SHRI RAMDEOBABA COLLEGE OF ENGINEERING AND MANAGEMENT, NAGPUR - 440013

An Autonomous College affiliated to
Rashtrasant Tukadoji Maharaj Nagpur University,
Nagpur, Maharashtra (INDIA)

PROGRAMME SCHEME & SYLLABI
2017-21

B. E. (ELECTRONICS DESIGN TECHNOLOGY)

About the Department

Department of Electronics Design Technology

1. Established in 1987, it is the only department that offers this course as a UG Programme in the country.

2. It has been accreditated by National Board of Accreditation of AICTE, New Delhi, twice.

3. A grant of 9 lakhs was received from AICTE under MODROBS for the up gradation of the PCB lab.

4. The department is equipped with a state-of-the-art PCB Laboratory with Surface Mount Devices (SMD) Workstations and PTH setup which has been recently upgraded.

5. The department conducts annual training programmes for the students to enhance their skills in the field of Embedded System Design & VLSI.

6. The department has a students' society called 'Genesis' which provides a platform to the students to interact with the alumni and technocrats. It enables students to show their hidden talent and to improve their soft skills.

Department Vision

To create Electronics design engineers who have technical excellence to work in industry in global scenario.

Department Mission

To be eminent in training the students in identifying the need of electronic design industry and providing techno-economical solution by designing electronic system.

Programme Educational Objectives

1. Create graduates with basic knowledge of sciences, mathematics and core electronics engineering with an ability to excel in professional career and/or higher education.

2. Exhibit professionalism, ethical attitude, communication skills, team work in their profession and adapt to current trends by engaging in lifelong learning.

3. Ability to apply knowledge to provide technically sound, economically feasible and socially acceptable solutions in designing electronic systems by analyzing data from experimentation.

Programme Outcomes :

Engineering Graduates will be able to :

1. **Engineering Knowledge :** Apply the knowledge of Mathematics, Science, Engineering fundamentals, and engineering specialization to the solution of complex engineering problems.

2. **Problem Analysis :** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design / development of Solutions :** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal and environmental considerations.

4. **Conduct investigation of complex problems :** Use research based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.

5. **Modern Tool Usage :** Create, select and apply appropriate techniques resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. **The Engineer and society :** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and Sustainability :** Understand the impact of the professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics :** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and Team work :** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication :** Communicate effectively and complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentations, make effective presentations, and give and receive clear instructions.

11. **Project management and Finance :** Demonstrate knowledge and understanding of the engineering and management principles and apply these to ones own work, as a member and leader in a team to manage projects and in multidisciplinary environment.

12. **Life-long Learning :** Recognize the need for and have the preparation and ability to engage in independent and life long learning in the broadest context of technological change.

Programme Specific Outcomes

1. Ability to understand all stages and the process involved in conceptualization, investigating, designing, and implementing electronics system.

2. Ability to make electronic system that is reliable, easily usable and techno-economical without affecting environment and social structure.

Teaching Scheme for First Year (Semester I and II) Bachelor of Engineering

GROUP 1: SEMESTER I / GROUP 2: SEMESTER II

Sr. No.	Code	Course	L	T	P	Credits	Internal Assessment	End Sem Exam	Total	Exam Duration
1	MAT101 MAT102	Engineering Mathematics-I/II	4	1	0	9	40	60	100	3 Hrs.
2	PHT101	Engineering Physics	4	1	0	9	40	60	100	3 Hrs.
3	PHP101	Engineering Physics lab	0	0	3	3	25	25	50	-
4	EET101	Electrical Engineering	3	1	0	7	40	60	100	3 Hrs.
5	EEP101	Electrical Engineering lab	0	0	2	2	25	25	50	-
6	CST101	Computer Programming	2	0	0	4	40	60	100	3 Hrs.
7	CSP101	Computer Programming lab	0	0	2	2	25	25	50	-
8	HUT101	Communication Skills	2	0	0	4	40	60	100	3 Hrs.
9	HUP101	Communication Skills lab	0	0	2	2	25	25	50	-
10	PEP101	Sports/Yoga	0	0	2	0	-	-	-	-
		TOTAL	**15**	**3**	**11**	**42**	**300**	**400**	**700**	

Teaching Scheme for First Year (Semester I and II) Bachelor of Engineering

GROUP 1 : SEMESTER II / GROUP 2 : SEMESTER I

Sr. No.	Code	Course	L	T	P	Credits	Internal Assessment	End Sem Exam	Total	Exam Duration
1	MAT102 MAT101	Engineering Mathematics-II/I	4	1	0	9	40	60	100	3 Hrs.
2	CHT101	Engineering Chemistry	4	1	0	9	40	60	100	3 Hrs.
3	CHP101	Engineering Chemistry lab	0	0	3	3	25	25	50	-
4	CET101	Engineering Mechanics	3	1	0	7	40	60	100	3 Hrs.
5	CEP101	Engineering Mechanics lab	0	0	2	2	25	25	50	-
6	MET101	Engineering Drawing	3	0	0	6	40	60	100	4 Hrs.
7	MEP101	Engineering Drawing lab	0	0	3	3	25	25	50	-
8	HUT102	Social Skills	2	0	0	4	40	60	100	3 Hrs.
9	INP102	Workshop	0	0	2	2	25	25	50	-
		TOTAL	**16**	**3**	**10**	**45**	**300**	**400**		

