, Chemical, Biotech, Automobile) (w.e.f. 2018 – 19)
(As per AICTE Guidelines)

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		
Chemistry	B	3	1	-	4	40	60	-	-	100	4
Mathematics –I	B	3	1		4	40	60	-	-	100	4
Engineering Graphics	C	3	-	-	3	40	60	-	-	100	3
English	A	3		-	3	40	60	-	-	100	3
Chemistry Lab	B	-	-	2	2	-	-	25	-	25	1
Engineering Graphics Lab	C	-	-	2	2	-	-	25	25 (OR)	50	1
English Lab	A	-	-	2	2	-	-	25	25 (OR)	50	1
Workshop Practices	C	1	-	2	3	-	-	25	25 (OR)	50	2
Induction Program*	H	-	-	-	-	-	-	-	-	-	-
		13	**2**	**8**	**23**	**160**	**240**	**100**	**75**	**575**	**19**

*** 3-week long Induction Program for students entering the institution, right at the start.**

ISE: Internal Sessional Examination ESE: End Semester Examination ICA: Internal Continuous Assessment

Syllabus Structure for First Year Engineering (Semester – II) (Computer, IT, Electrical, E & TC, Instrumentation) (w.e.f. 2018 – 19)
(As per AICTE Guidelines)

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		
Chemistry	B	3	1	-	4	40	60	-	-	100	4
Mathematics – II	B	3	1		4	40	60	-	-	100	4
Engineering Graphics	C	3	-	-	3	40	60	-	-	100	3
English	A	3		-	3	40	60	-	-	100	3
Chemistry Lab	B	-	-	2	2	-	-	25	-	25	1
Engineering Graphics Lab	C	-	-	2	2	-	-	25	25 (OR)	50	1
English Lab	A	-	-	2	2	-	-	25	25 (OR)	50	1
Workshop Practices	C	1	-	2	3	-	-	25	25 (OR)	50	2
		13	**2**	**8**	**23**	**160**	**240**	**100**	**75**	**575**	**19**

ISE: Internal Sessional Examination ESE: End Semester Examination ICA: Internal Continuous Assessment

Syllabus Structure for First Year Engineering (Semester –I I) (Mechanical, Civil, Chemical, Biotech, Automobile) (w. e. f. 2018 – 19)
(As per AICTE Guidelines)

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		
Physics	B	3	1	-	4	40	60	-	-	100	4
Mathematics - II	B	3	1	-	4	40	60	-	-	100	4
Basic Electrical & Electronics Engineering	C	3	1	-	4	40	60	-	-	100	4
Programming for Problem Solving	C	3	-	-	3	40	60	-	-	100	3
Physics Lab	B	-	-	2	2	-	-	25	-	25	1
Basic Electrical & Electronics Engineering Lab	C	-	-	2	2	-	-	25	25 (OR)	50	1
Programming for Problem Solving Lab	C	-	-	2	2	-	-	25	25 (PR)	50	1
		12	**3**	**6**	**21**	**160**	**240**	**75**	**50**	**525**	**18**

ISE: Internal Sessional Examination ESE: End Semester Examination ICA: Internal Continuous Assessment

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COURSE OUTLINE

Semester – I&II

W.E.F. 2018 – 19

Physics					
COURSE OUTLINE					
Course Title:	**Physics**	**Short Title:**	PHY	**Course Code:**	

Course description: To impart knowledge of basic concepts in applied physics and implementation to various engineering fields also provide the methodology necessary for solving problems in the field of engineering.

Lecture	**Hours/week**	**No. of weeks**	**Total hours**	**Semester credits**
	03	14	42	04
Tutorial	01	14	14	

Prerequisite course(s):

11^{th} and 12^{th} Physics

Course objectives:

(i) To acquire the knowledge of Electromagnetic field theory that allows the student to have a solid theoretical foundation to be able in the future to design emission , propagation and reception of electro- magnetic wave systems.
(ii) Gain an understanding of the basic principles and the experimental basis of the various fields of physics and the logical relationships of the various fields.
(iii) To develop in the student awareness of situations in engineering, which need ideas of quantum mechanics.
(iv) To enable the student with those aspects of quantum mechanics, which are necessary to begin to work in small structures such as those common in nanotechnology.
(v) Students will understand semiconductor materials and devices for optoelectronics in this course.

Course outcomes:

After successful completion of this course students will be familiar with

1. To study Bragg's Law and introduced to the principles of lasers, types of lasers and applications
2. Various terms related to properties of materials such as, permeability, polarization, etc.
3. Some of the basic laws related to quantum mechanics as well as magnetic and dielectric
4. properties of materials
5. Simple quantum mechanics calculations
6. Nanotechnology and their industrial applications.

COURSE CONTENT

Physics		**Semester:**	I or 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:	**No. of Lectures: 08 Hours**	**Marks: 12**

Introduction to Electromagnetic Theory and Optics

Electrostatics, Calculation of electric field and electrostatic potential for a charge distribution; Divergence and curl of electrostatic field; Laplace's and Poisson's equations for electrostatic potential and uniqueness of their solution, Bio-Savart law, Divergence and curl of static magnetic field, Magnetization and associated bound currents; magnetic susceptibility and ferromagnetic, paramagnetic and diamagnetic materials; Faraday's law in terms of EMF produced by changing magnetic flux; Lenz's law; Maxwell's equation in vacuum and non-conducting medium; Electrodynamics motion of a charged particle in electric and magnetic fields. Optics: Interference , Diffraction, Polarization, Applications: CRO

Unit–II:	**No. of Lectures: 08 Hours**	**Marks: 12**

Acoustics and Introduction to Mechanics:

Architectural acoustics and Ultrasonic. Potential energy function, F = - Grad V, equipotential surfaces and meaning of gradient; Conservative and non-conservative forces, curl of a force field, Problem of central force field, Keplers laws, Inertial and non Inertial frame of references, Motion of rigid body in 2D

Unit–III:	No. of Lectures: 08 Hours	Marks: 12

Quantum Mechanics and Nanotechnology for Engineers

Introduction to Quantum mechanics, Wave nature of Particles, Time-dependent and time independent Schrodinger equation for wave function, Solution of stationary-state Schrodinger equation for one dimensional problems– particle in a box. wave function, Born interpretation, probability current, Expectation values, Free-particle wave function and wave-packets, Uncertainty principle.

Nanotechnology: Synthesis, Characterization and applications of nanoscience and nanotechnology

Unit–IV:	No. of Lectures: 08 Hours	Marks: 12

Atomic Molecular physics

Inner-shell vacancy, X-rays and Auger transitions, Compton effect. Properties of laser beams: mono-chromaticity, coherence, directionality and brightness, laser speckles, absorption, spontaneous emission, and stimulated emission; Einstein's theory of matter radiation interaction and A and B coefficients; applications of lasers in science, engineering and medicine)., types of lasers gas lasers (He-Ne,Co_2); Application: Fiber optics

Unit–V:	No. of Lectures: 08 Hours	Marks: 12

Solid state physics and Semiconductor Physics

Energy bands in solids, metals, semiconductors, and insulators; Intrinsic and extrinsic Semiconductors; p-n junction, Photovoltaic effect.