Teaching and Examination Scheme Semester Pattern III Semester B.E. (Electronics Design Technology)

Sr. No.	Code	Course	L	T	P	Credits	Internal Assessment	End Sem Exam	Total	Exam Duration
							Maximum Marks			
1	MAT203	Engineering Mathematics III	3	1	0	7	40	60	100	3 Hrs
2	EET205	Network Theory	3	1	0	7	40	60	100	3Hrs
3	EDT201	Electronic Devices	4	1	0	9	40	60	100	3Hrs
4	EDP201	Electronic Devices Lab	0	0	2	2	25	25	50	3Hrs
5	EDT202	Digital Logic Design	4	1	0	9	40	60	100	3Hrs
6	EDP202	Digital Logic Design Lab	0	0	2	2	25	25	50	3Hrs
7	PHT201	Electronic Engineering Materials & IC Fabrication	3	1	0	7	40	60	100	3Hrs
8	CSP211	Object Oriented Data Structure Lab	0	0	2	2	25	25	50	3Hrs
9	CHT201	Environmental Studies I	2	0	0					
		Total	19	5	6	45	275	375	650	

Teaching and Examination Scheme Semester PatternIV Semester B.E. (Electronics Design Technology)

Sr. No.	Code	Course	L	T	P	Credits	Internal Assessment	End Sem Exam	Total	Exam Duration
							Maximum Marks			
1	MAT243	Engineering Mathematics IV	3	1	0	7	40	60	100	3 Hrs
2	EDT203	Electromagnetic Fields	4	1	0	9	40	60	100	3 Hrs
3	EDT204	Analog Circuits	4	1	0	9	40	60	100	3 Hrs
4	EDP204	Analog Circuits Lab	0	0	2	2	25	25	50	3 Hrs
5	EDT205	Electronic Circuits	3	1	0	7	40	60	100	3 Hrs
6	EDP205	Electronic Circuits Lab	0	0	2	2	25	25	50	3 Hrs
7	EDT206	Electronic Measurement & Instrumentation	3	1	0	7	40	60	100	3 Hrs
8	EDP206	Electronic Measurement & Instrumentation Lab	0	0	2	2	25	25	50	3 Hrs
9	CHT202	Environmental Studies II	2	0	0					
		Total	19	5	6	45	275	375	650	

Teaching and Examination Scheme Semester Pattern - V Semester B.E. (Electronics Design Technology)

Sr. No.	Code	Course	L	T	P	Credits	Internal Assessment	End Sem Exam	Total	Exam Duration
							Maximum Marks			
1	HUT301	Principles of Economics & Management	3	1	0	7	40	60	100	3Hrs
2	EDT301	Digital Systems Design with HDL	3	1	0	7	40	60	100	3Hrs
3	EDP301	Digital Systems Design with HDL Lab	0	0	2	2	25	25	50	3Hrs
4	EDT302	Statistical Signal Analysis	3	1	0	7	40	60	100	3Hrs
5	EDT303	PCB Technology	4	1	0	9	40	60	100	3Hrs
6	EDP303	PCB Technology Lab	0	0	2	2	25	25	50	3Hrs
7	EDT304	Microprocessor & Interfacing	4	1	0	9	40	60	100	3Hrs
8	EDP304	Microprocessor & Interfacing Lab	0	0	2	2	25	25	50	3Hrs
9	EDP305	Circuit Simulation-I lab	0	0	2					
		Total	17	5	8	45	275	375	650	

Teaching and Examination Scheme Semester Pattern - VI Semester B.E. (Electronics Design Technology)

Sr. No.	Code	Course	L	T	P	Credits	Internal Assessment	End Sem Exam	Total	Exam Duration
							Maximum Marks			
1	EDT306	Field & Radiating System	3	1	0	7	40	60	100	3Hrs
2	EET315	Control System Engineering	3	1	0	7	40	60	100	3Hrs
3	EDT307	Microcontroller based Design	3	1	0	7	40	60	100	3Hrs
4	EDP307	Microcontroller based Design Lab	0	0	2	2	25	25	50	3Hrs
5	EDT308	Computer Organization	3	0	0	6	40	60	100	3Hrs
6	EDT309	Analog communication Engineering	3	1	0	7	40	60	100	3Hrs
7	EDP309	Analog communication Engineering Lab	0	0	2	2	25	25	50	3Hrs
8	EDP310	Electronic Product Design lab	0	0	2	2	25	25	50	3Hrs
9	EDT311	Open Elective - I	3	1	0	7	40	60	100	3Hrs
10	EDP312	Circuit Simulation-II lab	0	0	2					
		Total	18	5	8	47	315	435	750	

Course Code	Open Elective - I
EDT311-1	Industrial Electronic system Design

Teaching and Examination Scheme Semester Pattern - VII Semester B.E. (Electronics Design Technology)

Sr. No.	Code	Course	L	T	P	Credits	Maximum Marks			Exam Duration
							Internal Assessment	End Sem Exam	Total	
1	EDT401	Design of electronic Equipments	4	1	0	9	40	60	100	3 Hrs
2	EDT402	CMOS VLSI Design	3	1	0	7	40	60	100	3 Hrs
3	EDP402	CMOS VLSI Design Lab	0	0	2	2	25	25	50	3 Hrs
4	EDT403	Digital Signal Processing	3	1	0	7	40	60	100	3 Hrs
5	EDP403	Digital Signal Processing Lab	0	0	2	2	25	25	50	3 Hrs
6	EDT404	Elective -I	4	0	0	8	40	60	100	3 Hrs
7	EDT405	Elective -II	4	0	0	8	40	60	100	3 Hrs
8	EDP406	Project Phase -1	0	0	4	8	100	--	100	3 Hrs
9	EDP407	FPGA Based Implementation	0	0	2	0				
		Total	18	3	10	51	350	350	700	

Course Code	Elective - I
EDT404-1	Electronic System Design
EDT404-2	Wireless communication
EDT404-3	Digital Communication

Course Code	Elective - II
EDT405-1	Power Electronics & Industrial Automation
EDT405-2	Optical Communication
EDT405-3	Micro Electro Mechanical Systems

Teaching and Examination Scheme Semester Pattern - VIII Semester B.E. (Electronics Design Technology)

Sr. No.	Code	Course	L	T	P	Credits	Maximum Marks			Exam Duration
							Internal Assessment	End Sem Exam	Total	
1	EDT408	Reliability of Electronic equipments	3	1	0	7	40	60	100	3 Hrs
2	EDT409	Advanced Processors & Embedded Systems	4	1	0	9	40	60	100	3 Hrs
3	EDP409	Advanced Processors & Embedded Systems Lab	0	0	2	2	25	25	50	3 Hrs
4	EDT410	Elective -III	4	0	0	8	40	60	100	3 Hrs
5	EDT411	Elective -IV	4	0	0	8	40	60	100	3 Hrs
6	EDP412	Project Phase II	0	0	4	8	50	50	100	3 Hrs
7	HUT402	Technical Communication	2	0	0	0				
		Total	17	2	6	42	235	315	550	

Course Code	Elective - III
EDT410-1	Advanced Digital Signal Processing
EDT410-2	CMOS & RF Design
EDT410-3	Switching Theory & Finite Automata

Course Code	Elective - IV
EDT411-1	Design For Testability
EDT411-2	Electromagnetic Interference / Electromagnetic Compatibility
EDT411-3	Computer Communication Networks

Syllabus of Group 1 - Semester I and Group 2 - Semester I, Bachelor of Engineering

Course Code : MAT101　　　　　　　　　　**Course : Engineering Mathematics-I**

L: 4 Hrs., T: 1 Hrs., P: 0 Hrs., Per week　　　　**Total Credits : 09**

Course Objective

Course objective of this course is to provide understanding the concepts of Mathematics and its application to Engineering. This course introduces the student to Differential Calculus for one and several variable, Differential Equations and Infinite Series.

Course Outcomes

On successful completion of the course, student shall be able to
1. Solve Engineering problems using the concept of Differential Calculus.
2. Get analytical solution of Ordinary Differential Equations in Engineering.
3. Test convergence of Infinite series.

Syllabus

Unit - I:

Ordinary Differential Calculus: Successive differentiation, Taylor's and Maclaurin's series for function of one variable, indeterminate forms, curvature, radius of curvature and circle of curvature.

Unit - II:

Partial Differentiation: Functions of several variables, first and higher order derivative, Euler's Theorem, Chain rule and Total differential coefficient, Jacobians. Taylor's and Maclaurin's series for function of two variables, Maxima and minima for function of two variables, Lagrange's method of undetermined multipliers.

Unit - III:

Infinite Series: Convergence, divergence and oscillation of series, General properties, Tests of convergence, Alternating series.

Unit - IV:

First Order Differential Equation: First order first degree differential equations: Linear, reducible to linear, exact and reducible to exact differential equations; Non-linear differential equations.

Unit - V:

Higher Order Differential Equation: Higher order differential equations with constant coefficient, method of variation of parameters, Cauchy's and Legendre's homogeneous differential equations, simultaneous differential equations, differential equation of the type $d2y/dx2 = f(x)$ and $d2y/dx2 = f(y)$.

Unit - VI:

Applications of Differential Equation: Applications of first order first degree differential equations: Simple electrical circuits in series. Application of higher order differential equations: Mechanical and electrical Oscillatory circuits (free, damped, forced oscillations)

Text Books:
1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, Delhi.
2. A text book of Applied Mathematics Volume I & II, by P. N. Wartikar and J. N. Wartikar, Pune Vidhyarthi Griha Prakashan, Pune-411030 (India)
3. Advanced Engineering Mathematics, 2 ed , Jain ,Iynger , Narosa publication

Reference Books:
1. Advanced Engineering Mathematics by Erwin Kreyszig, 8th edition, Neekunj print process, Delhi.
2. Schaum's Outline of Differential Equations, Richard Bronson , TMH, 3ed, New Delhi
3. Engineering Mathematics by Srimanta, Paul
4. A text book of Applied Mathematics I, T. Singh, K.L. Sarda, Professional Publishing House Pvt.Ltd., Nagpur.