Superconductivity (Superconductivity-basic phenomenology, Meissner effect, Type I and Type II super conductors, BCS pairing mechanisms, High T_c materials.) Applications Hall effect, Solid state laser (Ruby, Nd: YAG).

Text Books:

1. David Griffiths, Introduction to Electrodynamics, 4th edition, Pearson Publication
2. Eisberg and Resnick, Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles 2nd Edition, Wiley Publication
3. Gupta , Kumar and Saxena, "Solid State Physics "Pragati Publication
4. N Zettili, "Quantum Physics" 2th edition, Wiley Publication
5. Gupta ,Kumar and Sharma, Atomic and Molecular Physics, Pragati Prakashan
6. Murthy, "Textbook Of Nanosciene And Nanotechnology", University Press
7. J. C. Upadhya, "Classical Mechanics" Himalaya Publication House.

Reference Books:

1. Resnick , Halliday, Krane, "Physics, Volume I and II" Wiley Publication, 5th Edition
2. W. Saslow, Electricity, Magnetism and light,Academic Press Publication
3. O. Svelto, Principles of Lasers, Springer Publication.
4. Quila " Perspective of Quantum Mechanics", NCBA Publication
5. M A Wahab ,Solid State Physics, Narosa Publishing House.

MATHEMATICS-I					
COURSE OUTLINE					
Course Title:	**Mathematics –I**	**Short Title:**	**M-I**	**Course Code:**	

Course description: This course is aimed at introducing the fundamentals of basic Mathematics to undergrduate 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**
	3	14	42	4
Tutorial	1	14	14	

Prerequisite course(s): 11^{th} & 12^{th} mathematics

Course objectives:

The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their discipline

Course outcomes:

After successful completion of this course the student will be able to:

1. Apply differential and integral calculus. Apart from some other applications they will have a basic understanding of Beta and Gamma functions.
2. The fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.
3. The tool of Fourier series for learning advanced Engineering Mathematics.
4. To deal with functions of several variables that are essential in most branches of Engineering.The essential tool of matrices and linear algebra in a comprehensive manner.

COURSE CONTENT

Mathematics -I		**Semester:**	I
Teaching Scheme:		**Examination scheme**	
Lectures:	**3 hours/week**	**End semester exam (ESE):**	60 marks
Tutorial	**1 hours/week**	**Duration of ESE:**	03 hours
		Internal Sessional Exams (ISE):	40 marks

Unit–I:	**No. of Lectures: 08 Hours**	**Marks: 12**

Matrices:

Introduction to rank of a matrix; System of linear equations; Symmetric and orthogonal matrices; Eigen values and Eigenvectors, Diagonalization of matrices. Application of matrices (Rotation)

Unit–II:	**No. of Lectures: 08 Hours**	**Marks: 12**

Differential and Integral Calculus:

Rolle's Theorem, Mean value theorem, Taylor's and Maclaurin's theorem; Gamma function, Beta function

Unit–III:	**No. of Lectures: 08 Hours**	**Marks: 12**

Partial Differentiation:

Partial derivatives, Eulers theorem, Composite function, total derivative; Method of Lagranges multipliers.

Unit–IV:	**No. of Lectures: 08 Hours**	**Marks: 12**

A) Fourier series

Full range Fourier series, Half range sine and cosine series.

B)Vector Calculus : Gradient ,Curl, Divergence, Directional Derivatives.		
Unit–V:	**No. of Lectures: 08 Hours**	**Marks: 12**

Complex Number:

Circular functions, Hyperbolic and Inverse Hyperbolic functions, logarithms of complex number, resolving real and imaginary parts of a complex number.

Text Books:

1. H.K.DASS "Advance Engineering Mathematics" S. Chand publications.
2. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications,Reprint, 2010,2016.
3. DebashisDatta "Textbook of Engineering Mathematics'' New Age International Publication. Revised second edition.
4. "Engineering Mathematics A Tutorial Approach". Ravish R..Singh, Mukul Bhatt.Tata McGraw Hill Education Private Limited .New Delhi.

Reference Book:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006.
3. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi,2008.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
5. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005..
6. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010

Basic Electrical and Electronics Engineering					
COURSE OUTLINE					
Course Title:	Basic Electrical and Electronics Engineering	**Short Title:**	BEEE	**Course Code:**	

Course description:

This course provides an introduction to electrical and electronics engineering which includes over view of electric power generation, single and three phase AC circuit, fundamentals of electrical installation, semiconductor devices such as diodes, transistor, FETs and Power Electronic devices, logic gates and their application.

	Hours/week	No. of weeks	Total hours	Semester credits
Lecture	**03**	**14**	**42**	**04**
Tutorial	**01**	**14**	**14**	

Prerequisite course(s):

11^{th} & 12^{th} Physics

Course objectives:

1. To explain basic laws and theorems of electrical networks
2. To explain fundamentals alternating current circuits.
3. To provide students with a firm grasp of the essential principles of basic electronics.
4. To understand the concepts and terminology that is used in electronics engineering.
5. 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:

After successful completion of this course the student will be able to:

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 and understand definition and relationship of various AC circuits.
3. Understand working principle of PN junction diode, Zener diode and their applications.
4. Describe different configuration of Bipolar Junction Transistor.
5. Describe different configurations of FET
6. Understand operating principle Power Electronics Devices
7. Describe use of the Basic gate and Universal gate

COURSE CONTENT

Basic Electrical and Electronics Engineering		**Semester:**	**I or II**
Teaching Scheme:		**Examination scheme**	
Lectures:	**3 hours/week**	**End semester exam (ESE):**	**60 marks**
Tutorial	**1 hours/week**	**Duration of ESE:**	**03 hours**
		Internal Sessional Exams (ISE):	**40 marks**

Unit–I:	**No. of Lectures: 08 Hours**	**Marks: 12**

DC Circuit: Kirchhoff's laws,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, Norton Theorems, Maximum power transfer theorem.

Unit–II:	**No. of Lectures: 08 Hours**	**Marks: 12**

AC Circuits:

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. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, combinations (series and parallel),

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.

Unit–III:	**No. of Lectures: 08 Hours**	**Marks**

Semiconductor Basics, Diode Equivalent Circuits, Diode Characteristics, Diode as a Switch, Diode as a Rectifier (half wave & full wave), capacitor filter, Comparison of rectifiers, Breakdown Mechanisms, Zener Diode – Operation, characteristics and Application, Photo diode, LED.

Bipolar Junction Transistor (BJT): Common Base, Common Emitter and Common Collector Configurations, their dc current gains, regions of operations, Operating Point, Load line, Voltage Divider Bias Configuration, BJT amplifier.

Unit–IV:	**No. of Lectures: 08 Hours**	**Marks: 12**

Field Effect Transistor (FET): Construction, Characteristics and working of Junction FET, JFET Parameters, JFET as switch.

Depletion and Enhancement type MOSFET: Construction, Characteristics and working, Comparison of MOSFET with JFET and BJT.

Introduction to NMOS, PMOS & CMOS circuits, CMOS as Switch.