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Syllabus of Group 1 - Semester I and Group 2 – Semester II, Bachelor of Engineering

Course Code : PHT101	**Course : Engineering Physics**
L: 4 Hrs, T: 1 Hr, P : 0 Hr., Per week	**Total Credits : 09**

Course Objectives :
1. To develop the ability to apply concepts in elementary physics to understanding of engineering applications;
2. To introduce more advanced physics concepts, which form the basis of modern engineering;
3. To provide a sound foundation in mathematical formulation of concepts learnt and their applications;
4. To elaborate the general nature of concepts learnt and of possibility of their cross-disciplinary application;
5. To develop skills for numerical problem solving in areas covered

Course Outcomes :
At the end of the course the students
1. will be able to recognize and analyze phenomena of interference, diffraction and polarization of light waves ;
2. will understand principles of laser action and basic working of many types of laser devices ;
3. will understand geometrical theory of optical fibre communication and the phenomena of attenuation and dispersion of electrical signals in the fibre ;
4. will understand fundamental notions in quantum mechanics such as wave particle duality, de Broglie matter waves, Heisenberg uncertainty relations, wave function of system, quantum confinement, quantization of energy and quantum tunneling of potential barriers;
5. will understand concepts like Fermi energy and density of states, understand calculation of carrier density and electrical conductivity in intrinsic and semiconductors and understand the behaviour of pn-junction;
6. will understand broad principles of electromagnetic electron lenses, cyclotron, mass spectrograph and working of the CRO;
7. will understand the reasons for novel properties at nano-scale, be familiar with elements of some of the methods of synthesis and characterization and some of the properties of such materials ;
8. will be able to understand and perform numerical calculations in areas of optics, lasers, optical fibres, quantum physics, semiconductors, charged particle devices and nano physics at the level defined above for these.

Unit-I:

Optics:
Interference in thin films, division of amplitude and wavefront, wedge-shaped films, Newton's rings, antireflection coatings; Diffraction, single slit, double slit, Different types of polarization of light, Malus' law, production of plane polarized light, birefringence, wave plates.

Unit-II:

Quantum Physics:

Wave-particle duality, wave packets, Heisenberg uncertainty relations; Wave function, probability Schrodinger's equation, time dependent equation and its separation; Infinite potential and finite potential wells, phenomenon of tunneling.

Unit-III:

LASERs and Optical Fibres:

Interaction of matter and radiation, LASER, spontaneous and stimulated emission, population inversion; Common types of lasers and their applications; Optical fibres, structure, types, propagation in a fibre, modes of propagation, signal attenuation, signal distortion.

Unit-IV:

Mass Spectrograph and Particle Accelerators :

Principles of electron optics, cathode ray tube, cathode ray oscilloscope, mass spectrographs, particle accelerators.

Unit-V:

Semiconductors:

Band structure of solids, band diagrams of insulators, semiconductors and conductors, Fermi level in conductors and semiconductors, carrier concentration, conductivity, effective mass; Junction diode and its band diagram, depletion region and barrier potential, diode rectifier equation.

Unit-VI:

Nanophysics:

What is Nanotechnology? Fullerenes and nanoparticles; Outline of methods of preparation; Elements of electron microscopy; Scanning probe microscopy, Outline of properties – physical, thermal, optical, electrical, magnetic; Quantum size-effects; CNTs; Applications.

Text Books:

1. Fundamentals of Physics: D. Halliday, R. Resnik and J. Walker, John Wiley.
2. Engineering Physics: S. Jain and G.G. Sahasrabudhe, Universities Press (2010) / Applied Physics : S. Jain Sahastrabuddhe and S.M. Pande.
3. Introduction to Nanoscience and Nanotechnology: K.K. Chattopadhyay and A.N. Banerjee, PHI Learning (2009)

Reference Books:

1. Electronic Engineering Materials and Devices: J. Allison, TMH.
2. Engineering Physics: H. Malik and A.K. Singh, TMH (2010).
3. Engineering Physics: D.K. Bhattacharya and A.Bhaskaran, Oxford University Press (2010)

Syllabus of Group 1 - Semester I and Group 2 – Semester II, Bachelor of Engineering

Course Code: PHP101   **Course: Engineering Physics Laboratory**

L: 0 Hrs., T: 0 Hrs., P: 3 Hrs., Per week   **Total Credits: 03**

Course Outcomes :

1. Students should be able to perform tasks like leveling, alignment, reading vernier scales, do specific measurements, systematically record observations, do calculations from data collected and draw conclusions.
2. Students gain working familiarity with instruments like simple spectrometer, travelling microscope, lenses, prisms, ammeter, voltmeter, the CRO, power supplies etc.;
3. Students gain better understanding of concepts like interference, diffraction, polarization, energy band gap \in semiconductor etc.
4. Students gain a working knowledge of estimating errors in an experiment for which background theory is known;
5. Students should be able to subject data collected to statistical and error analysis.

A minimum of 8 experiments to be performed from the following list of experiments.

List of Experiments :

In addition to the demo experiments, the Lab turns will be utilized for performing the experiments based on the following list:

1. Study of diodes
2. Study of transistors
3. Study of thermistors
4. Study of phenomena of interference due to thin films.
5. Diffraction of light by slit(s), an edge, obstacles, etc.
6. Hall effect
7. Study of CRO
8. Graph plotting, curve fitting, visualization using Mathematica

Reference Books:

1. Physics Lab Manual written by the Teaching Faculty of Physics Department, RCOEM.

Syllabus of Group 1 - Semester I and Group 2 - Semester II, Bachelor of Engineering

Course Code : EET101   Course : Electrical Engineering

L:3 Hr., T:1 Hrs., P:0 Hrs., Per week   Total Credits : 07

Course Outcomes :

Upon completion of this course, the students shall be able to,

1. Apply the basic laws of electric and magnetic circuits to obtain the unknown quantities.
2. Represent and interpret the sinusoidal electrical quantities mathematically as well as graphically in the form of waveforms/phasors and analyze the 1-phase/3-phase AC circuits to determine the unknown quantities.
3. Determine the power losses/efficiency and voltage drop/voltage regulation of a 1-phase transformer at full load condition and demonstrate the knowledge related with its need, construction, principle, types and applications.
4. Describe the construction, principle, applications and performance characteristics of DC machines and Induction motors.
5. Demonstrate the concept of electrical power generation, transmission, distribution and the understanding about conventional/renewable energy sources.
6. Demonstrate the understanding about necessity of electrical earthing, safety & protecting devices, electrical energy utilization, illumination sources and their selection.

Unit-I:

DC Electric Circuits: Definition of EMF, Current, Power, Energy Resistance, Variation of resistance with physical parameters viz. length, area, specific resistivity and temperature. Ohm's law, resistances in series and parallel, current and voltage division rules, KVL & KCL, star delta transformation and related numerical. Measurement of DC electrical quantities.

Magnetic Circuit: Concept of MMF, Flux, reluctance, analogy with electric circuits, B-H curve, simple numerical on series magnetic circuits.

Unit-II:

AC Circuits: Generation of single phase and three phase alternating EMF. Average and RMS values for sinusoidal waveform. Phasor representation of sinusoidal electrical quantities, Steady state behavior of RLC circuits with sinusoidal excitation. Reactance, impedance, Power & Energy in AC Circuits. Simple numerical on series and parallel AC circuits. Concept & importance of power factor & its improvement (with simple numerical).

Simple analysis of balanced three phase AC circuits, Star-delta resistive networks. Measurement of AC electrical quantities.

Unit-III:

Introduction to Electrical Power System :

Introduction to Power Generation (Thermal, Hydro, Nuclear, Wind and Solar) with block schematic representation only. Single line diagram for Generation, Transmission & Distribution through different voltage levels; Low voltage radial distribution system (Over head & underground, single phase and three phase).

Necessity of equipment earthings, Fuses (Rewirable and HRC), MCB, ELCB.Basic operation of UPS and Inverters (Block schematic representation).

Unit-IV:

Single phase Transformer :

Principle of operation, Construction Transformer ratings, No load and On load operation with leakage reluctance, losses, efficiency, Definition & formula for voltage regulation, OC/ SC test, equivalent circuit referred to primary side of transformer.

Unit-V:

Rotating Electric Machines :

DC Machines: DC Generator-Principle of working, construction (without details of armature winding), classification of DC generators. DC Motors-Back EMF, necessity of starters, speed and torque equations, characteristics of motors, speed control of DC motors (without numerical), Application of DC motors.

Three Phase Induction Motors: Working principles, types and construction of three phase Induction Motor, synchronous speed, torque, slip, torque slip characteristics, applications of three phase Induction motor.

Single Phase Induction Motors: operating principle of capacitor start and run single phase induction motor and its applications.

Unit-VI:

Utilization of Electrical Energy :

Illumination: Definition of luminous flux, luminous intensity, Candle power, illumination, Luminance, Luminous efficiency (lumens/watt) of different types of lamps, working principle of Fluorescent/Sodium Vapour/ Mercury vapor & CFL Lamps. Simple numerical to determine number of lamps to attain a given average lux level in an area.

Electric Heating: Advantages of Electrically produced heat, types and applications of Electric heating equipment, transfer of heat (conduction, convection, radiation); Resistance ovens, Induction heating (Core & coreless type), Dielectric heating. (Note. Numerical excluded)

Tariff: One part (KWH based) tariff with simple numerical; to calculate the domestic electricity charges.

Text Books :

1. Elements of Electrical sciences: P. Mukhopadhyay, N. Chand & Bros Roorkee (1989).
2. Electrical Technology: B. L. Thareja, S. Chand Publications.
3. Basic Electrical Engineering: S. B. Bodkhe, N. M. Deshkar, P. P. H. Pvt. Ltd.

Reference Books :

1. Basic Electrical Engineering: T.K. Nagasarkar & M. S. Sukhija, Oxford Univ. Press.
2. Utilization of Electrical Energy: H. Pratab, Dhanpatrai & Sons.
3. Utilization of Electrical Energy: E. Openshaw Taylor, Orient Longman.
4. Websites: www.powermin.nic.in, www.mnes.nic.in, www.mahaurja.com.

Syllabus of Group 1 - Semester I and Group 2 - Semester II, Bachelor of Engineering

Course Code : EEP101	Course: Electrical Engineering Lab
L:0 Hr., T:0Hrs., P:2 Hrs., Per week	Total Credits : 02

Course Outcomes :

Upon completion of this course, the students shall be able to,

1. Connect the electric circuits based on the syllabus of theory subject EET101 and test the performance by way of observation, calculations and conclusion.

2. Demonstrate the concept and significance of power factor and how it can be improved.

3. Conduct an electrical energy survey of connected load at residential premises and demonstrate the understanding of energy tariff by calculating the energy bill in accordance with the norms of State Electricity Distribution Company.