Unit–V:	**No. of Lectures: 08 Hours**	**Marks: 12**

Silicon Controlled Rectifier (SCR): Operation, Construction, Characteristics, Applications.

Triac& UJT (Working, Characteristics and applications)

Number System & their Conversions, De-Morganstheorem,Boolean Algebra

Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, XOR and XNOR.

Electric Wiring installations: Types of insulated wires & wiring systems, concept of fuses, MCBs, RCCB, ELCBs, etc. in wiring installations, concept of earthing, energy bill calculations.

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. K. A. Krishnamurty, M. R. Raghuveer, "Electrical and Electronics Engineering for Scientists and Engineers," Willey Eastern Limited.
3. J. B. Gupta, "A Course in Electrical Power", S. K. Kataria and Sons, 12th Edition, 2002.
4. R. S. Sedha, "Applied Electronics", S. Chand Publication
5. V.K. Mehta, "Principles of Electronics", S. Chand Publications

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. Vincent Del Toro, "Electrical Engineering Fundamentals", Pearson
6. R. P. Jain, "Modern Digital Electronics" McGraw Hill Education (India) Private Limited, Fourth Edition, 2017.
7. B. L. Theraja, "Applied Electronics" S. Chand Publication
8. A.P. Malvino, "Electronics Principles" TMH Publications.

Programming for Problem Solving					
COURSE OUTLINE					
Course Title:	Programming for Problem Solving	**Short Title:**	PPS	**Course Code:**	

Course description:

This course provides students with a comprehensive study of the C programming language. This course focuses on introduction to program design and problem solving using the 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	04

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:

After successful completion of this course the student will be able to:

1. To formulate simple algorithms for arithmetic and logical problems
2. Understand the fundamentals of C programming.
3. To test and execute the programs and correct syntax and logical errors
4. Choose the loops and decision making statements to solve the problem.
5. To decompose a problem into functions and synthesize a complete program using divide and conquer approach
6. To use arrays, pointers and structures to formulate algorithms and programs

COURSE CONTENT

Programming for Problem Solving		**Semester:**	**I or 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:	**No. of Lectures: 08 Hours**	**Marks: 12**

Introduction

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–II:	**No. of Lectures: 08 Hours**	**Marks: 12**

Loop

Loop Control Instruction: Loops, the while Loop, Tips & Traps, More Operators, for Loop, Nesting of Loops, Multiple Initialization 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 go to Keyword		
Unit–III:	**No. of Lectures: 08 Hours**	**Marks: 12**
Function & Pointers		
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–IV:	**No. of Lectures: 08 Hours**	**Marks: 12**
Array		
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 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–V:	**No. of Lectures: 08 Hours**	**Marks: 12**
Strings & Structure		
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. YashavantKanetkar, Let Us C, BPB Publication, 14th Edition		
Reference Books:		
1. E Balagurusamy, Programming in ANSIC C by, Tata McGraw Hill, 4th Edition 2. K. R. Venugopal and S. R. Prasad, Mastering C, Tata McGraw Hill, 2011, 2nd Edition 3. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, PHI, 2nd Edition 4. Paul Deitel and Harvey Deitel, C How to Program, Pearson, 8th Edition 5. R.S. Salaria, Computer concepts and Programming in C, Khanna Publication		

Chemistry

COURSE OUTLINE

Course Title:	**Chemistry**	**Short Title:**	CHY	**Course Code:**	

Course description:

This course is aimed at introducing the fundamentals of basic sciences (Chemistry) 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 Chemistry and their applications in different branches of engineering.

Lecture	**Hours/week**	**No. of weeks**	**Total hours**	**Semester credits**
	03	14	42	04
Tutorial	01	14	14	

Prerequisite course(s):

11th& 12thChemistry

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:

The concepts developed in this course will aid in quantification of several concepts in Chemistry that have been introduced at the 10+2 levels in schools. Technology is being Increasingly based on the electronic, atomic and molecular level modifications.
Quantum theory is more than 100 years old and to understand phenomena at nanometer levels, one has to base the description of all chemical processes at molecular levels. The course will enable the student to:

1. Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
2. Rationalise bulk properties and processes using thermodynamic considerations.
3. Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques
4. Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
5. List major chemical reactions that are used in the synthesis of molecules.

COURSE CONTENT

Chemistry		**Semester:**	I or II
Teaching Scheme:		**Examination scheme**	
Lectures:	**2 hours/week**	**End semester exam (ESE):**	**60 marks**
Tutorial	**1 hours/week**	**Duration of ESE:**	**03 hours**
		Internal Sessional Exams (ISE):	**40 marks**

Unit–I:	**No. of Lectures: 08 Hours**	**Marks: 12**

Atomic and molecular structure

Schrodinger equations, Schrodinger equation. Particle in a box solutions and their applications for conjugated molecules and nanoparticles, Molecular orbitals of diatomic molecules and plots of the multicentre orbitals. Equations for atomic and molecular orbitals. Energy level diagrams of diatomics. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.

Unit–II:	**No. of Lectures: 08 Hours**	**Marks: 12**

Spectroscopic techniques and applications

Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications of Nuclear magnetic resonance and magnetic resonance imaging, Diffraction and scattering.

Unit–III:	No. of Lectures: 08 Hours	Marks: 12

Periodic properties

Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases,

Unit–IV:	No. of Lectures: 08 Hours	Marks: 12

Intermolecular forces and potential energy surfaces.

Ionic, dipolar and van Der Waals interactions. Equations of state of real gases and critical Phenomenon . Potential energy surfaces of H_3, H_2F and HCN.

Use of free energy in chemical equilibria

Thermodynamic functions: definitions - energy, entropy and free energy. Estimations of entropy and free energies. Free energy and e.m.f. Cell potentials, the Nernst equation and applications.

Unit–V:	No. of Lectures: 08 Hours	Marks: 12

Stereochemistry.

Isomerism, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations (R and S Configuration with Ex.) and conformational analysis.(Staggered and eclipsed Conformation of Ethane)

Organic reactions and synthesis of a drug molecule

Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, Synthesis of a commonly used drug molecule.(Aspirin and Paracetamol)

Text Books

1.Tembe, Kamaluddin and Krishnan,,Engineering Chemistry, (NPTEL Web-book)

Reference Books:

1. B. H. Mahan University chemistry, Pearsons Publication, 4th edition
2. M. J. Sienko and R. A. Plane, Chemistry: Principles and Applications,
3. C. N. Banwell, Fundamentals of Molecular Spectroscopy,Mcgraw Higher Ed., 4th edition.
4. P. W. Atkins, Physical Chemistry, Oxford University Press, 7th edition.
5. J. D. Lee Concise Inorganic Chemistry ,Oxford University Press, 5 th edition
6. Puri,Sharma, Kalia, Principles of Inorganic Chemistry

ENGINEERING GRAPHICS					
COURSE OUTLINE					
Course Title:	ENGINEERING GRAPHICS	**Short Title:**	EG	**Course Code:**	

Course description:

Engineering Graphics is the language of engineers. The concepts of Engineering Graphics are used to develop, express the ideas, and convey the instructions which are used to carry out jobs in the field Engineering. The course illustrates the techniques of graphics in actual practice. This preliminary course aims at building a foundation for the further course in drawing and other allied subjects. This subject is useful in developing drafting and sketching skills of students.

Lecture	**Hours/week**	**No. of weeks**	**Total hours**	**Semester credits**
	03	14	42	03

Prerequisite course (s):

Course objectives:

This course objectives are -

1. 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
2. To communicate effectively
3. To use the techniques, skills, and modern engineering tools necessary for engineering practice

Course outcomes:

All phases of manufacturing or construction require the conversion of new ideas and design concepts into the basic line language of graphics.

The student will learn :

1. Introduction to engineering design and its place in society
2. Exposure to the visual aspects of engineering design
3. Exposure to engineering graphics standards
4. Exposure to solid modeling.

COURSE CONTENT

ENGINEERING GRAPHICS		**Semester:**	**I or II**
Teaching Scheme:		**Examination scheme**	
Lectures:	**3 hours/week**	**End semester exam (ESE):**	**60 marks**
		Duration of ESE:	**04 hours**
		Internal Sessional Exams (ISE):	**40 marks**

Unit–I:	**No. of Lectures: 08 Hours**	**Marks: 12**

Introduction To Engineering Graphics:-

A) Principles of Engineering Graphics and their significance, usage of Drawing Instruments and Supporting Material, Letters and Numbers as per BIS : SP46-2003, Scale (Plane , Diagonal & Vernier scale)

B) Curves and Conic Section draw ellipse by directrix and arc of circle method. draw parabola by directrix and rectangle method . draw hyperbola by rectangle and directrix method.Cycloid, Epicycloid, Hypocycloid and Involute.

Unit–II:	**No. of Lectures: 08 Hours**	**Marks: 12**

A) PROJECTIONS OF STRAIGHT LINES:- Principle of Orthographic Projections,-, Projections of Points, Projection of Line, Lines inclined to both the Planes,

B) PROJECTIONS OF PLANES:- Projection of different simple shapes e.g. Circle, Triangle, Rectangle, Pentagon and Hexagon on principle plane (Inclined to one plane and to both planes).

Unit–III:	No. of Lectures: 10 Hours	Marks: 12

A) Projection of simple solid.
Projection of Prism, Pyramid, Cone, Cylinder and Cube with their axis inclined to one reference plane and parallel to other Projection of Prism, Pyramid, Cone, Cylinder and Cube with their axis inclined to one reference plane and parallel to other

B) Development of solid surfaces e.g. Prism, Cylinder, Cone, Pyramid and Cubes

Unit–IV:	No. of Lectures: 08 Hours	Marks: 12

A) Orthographic projections of different machine parts problem on first angle &Third Angle.

B) Types of sections and Conversion of pictorial view into sectional orthographic views

Unit–V:	No. of Lectures: 08 Hours	Marks: 12

ISOMETRIC PROJECTIONS

Introduction, Isometric axes, lines and planes, true scale and isometric scale. Isometric projection and Isometric view Conversion of given orthographic view into isometric projection.

Text Books:

1. Venugopal K and Prabhu Raja V(2015), "Engineering Graphics", New AGE International Publishers,.
2. Narayana,K.L& P Kannaiah(2008),Text book on "Engineering Drawing. SciTech Publication.

Reference Books:

1. N.D. Bhat and V.M. Panchal, Engineering Graphics, Charotar Publishers 2013
2. Agrawal B &Agrawal B.C (2008) Engineering Graphics, TMH Publication.

Workshop Practices					
COURSE OUTLINE					
Course Title:	**Workshop Practices**	**Short Title:**	WP	**Course Code:**	

Course description:

This course covers the basic knowledge of different manufacturing methods like sand casting, dies casting, metal casting, forming, machining, joining, CNC machining, additive manufacturing and advanced manufacturing methods. It also covers the fundamentals of fitting operations, power tools, knowledge of electrical & electronics, carpentry tools and equipment, plastic molding, glass cutting, arc welding, gas welding and brazing.

Lecture	Hours/week	No. of weeks	Total hours	Semester credits
	01	14	14	02
Practices	02	14	28	

Prerequisite course(s):

12th Physics, mathematics, basic knowledge of drawing

Course objectives:

1. To study the basics of metal machining.
2. To study the different cutting tool materials and types & geometry of cutting tools.
3. To learn introductory concepts of additive manufacturing.
4. To understand basic manufacturing processes like casting and welding and learn various aspects of casting methods and welding methods.
5. To know about the applications of advanced manufacturing processes.
6. To understand basics of electrical & electronics, carpentry joints, tools equipment, fitting operations, tools, equipment.
7. To understand concepts of plastic molding and glass cutting.
8. To get the knowledge of brazing.

Course outcomes:

After successful completion of this course the student will be able to:

1. Students will be able to fabricatecomponents with their own hands.
2. Get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
3. Assemble different components, they will be able to produce small devices oftheir interest.

COURSE CONTENT

Workshop Practices		**Semester:**	I or II
Teaching Scheme:			
Lectures:	**01 hour/week**		

Unit–I: Manufacturing Methods	**No. of Lectures: 04 Hours**	

a) Sand casting, die casting, casting defects etc. rolling, forging etc.

b) Introduction to machining, cutting tool, cutting tool materials, different machining operation, welding, classification of welding, different welding process.

c) Advanced Manufacturing methods- Introduction, different advanced manufacturing methods.

d) Introduction to metal casting, patterns, pattern material, gating system, core, mold.

Unit–II: CNC machining	**No. of Lectures: 01 Hour**	

and Additive manufacturing		
Introduction to CNC, classification of CNC, advantages, disadvantages, part programming, Additive manufacturing		
Unit–III: Fitting Operations & Power tools	**No. of Lectures: 03 Hour**	
Different type of fitting operations, tools, equipment, Introduction to power tools, classification of power tools. Introduction to carpentry tools and equipment, types of carpentry joints. Introduction to plastic molding, plastic molding technique, etc. Introduction to glass cutting, use of glass cutter.		
Unit–IV: Electrical &Electronics	**No. of Lectures: 01 Hour**	
Single phase, three phase, direct current, transformers, transformer losses, miniature circuit breakers, earth leakage circuit breakers, house wiring, different type of cables, extension boards, concept of maintenance, maintenance of electrical equipment, importance of grounding. Introduction of PCB, types of PCB, mounting components and soldering.		
Unit–V: Welding (arc welding & gas welding), Brazing	**No. of Lectures: 01 Hour**	
Introduction to arc welding and gas welding, types of welding joints, types of flames, etc. Introduction to brazing process, difference between brazing and welding, flux, filler material.		
Text Books:		
1. Hajrachoudhury S. K., hajraChoudhury A. K and Nirjhar Roy "Elements of Workshop Technology" Vol.1 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.		
Reference Books:		
1. Kalpakjian S. and Steven S. Schmid, "Manufacturing Engineering and Technology" 4th edition, Perason Education India Edition, 2002. 2. Gowri P. hariharan and A. Suresh Babu, " Manufacturing Technology – I" Perason education, 2008 3. Roy A. Lindberg, "Processes and Materials of manufacture", 4th Edition, Prentice hall India,1998.		