List of Experiments :

1. To verify Kirchoff's voltage and current law using D.C. source.

2. To study the R-L-C series circuit with AC source

3. To study R-L-C parallel circuit with AC source

4. To perform direct load test on 1-phase transformer for finding regulation and efficiency

5. To perform open circuit and short circuit tests on 1-phase transformer

6. To study 3-phase star delta connections and verify different relations of voltage ,current and power

7. To study the speed control techniques for DC shunt motor

8. To study the importance of power factor and improvement of power factor using static capacitors.

9. To analyze energy bill of residential category and prepare energy sheet.

Syllabus of Group 1 - Semester I and Group 2 - Semester II, Bachelor of Engineering

Course Code: CST101	Course : Computer Programming
L: 2 Hrs. T: 0 Hrs. P: 0 Hrs. Per week	Total Credits: 4

Course Outcomes

On successful completion of the course, students will be able to

1. Understand basics of computer, software, number systems, flowchart and algorithms.

2. Design and code well-structured C programs.

3. Write program on the basis of decision control structures and loop control structures.

4. Perform sorting and various other operations on 1-D and 2-D array.

5. Perform operations on structures, functions and pointers.

Syllabus

Unit-I:

Computer Fundamentals: Basic Structure of a computer, Input/output devices and memories, types of computer. Introduction to DOS and Windows OS, Number Systems: Decimal, Binary, Octal, Hexadecimal and conversion from one to another. Algorithm – Conventions used in writing algorithm, Software Life Cycle, Program and Programming Languages Procedural, Object oriented, High level, Assembly, Machine Language. System Software - Translator, Compiler, Interpreter, Linker, Loader and Flowchart.

Unit-II:

C Programming Language: Keyword, Constant, Variable, Data types, Operators, Types of Statements, Preprocessor Directives, Decision Control Statement-if, if-else, Nested if-else statement, Switch case.

Unit-III:

Loop Control Structure: go to, while, for, do while, break, continue. Storage classes, Enumerated Data types, Renaming Data types with typedef(), Type Casting, Bitwise Operators.

Unit-IV:

Array: Introduction, array Declaration, Single and multidimensional array. Pointers: Introduction, Definition and use of pointer, Pointer arithmetic, pointer operators, pointer and array, pointer to pointer

Unit-V:

Structures and Union: Declaring and using structure, Structure initialization, Structure within structure, array of structure, pointer to structure.

Unit-VI:

Function Programming: Introduction, User Defined and Library Function, Parameter passing, Return value, Recursion, pointer and function

Text Books:

1. Mastering C: K. R. Venugopal and S. R. Prasad, Tata McGraw Hill

2. Programming in ANSI C,5th ed. : E. Balguruswami McGraw Hill

Reference Books:

1. Let Us C.9thed: Yashwant Kanetkar, BPB Publication

2. Programming with C: Byron Gottfried, Schaums Outline Series.

Syllabus of Group 1 - Semester I and Group 2 - Semester II, Bachelor of Engineering

Course Code: CSP 101	Course: Computer Programming Lab
L: 0 Hrs., T: 0 Hrs., P:2 Hrs. Per week	Total Credits: 2

Course Outcomes :

On successful completion of the course, students will be able to

1. Implement programs based on if-else, switch and loop structure.
2. Implement programs based on 1-D and 2-D numeric and character arrays.
3. Perform operation on structure and pointer.
4. Design programs based on functions.

CSP101 practicals based on above CST 101 syllabus

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Syllabus of Group 1- Semester I and Group 2-Semester II, Bachelor of Engineering

Course Code : HUT101	Course:-Communication Skills
L:2 Hrs.,T:0Hrs.,P:0Hrs.,Per week	Total Credits:4

Course Outcomes :

1. Students have better reading comprehension, pronunciation, and functional English grammar.
2. Students are able to write letters and resumes
3. Students are able to organize their thoughts for effective presentation and writing.
4. Students are able to learn skills to present themselves well in an interview, and handle a Group Discussion

Syllabus

Unit-I :

Communication:

What is Communication, the Media of Communication, Channels of Communication, Barriers to Effective Communication, Role of Communication Skills in Society.

Unit-II :

Reading Comprehension :

The Process of Reading, Reading Strategies Central idea, Tone and Intention, Comprehension Passages for practice.

Unit-III :

Professional Speaking:

Components of an effective talk, Idea of space and time in public speaking, Tone of voice, Body language, Timing and duration of speech, Audio-Visual Aids in speech. Presentation Skills, Group Discussion and Job Interviews

Unit IV :

Orientation to Literary and Scholarly Articles:

Preferably two fictional and two non-fictional texts (Selected by the teachers and the Head). The art of writing articles on social, cultural, scientific and technical issues (Paragraph Writing), Exercises.

Unit V :

Business Correspondence:

Types and Formats of Business letters, Routine Business Letters (Inquiry, Order, Instruction, Complaint, Adjustment), Sales Letters, Resumes and Job applications, Business Memos, Emails.

Unit VI:
Grammar:
Synonym and Antonym, Give one word for, Voice, Narration and Comparison of Adjectives and Adverbs, Transformation of sentences and Common Errors, Idioms and Phrases, Note Making, Précis writing.