English					
COURSE OUTLINE					
Course Title:	**English**	**Short Title:**	**ENG**	**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	3

Prerequisite course(s):

11th& 12th English

Course objectives:

1. To acquire basic proficiency in English including reading and listening
2. To demonstrate proficiency in the use of written English, including proper spelling, Grammar and punctuation.
3. Toenhancetheir ability to use spoken words in interpersonal communication, small group interactions and public speaking
Comprehension, writing and speaking skills.
4. Becomeaccomplishedtechnicalcommunicators.

Course outcomes:

After successful completion of this course the student will be able to:

1. To acquire basic proficiency in English including reading and listening
2. To demonstrate proficiency in the use of written English, including proper spelling, Grammar and punctuation.
3. To enhance their ability to use spoken words in interpersonal communication, small group interactions and public speaking
Comprehension, writing and speaking skills.
4. Become accomplished technical communicators.

COURSE CONTENT

English		**Semester:**	I or II
Teaching Scheme:		**Examination scheme**	
Lectures:	**03 hours/week**	**End semester exam (ESE):**	**60 marks**
		Duration of ESE:	**03 hours**
		Internal Sessional Exams (ISE):	**40 marks**

Unit–I:	**No. of Lectures: 08 Hours**	**Marks: 12**

1. Introduction to Phonetics

1.1 Vowel Sounds
1.2 Consonant Sounds
1.3 Diphthongs
1.4 Intonation

Unit–II:	**No. of Lectures: 08 Hours**	**Marks: 12**

2. Basic Writing Skills

2.1 Sentence Structures
2.2 Use of phrases and clauses in sentences
2.3 Importance of proper punctuation
2.4 Creating coherence
2.5 Organizing principles of paragraphs in documents
2.6 Techniques for writing precisely

Unit–III:	No. of Lectures: 08 Hours	Marks: 12
3. Identifying Common Errors in Writing 3.1 Subject-verb agreement 3.2 Noun-pronoun agreement 3.3 Tenses 3.4 Articles 3.5 Prepositions 3.6 Primary Auxiliary Verbs 3.7 Modal Auxiliary Verbs		
Unit–IV:	**No. of Lectures: 08 Hours**	**Marks: 12**
4. Nature and Style of sensible Writing 4.1 Describing 4.2 Defining 4.3 Classifying 4.4 Job Application 4.5 Résumé, Curriculum Vitae & Bio-Data		
Unit–V:	**No. of Lectures: 08 Hours**	**Marks: 12**
5. Reading Comprehension 5.1 Skimming 5.2 Scanning 5.3 Intensive 5.4 Extensive		
Text Book		
1. Raymond Murrphy, Essential English Grammar, Cambridge University Press, 2nd edition **2.** Rajinder Pal & PremLata , English Grammar&Composition, Sultan chand Publication		
Reference Books:		
1. Michael Swan, Practical English Usage. OUP. 1995. 2. F.T. Wood. Macmillan Remedial English Grammar..2007 3. William Zinsser, On Writing Well.. Harper Resource Book. 2001 4. Hamp-Lyons and Ben Heasly, Study Writing. Liz Cambridge University Press. 2006. 5. Sanjay Kumar and PushpLata, Communication Skills, Oxford University Press. 2011. 6. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press		

Physics Lab					
LAB COURSE OUTLINE					
Course Title:	Physics(Lab)	**Short Title:**	PHY (Lab)	**Course Code:**	

Course description:

To impart knowledge of basic concepts in applied physics and implementation to various engineering fields also provide the methodology necessary for solving problems in the field of engineering.

Laboratory	**Hours/week**	**No. of weeks**	**Total hours**	**Semester credits**
	02	14	28	1

End Semester Exam (ESE) Pattern:

Prerequisite course(s):

11^{th} and 12^{th} Physics

Course objectives:

(i) To acquire the knowledge of Electromagnetic field theory that allows the student to have a solid theoretical foundation to be able in the future to design emission , propagation and reception of electro- magnetic wave systems.
(ii) Gain an understanding of the basic principles and the experimental basis of the various fields of physics and the logical relationships of the various fields.
(iii) To develop in the student awareness of situations in engineering, which need ideas of quantum mechanics.
(iv) To enable the student with those aspects of quantum mechanics, which are necessary to begin to work in small structures such as those common in nanotechnology.
(v) Students will understand semiconductor materials and devices for optoelectronics in this course.

Course outcomes:

Upon successful completion of lab Course, student will be able to:

1. To study Bragg's Law and introduced to the principles of lasers, types of lasers and applications
2. Various terms related to properties of materials such as, permeability, polarization, etc.
3. Some of the basic laws related to quantum mechanics as well as magnetic and dielectric
4. properties of materials
5. Simple quantum mechanics calculations
6. Nanotechnology and their industrial applications.

LAB COURSE CONTENT

Physics (Lab)		**Semester:**	I or II
Teaching Scheme:		**Examination scheme**	
Practical:	**2 hours/week**		
		Internal Continuous Assessment (ICA):	25 marks

To conduct ten practical from given following list

Introduction to Electromagnetic and Optics

- Experiments on electromagnetic induction and electromagnetic breaking;
- LC circuit and LCR circuit;
- Resonance phenomena in LCR circuits;
- Magnetic field from Helmholtz coil;
- Measurement of Lorentz force in a vacuum tube.

- Michelsons Interferrometer
- Brewsters Law
- Varification of Law of Malus
- To study B-H curve
- Determination of e/m by Thomsons method

Acoustics and Introduction to Mechanics

- Ultrasonic Detector
- Sound level meter
- Coupled oscillators;
- Resonance phenomena in mechanical oscillators.

Quantum Mechanics and Nanotechnology for Engineers

- Frank-Hertz experiment;
- Photoelectric effect experiment;
- Synthesis of Graphene by Hummer's method
- Characterization of Graphene by Hummer's method
- Synthesis of nanostuructures such as nanoparticles,nanofibers, nanorods by Chemical Method; Physical Method or Hybrid Method;
- Characterization of nanostuructures such as nanoparticles,nanofibers, nanorods by Chemical Method; Physical Method or Hybrid Method;
- Use of Nanostructureforsolarcellfabrication.
- Conductingpolymersfornanotechnologyapplications

Atomic Molecular physics

- To determine the wavelength of He-Ne laser .
- Fiber optics communication
- Diffraction and interference experiments (from ordinary light or laser pointers)

Solid state physics and Semiconductor Physics

- Diode characteristics
- I-V characteristics of Solar cell
- Determination of forbidden band gap.
- Determination of wavelength of He-Ne Laser.
- Hall effect
- Four Probe method
- Crystal structure

Text Books:

1. David Griffiths, Introduction to Electrodynamics, 4th edition, Pearson Publication
2. Eisberg and Resnick, Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles 2nd Edition, Wiley Publication
3. Gupta , Kumar and Saxena, "Solid State Physics" Pragati Publication
4. N Zettili, "Quantum Physics" 2th edition, Wiley Publication
5. Gupta ,Kumar and Sharma, Atomic and Molecular Physics, Pragati Prakashan
6. Murthy, "Textbook Of Nanosciene And Nanotechnology", University Press
7. J. C. Upadhya, "Classical Mechanics" Himalaya Publication House.