Text Book :
1. M. Ashraf. Rizvi. Effective Technical Communication. Tata Mc Graw-Hill Publishing Company Limited.2009

Reference Books :
1. Sanjay Kumar and Pushp Lata. Communication Skills. Oxford Publication
2. Meenakshi Raman and Sangeeta Sharma. Technical Communication. Second Edition Oxford Publication.2011
3. Anne Nicholls. Mastering Public Speaking. Jaico Publishing House.2003
4. Dr Asudani .V. H An easy approach to English. Astha Publication Nagpur. 2009 , 3rd Edition.

Syllabus of Group 1- Semester I and Group 2-Semester II, Bachelor of Engineering

Course Code : HUP101   Course : Communication Skills Lab
L:0Hrs.,T:0Hrs.,P:2Hrs.,Per week   Total Credits:2

Course Outcomes
On successful completion of the course, students will be able to
1. Learn presentation skills
2. Understand effective strategies for Personal Interview and Group Discussions
3. Learn and apply effective language skills – listening, speaking, reading and writing

Sr. No	Name of the Practical	Activities Taken	Medium of Practical
1	Speaking Skills	1. Introduction to effective ways of speaking 2. Oral presentations Extempore / Debate / JAM/Self-introduction	PPT Based, Activity Based
2	Presentation Skills	1. Preparing visual aids/PPTs on given topics	PPT Based, Activity Based, Open Source CDs
3	Group Discussion-Orientation	1. GD types 2. GD techniques/rules - videos 3. General/familiar topics for discussion	Open Source CDs PPT based Activity based
4	Group Discussion-Practice session	1. Divide in group of 6 2. Classification of topics 3. Feedback	PPT Based, Activity Based
5	Group Discussion-Mock	1. Divide in group of 6 2. Mock GDs - types 3. Feedback	Activity Based
6	Interview Techniques-Orientation	1. Various types of interviews 2. Types of interviews 3. Self-analysis 4. KYC sheet 5. Self-introduction	Open Source CDs Activity Based
7	Interview Techniques Practice Sessions	1. Video 2. Non-verbal communication 3. Types of interview questions	Open Source CDs Activity Based
8	Interview Techniques-Mock Interviews Optional Practicals	1. Mock Interviews (One to One) Teacher can decide any other Practical apart from the ones mentioned below	Activity Based
9	Listening Skills	1. Listening Barriers	PPT Based, Activity Based
10	Non Verbal Communication	1. Kinesics in com/interviews 2. Activities/Role play	Open Source CDs PPT based
11	Use Figurative Language	1. Intro phrases/ Idioms/proverbs/ pronunciation	PPT Based, Activity Based

Syllabus of Group 1 - Semester I and Group 2 - Semester II, Bachelor of Engineering

Course Code :PEP101   **Course: Sports/Yoga**

L:0 Hr., T:0Hrs., P:2 Hrs., Per week   **Total Credits : 00**

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Course Outcomes

On successful completion of the course, students will be able to

1. Understand fundamental skills and basic rules of games.
2. Gain health related physical fitness.
3. Develop body-mind coordination through games and yogasans.

BRIEF OBJECTIVES OF SPORTS/YOGA PRACTICAL CLASSES

It has long been proven that a healthy body leads to a healthy mind. With a strong belief in this, Physical Education department at RCOEM will conduct sports/yoga classes with the objective of maintaining health, fitness and wellness of students as well as create awareness about need for good health and physical fitness. The objective would also be todevelop team spirit, social skills as well as identify and develop leadership qualities in students through various sports group activities. Training of students to understand the rules of various national and international games would also be an important objective. Sport activities would also be conducted with the objective to provide recreation to the students which is an important neutralizer for stress. Additionally, the objective would be to evaluate fitness of students so as to recommend and conduct specific Yoga and Sport activities.

PROGRAMME OUTLINE

1. Sports

1. Introduction to sports i.e. volleyball, cricket, football, basketball, badminton, T.T., Athletics.
2. Health and safety issues related to sports; Knowledge, recognition and ability to deal with injuries and illnesses associated with sports.
3. Awareness about sports skills, techniques and tactics.
4. Rules, regulations and scoring systems of different games (Indoor & Outdoor).
5. Trials of students to participate in inter-collegiate/University level games.

2. Yoga: Includes asanas like sitting, standing and lying, Surayanamaskar, Pranayam.

3. Physical fitness test : this would include speed, Cardiovascular Endurance, strength, skill & flexibility.

Syllabus of Group 1 - Semester II and Group 2 – Semester II, Bachelor of Engineering

Course Code: MAT102   **Course: Engineering Mathematics-II**

L: 4 Hrs., T: 1 Hrs., P: 0 Hrs., Per week   **Total Credits: 09**

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Course Objective

The objective of this course is to expose student to understand the basic importance of Integral Calculus and Vector calculus. The student will become familiar with fitting of curves and regression analysis.

Course Outcomes

On successful completion of the course, student shall be able to

1. Understand and use the concepts of Integral Calculus for Engineering problems.
2. Apply technique of Vector differentiation and integration to various Engineering problems.
3. Know basic statistical techniques required for Engineering.

Syllabus

Unit-I:

Integral Calculus I: Beta and Gamma functions, Differentiation of definite integrals, Mean value and root mean square values.