Reference Books:

1. Resnick , Halliday , Krane, "Physics, Volume I and II" Wiley Publication, 5th Edition
2. W. Saslow, Electricity, Magnetism and light, Academic Press Publication
3. O. Svelto, Principles of Lasers, Springer Publication.
4. Quila " Perspective of Quantum Mechanics", NCBA Publication
5. M A Wahab ,Solid State Physics, Narosa Publishing House,

Guide lines 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 laboratory assignments submitted by the students in the form of journal.

Basic Electrical and Electronics Engineering Lab.					
LAB COURSE OUTLINE					
Course Title:	Basic Electrical and Electronics Engineering (Lab)	**Short Title:**	BEEE (Lab)	**Course Code:**	

Course description:

Also in this laboratory course emphasis is on the understanding of the characteristics of basic circuits that use resistors, capacitors, ac/dc circuits, diodes, bipolar junction transistors, logic gates etc. The students can use this knowledge to analyze more complex circuits such as complex electrical networks, rectifiers, amplifiers, digital circuits etc. The students can use this knowledge to analyze more complex circuits such as electrical networks, single and three phase circuits etc.

Laboratory	**Hours/week**	**No. of weeks**	**Total hours**	**Semester credits**
	02	**14**	**28**	**01**

End Semester Exam (ESE) Pattern:	**Oral (OR)**

Prerequisite course(s):

11^{th} & 12^{th}Physics

Course objectives:

1. The objective of this lab. is to impart the fundamental knowledge of electrical and electronics engineering to the students and to develop the students' ability to apply the specific procedures to analyze the electrical engineering Systems.
2. 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, power measurement, etc.
3. In this lab, students will become familiar with various basic analogue and digital electronic circuits.

Course outcomes:

Upon successful completion of lab Course, student will be able to:

1. Identify electrical and electronics components/equipments.
2. Simplify D.C. network using Superposition Theorem.
3. Simplify D.C. network using Thevenin's Theorem.
4. Learn diode V-I Characteristic
5. Understand BJJ as a switch
6. Understand LED, JFET, SCR V-I characteristics

LAB COURSE CONTENT

Basic Electrical and Electronics Engineering (Lab)		**Semester:**	**I or II**
Teaching Scheme:		**Examination scheme**	
Practical:	**2 hours/week**	**End semester exam (ESE):**	**25 marks**
		Internal Continuous Assessment (ICA):	**25 marks**

(Minimum FOUR practicals in each group)

Group A

1. Study and representation of electrical and electronics components/equipments.
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-C series exited by single phase AC supply.

Group B

7. To plot the V-I Characteristics of P-N Junction diode forward characteristic
8. Study of BJT as a Switch a) Determination of parameters in cut off region, b) Determination of parameters in saturation region.
9. To plot the V-I Characteristics of JFET. a) drain characteristic b) transfer characteristic
10. To plot thecharacteristics of Light Emitting Diode (LED)
11. To plot V-I characteristics of SCR a) To plot forward characteristic of SCR. b) To determine VBO, IL& IH of SCR
12. Implementation of any Boolean expression using LOGIC GATES. a) Simplification of Boolean expression, b) Implementation using Basic gates and Universal gates

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. K. A. Krishnamurty, M. R. Raghuveer, "Electrical and Electronics Engineering for Scientists and Engineers," Willey Eastern Limited.
3. J. B. Gupta, "A Course in Electrical Power", S. K. Kataria and Sons, 12th Edition, 2002.
4. R. S. Sedha, "Applied Electronics", S. Chand Publication
5. V.K. Mehta, "Principles of Electronics", S. Chand Publications

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. Vincent Del Toro, "Electrical Engineering Fundamentals", Pearson
6. R. P. Jain, "Modern Digital Electronics" McGraw Hill Education (India) Private Limited, Fourth Edition, 2017.B. L. Theraja, "Applied Electronics" S. Chand Publication
7. A.P. Malvino, "Electronics Principles" TMH Publications.

Guide lines 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 laboratory assignments submitted by the students in the form of journal.

Programming for Problem Solving Lab					
LAB COURSE OUTLINE					
Course Title:	Programming for Problem Solving (Lab)	**Short Title:**	**PPL (Lab)**	**Course Code:**	

Course description:

This course provides students with a comprehensive study of the C programming language with program design and problem solving. This course focuses on Programming topics include control structures, functions, arrays, pointers, and file I/O.

Laboratory	**Hours/week**	**No. of weeks**	**Total hours**	**Semester credits**
	02	14	28	1

End Semester Exam (ESE) Pattern:	Practical (PR)

Prerequisite course(s):

11th Physics, 12th Physics

Course objectives:

1. Learn the fundamentals, structure and syntax of C Language.
2. Write simple programs in C Language.

Course outcomes:

Upon successful completion of lab Course, 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

Programming for Problem Solving (Lab)		**Semester:**	I or II
Teaching Scheme:		**Examination scheme**	
Practical:	**2 hours/week**	**End semester exam (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 practice.

GROUP - B

Concerned faculty member should suitably frame FIVE laboratory assignments from the following list.

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 Software/Tool/Technology is recommended for laboratory assignments of concern subject.

Text Books:

1. Yashavant Kanetkar, Test Your C Skills , , BPB Publication ,5th Edition
2.Yashavant Kanetkar, Let Us C by , BPB Publication, 14th Edition

Reference Books:

1. E Balagurusamy, Programming in ANSIC C by, Tata McGraw Hill, 4th Edition
2. K. R. Venugopal and S. R. Prasad, Mastering C, Tata McGraw Hill, 2011, 2nd Edition
3. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, PHI, 2nd Edition
4. Paul Deitel and Harvey Deitel, C How to Program, Pearson, 8th Edition
5. R.S. Salaria, Computer concepts and Programming in C, Khanna Publication

Guide lines 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 laboratory assignments submitted by the students in the form of journal.

Chemistry Lab

LAB COURSE OUTLINE

Course Title:	Chemistry (Lab)	**Short Title:**	CHY (Lab)	**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 hours**	**Semester credits**
	02	14	28	1

End Semester Exam (ESE) Pattern:

Prerequisite course(s):

11^{th}&12^{th} Chemistry, Different laws, basic principles and theories.

Course objectives:

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.

- To impart knowledge of basic concepts in chemistry and implementation to various engineering fields.
- 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:

・ The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering. The students will learn to:

・ Estimate rate constants of reactions from concentration of reactants/products as a function of time

・ Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc

・ Synthesize a small drug molecule and analyse a salt sample .

LAB COURSE CONTENT

Chemistry (Lab)		**Semester:**	I or II
Teaching Scheme:		**Examination scheme**	
Practical:	**2 hours/week**		
		Internal Continuous Assessment (ICA):	***25 marks***

Choice of 10-12 experiments from the following:

・ Determination of surface tension and viscosity
・ Thin layer chromatography
・ Ion exchange column for determination of hardness of water
・ Determination of chloride content of water
・ Colligative properties using freezing point depression
・ Determination of the rate constant of a reaction
・ Determination of cell constant and conductance of solutions
・ Potentiometry - determination of redox potentials and emfs
・ Synthesis of a polymer/drug
・ Saponification/acid value of an oil
・ Chemical analysis of a salt

- Lattice structures and packing of spheres
- Models of potential energy surfaces
- Chemical oscillations- Iodine clock reaction
- Determination of the partition coefficient of a substance between two immiscible liquids
- Adsorption of acetic acid by charcoal
- Use of the capillary viscosimeters to the demonstrate of the isoelectric point as the pH of minimum viscosity for gelatin sols and/or coagulation of the white part of egg .

Text Books

1.Tembe, Kamaluddin and Krishnan, Engineering Chemistry, (NPTEL Web-book)

Reference Books:

1. B. H. Mahan University chemistry, Pearsons Publication, 4th edition
2. M. J. Sienko and R. A. Plane, Chemistry: Principles and Applications,
3. C. N. Banwell, Fundamentals of Molecular Spectroscopy,Mcgraw Higher Ed., 4th edition.
4. P. W. Atkins, Physical Chemistry, Oxford University Press, 7th edition.

Guide lines 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 laboratory assignments submitted by the students in the form of journal.

Engineering Graphics Lab					
LAB COURSE OUTLINE					
Course Title:	**Engineering Graphics** (Lab)	**Short Title:**	EG (Lab)	**Course Code:**	

Course description:

Engineering Graphics is the language of engineers. The concepts of Engineering Graphics are used to develop, express the ideas, and convey the instructions which are used to carry out jobs in the field Engineering. The course illustrates the techniques of graphics in actual practice. This preliminary course aims at building a foundation for the further course in drawing and other allied subjects. This subject is useful in developing drafting and sketching skills of students.

Laboratory	Hours/week	No. of weeks	Total hours	Semester credits
	02	14	28	01

End Semester Exam (ESE) Pattern: ***Oral (OR)***

Prerequisite course(s):

Course objectives:

This course objectives are -

1. 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.
2. To communicate effectively.
3. To use the techniques, skills, and modern engineering tools necessary for engineering Practice.

Course outcomes:

Upon successful completion of lab Course, student will be able to:

All phases of manufacturing or construction require the conversion of new ideas and design concepts into the basic line language of graphics.

The student will learn :

1. Introduction to engineering design and its place in society
2. Exposure to the visual aspects of engineering design
3. Exposure to engineering graphics standards
4. Exposure to solid modeling.

LAB COURSE CONTENT

Engineering Graphics Lab		**Semester:**	**I or II**
Teaching Scheme:		**Examination scheme**	
Practical:	**2 hours/week**	**End semester exam (ESE):**	25 marks
		Internal Continuous Assessment (ICA):	25 marks

Sheet No. 01 Lines, Dimensioning and Scales. (04 Hrs)

Sheet No. 02 Engineering curves - Three different curves are to be draw using any one method. (04 Hrs)

Sheet No. 03 Projections of Lines and Planes - Two problems on projection of lines and two problems on projection of planes (04 Hrs).

Sheet No. 04 Projection of solids and Development of Surfaces (Two Problems on each) - Two problems on two different solids,

a) axis of solid inclined to HP and parallel to VP and
b) Axis of solid inclined to VP and parallel to HP. (04 Hrs)

Sheet No. 05 Orthographic projections - Two objects by first / Third angle projection method, Full orthographic views, Sectional orthographic views (06 Hrs)

Sheet No. 06 Isometric projection - Isometric views of two different objects, Isometric projection of two different objects. (04 Hrs)

Text Books:

1. Venugopal K and Prabhu Raja V(2015), "Engineering Graphics", New AGE International Publishers.
2. Narayana,K.L& P Kannaiah(2008),Text book on "Engineering Drawing. SciTech Publication.

Reference Books:

1. N.D. Bhat and V.M. Panchal, Engineering Graphics, Charotar Publishers 2013
2. Agrawal B &Agrawal B.C (2008) Engineering Graphics, TMH Publication.

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and drawing sheets submitted by the student in the form of journal.

Guidelines for ESE:

ESE will be based on the laboratory assignments submitted by the students in the form of journal.

Workshop Practices LAB					
LAB COURSE OUTLINE					
Course Title:	**Workshop Practices (Lab)**	**Short Title:**	WP (Lab)	**Course Code:**	

Course description:

This course covers the basic knowledge of different manufacturing methods like sand casting, dies casting, metal casting, forming, machining, joining, CNC machining, additive manufacturing and advanced manufacturing methods. It also covers the fundamentals of fitting operations, power tools, knowledge of electrical & electronics, carpentry tools and equipment, plastic molding, glass cutting, arc welding, gas welding and brazing.

Laboratory	**Hours/week**	**No. of weeks**	**Total hours**	**Semester credits**
	02	14	28	02

End Semester Exam (ESE) Pattern:	**Oral (OR)**

Prerequisite course(s):

12^{th} Physics, mathematics, basic knowledge of drawing

Course objectives:

1. To study the basics of metal machining.
2. To study the different cutting tool materials and types & geometry of cutting tools.
3. To learn introductory concepts of additive manufacturing.
4. To understand basic manufacturing processes like casting and welding and learn various aspects of casting methods and welding methods.
5. To know about the applications of advanced manufacturing processes.
6. To understand basics of electrical & electronics, carpentry joints, tools equipment, fitting operations, tools, equipment.
7. To understand concepts of plastic molding and glass cutting.
8. To get the knowledge of brazing

Course outcomes:

Upon successful completion of lab Course, student will be able to:

1. Students will be able to fabricatecomponents with their own hands.
2. Get practical knowledge of the dimensional accuracies and dimensional tolerances possible
3. with different manufacturing processes.
4. Assemble different components, they will be able to produce small devices oftheir interest.

LAB COURSE CONTENT

Workshop Practices LAB		**Semester:**	**I or II**
Teaching Scheme:		**Examination scheme**	
Practical:	**2 hours/week**	**End semester exam (ESE):**	**25 marks**
		Internal Continuous Assessment (ICA):	**25 marks**

Note: - Workshop manual should consist of minimum **seven** activities from the following list ofpracticals.

Students should practice and prepare a job, which consist of following activities in different shops-

1. **Machine shop:**

i)Demonstration of lathe machine (different parts, different operations, different type of cutting tools)

ii) One job Practice of Facing, Plane Turning, step turning, taper turning, knurling , parting, external or internal thread cuttings, drilling.

iii) Demonstration of milling machine.
iv) One job Practice of Keyway milling using milling machine.
v)One job Practice of Spur gear cutting using milling machine.

2. Smithy Shop:

i)Demonstration of smithy tools & equipment.
ii)) One job Practice of S shape or Hook shape involving bending, flattening operations.

3. Foundry Shop:

i) Demonstration of foundry tools, patterns, ingredients of molding sand.
ii) Demonstration of preparation of mold using split pattern and casting of the same.

4. Fitting Shop:

i) Demonstration of different hand operated power tools, uses and their applications.
ii) One job Practice of T shape and U shape workpiece as per the given dimensions, which contains: filling, drilling and grinding.

5. Carpentry Shop:

i)Demonstration of Carpentry Tools, Equipment and different joints.
ii)) One job Practice of Cross Half lap joint or Half lap Dovetail joint.

6.House Wiring:

i) Introduction to House wiring, different types of cables. Types of power supply, types of bulbs, parts of tube light, Electrical wiring symbols.
ii) 2-phase, 3-phase electric supply, earthling, Electric safety.

7. Welding Shop:

i) Demonstration of weldingtools, welding joints, symbols and welding equipment (Gas and Arc welding)
ii) Selection of welding electrode and current, and demonstration of brazing.
iii)) One job Practice of Lap Joint by arc welding and gas welding.

8. CNC Shop:

i) Demonstration of CNC lathe machine and CNC milling machine.
ii)CNC part programming.
iii)Demonstration of different operations like facing, turning, step turning, taper turning etc. on CNC lathe machine.

Note: - Candidates are required to finish the job to the following limits.
Machine Shop: $\pm$0.5 mm , Fitting Shop:$\pm$0.5 mm, Carpentry Shop :$\pm$2 mm, Smithy Shop: $\pm$2mm, Welding Shop: $\pm$1 mm,

Text Books:

1. Hajra choudhury S. K., Hajra Choudhury A. K and Nirjhar Roy "Elements of Workshop Technology" Vol.1 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.

Reference Books:

1. Kalpakjian S. and Steven S. Schmid, "Manufacturing Engineering and Technology" 4th edition, Perason Education India Edition, 2002.
2. Gowri P. hariharan and A. Suresh Babu, " Manufacturing Technology – I" Perason education, 2008
3. Roy A. Lindberg, "Processes and Materials of manufacture", 4th Edition, Prentice hall India,1998.
4. Rao P. N, "Manufacturing Technology", Vol. I and Vol. II. Tata McGraw-Hill house, 2017.

Guide lines 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 laboratory assignments submitted by the students in the form of journal.

English Lab					
LAB COURSE OUTLINE					
Course Title:	English(Lab)	**Short Title:**	**ENG** (Lab)	**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.

Laboratory	**Hours/week**	**No. of weeks**	**Total hours**	**Semester credits**
	02	14	28	01

End Semester Exam (ESE) Pattern: ***Oral (OR)***

Prerequisite course(s):

11th& 12th 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 lab Course, student 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

English (Lab)		**Semester:**	**I or II**
Teaching Scheme:		**Examination scheme**	
Practical:	**2 hours/week**	**End semester exam (ESE):**	**25 marks**
		Internal Continuous Assessment (ICA):	**25 marks**

The following course content is prescribed for the English Language Lab based on Unit-6 of AICTE Model Curriculum 2018-19 for B.E First Year.. This unit involves interactive practice sessions in Language Lab .Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.

- **Interactive Practice Sessions in Language Lab:**
  1. **Listening Comprehension:**
     Understand: Listening Skill- Its importance – Purpose- Barriers of Listening.
     Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants.
  2. **Pronunciation, Intonation, Stress and Rhythm:**
     Understand: Word Stress & Sentence Stress , Intonation and rhythm
     Practice: Basic Rules of Word Stress & Sentence Stress
  3. **Common Everyday Situations: Conversations and Dialogues:**
     Understand: Verbal – Non-verbal Communication.
     Practice: Situational Dialogues – Role-Play- Expressions in Various Situations – Making Requests and Seeking Permissions
  4. **Communication at Workplace:**
     Understand : Communication at Workplace

Practice: Communication at Workplace

5. Interviews:

Understand: Interview Skills.

Practice: Mock Interviews.

6. Introducing oneself & Introducing others:

Understand : Introduction

Practice: Introducing oneself & Introducing others

Text Book

1. Raymond Murrphy, Essential English Grammar, Cambridge University Press, 2nd edition
2. Rajinder Pal & PremLata , English Grammar &Composition, Sultan chand Publication

Reference Books:

1. Michael Swan, Practical English Usage. OUP, 1995.
2. F.T. Wood. Macmillan Remedial English Grammar..2007
3. William Zinsser, On Writing Well.. Harper Resource Book. 2001
4. Hamp-Lyons and Ben Heasly, Study Writing. Liz Cambridge University Press. 2006.
5. Sanjay Kumar and PushpLata, Communication Skills, Oxford University Press. 2011.
6. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

Guide lines 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 marks for each assignment on completion date declared for each assignments.

Guidelines for ESE:

ESE will be based on the laboratory assignments submitted by the students in the form of journal.

MATHEMATICS-II					
COURSE OUTLINE					
Course Title:	**Mathematics -II**	**Short Title:**	**M-II**	**Course Code:**	

Course description: This course is aimed at introducing the fundamentals of basic Mathematics to undergrduate 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	4
Tutorial	01	14	14	

Prerequisite course(s): 11^{th} & 12^{th} mathematics

Course objectives:

The objective of this course is to familiarize the prospective engineers with techniques in Multivariate integration, ordinary and partial differential equations and complex variables. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines

Course outcomes:

After successful completion of this course the student will be able to:

1) Use mathematical tools needed in evaluating multiple integrals and their usage.
2) Apply effective mathematical tools for the solutions of differential equations that model physical processes.
3) Use tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems.

COURSE CONTENT

Mathematics -II		**Semester:**	**II**
Teaching Scheme:		**Examination scheme**	
Lectures:	**3 hours/week**	**End semester exam (ESE):**	**60 marks**
Tutorial	**1 hours/week**	**Duration of ESE:**	**03 hours**
		Internal Sessional Exams (ISE):	**40 marks**

Unit–I:	**No. of Lectures: 8 Hours**	**Marks: 12**

First order ordinary differential equations:
Exact equations, Integrating Factor, Equations reducible to exact , linear and Bernoulli's equations, **Equations not of first degree**: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

Unit–II:	**No. of Lectures: 08 Hours**	**Marks: 12**

Linear Differential Equations with constant coefficients**:** Linear differential equations with constant coefficients ,Method to find Perticular Integral by shortcut methos, method of variation of parameters, Cauchy-Euler equation. Legendres Equations.

Unit–III:	**No. of Lectures: 08 Hours**	**Marks: 12**

Function of Complex Variable :
Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; zeros of analytic functions, singularities, Cauchy Integral formula (without proof), Cauchy Residue theorem(without proof)

Unit–IV:	**No. of Lectures: 08 Hours**	**Marks: 12**

Numerical methods:-Solution of Ordinary differential equations: by Taylor's series and Picard's

Method. Runge-Kutta method of fourth order for solving first order equations.
Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules.

Unit–V:	**No. of Lectures: 08 Hours**	**Marks: 12**

Multivariable Calculus (Integration):
Double integrals (limits Given and limits not given) by Cartesian and Polar coordinates. Triple integration by spherical polar coordinates. Applications: areas and volumes.

Text Books :

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
2. H.K.DASS "Advance Engineering Mathematics" S. Chand publications.
3. Ravish R. Singh, Mukul Bhatt "Engineering Mathematics A Tutorial Approach.Tata McGrawHill Education Private Limited. New Delhi

Reference Books:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edn., Wiley India, 2009.
4. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
5. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India,1995.
6. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., Mc-GrawHill, 2004.
7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010