Unit-II:

Integral Calculus II: Tracing of curves (Cartesian, polar and parametric curves), rectification of simple curve, quadrature, volumes and surface of solids of revolutions(Cartesian, polar and parametric forms).Theorem of Pappus and Guldin.

Unit-III:

Multiple Integrals and their Applications: Elementary double integrals, change of variable (simple transformation), change of order of integration (Cartesian and polar), application to mass, area, volume and centre of gravity (Cartesian and polar forms), elementary triple integrals.

Unit-IV:

Vector Calculus I: Scalar point function, Vector point function, vector differentiation, gradient, divergence and curl, directional derivatives with their physical interpretations, solenoidal and irrotational motions, Scalar potential function.

Unit-V:

Vector Calculus II: Vector integration: Line integrals, work done, conservative fields, surface integrals and volume integrals, Stoke's theorem, Gauss divergence theorem, Green's theorem and their simple applications.

Unit VI:

Statistics: Fitting of straight line, $y = a + bx$, parabola $y = a + bx + cx2$ and the exponential curves by method of least squares, Coefficient of linear correlation, lines of regression, rank correlation, multiple regression and regression plane of the type $z = a + bx + cy$, coefficient determination.

Text Books:

1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, Delhi
2. A text book of Applied Mathematics Volume I & II, by P. N. Wartikar and J. N. Wartikar, Pune Vidhyarthi Griha Prakashan, Pune-411030 (India)
3. Advanced Engineering Mathematics, 2 ed, Jain, Iynger, Narosa publication.

Reference Books:

1. Advanced Engineering Mathematics by Erwin Kreyszig, 8th edition, Neekunj print process, Delhi.
2. Engineering Mathematics: Principal and Applications Srimanta, Paul, Oxford Univ Press,(2011).
3. Higher Engineering Mathematics: B.V. Ramana, TMH.

Syllabus of Group 1 - Semester I and Group 2 - Semester II, Bachelor of Engineering

Course No. CHT101   Course : Engineering Chemistry

L: 4 Hrs., T: 1 Hrs., P: 0 Hrs., Per week   Total Credits : 09

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Course Outcomes of Engineering Chemistry :

Upon successful completion of the course, the student shall be :

1. Able to understand the basic scientific principles underlying the troubles caused by impurities present in water and treatment to remove the same.
2. Understand the applications of different nanomaterials with their synthtic routes.
3. Able to characterize the fuels and analyze their combustion mechanism.
4. Able to understand the effect of constituents on quantity of cement manufactured with their setting and hardening reactions.
5. Able to understand principles of lubrication along with chemical properties of lubricants.
6. Knowledge of proper engineering materials having better corrosion resistance and sustainability and implement the effective measures to minimize the corrosion wherever possible.

Syllabus

Water Treatment :

Water Treatment for Industrial Applications: Brief introduction regarding sources, impurities in water, hardness of water and their types. Softening of water using lime-soda process: principles in hot and cold lime-soda process. Zeolite softener, demineralization by synthetic ion exchange resins. Boiler troubles: Carryover, Priming and Foaming, Scales and Sludges, Caustic Embrittlement, Boiler Corrosion-causes and effects on boiler operation and methods of prevention. External and Internal conditioning : Phosphate, Carbonate and Calgon conditioning.

Water Treatment for Domestic Water:

Domestic water treatment : Brief discussion and Chemistry involved in the process of sedimentation, coagulation, filtration and sterilization by UV, Ozone, Chlorination including Break point chlorination. Desalination of water using reverse osmosis and electro dialysis.

Numericals Based on Water Softening: Numericals based on (1) lime-soda (2) zeolite / ion-exchange water treatment processes.

Cement :

Process parameters involved in the manufacturing of portland cement, manufacture of portland cement, microscopic constituents of cement and their effects on strength; setting and hardening of cement.

Types and uses of cement : Pozzolonic; Rapid hardening, Low heat and High alumina cements. Additives and admixtures used in cement: Accelerators, Retarders, Air entrainment agents, Water repellants.

Chemical approach to Nanomaterials :

General introduction to nanotechnology, timeline and milestone, overview of different nanomaterials available, potential use of nanomaterials in electronics, sensors, medical applications, catalysis, environment and cosmetics.

Physical chemistry related to nanoparticles such as colloids and clusters: conductivity and enhanced catalytic activity compared to the same materials in the macroscopic state.

Synthesis of nanomaterials: ' Top-Down'- photolithography and 'Bottom-Up'- sol-gel method .

Carbon nanotubes: Single-walled and multi-walled carbon nanotubes, their structures, properties and applications.

Potential risks of nanomaterials- Health and environmental impact.

Fuels and combustion :

Introduction, Calorific value, Higher and Lower calorific value, flame temperature and flame intensity , determination of calorific value by Bomb calorimeter and Boy's calorimeter, numericals based on the determination of calorific value by Bomb and Boy's Calorimater.

Solid Fuels:

Types of coals, proximate and ultimate analysis of coal, its significance, Carbonization of Coal.

Liquid and Gaseous Fuels:

Liquid fuels: mining & fractional distillation of crude petroleum, use of gasoline in internal combustion engine, octane number, cetane number, flash point of combustible liquid fuel, knocking. Fisher-Tropsch's process for manufacture of synthetic gasoline, thermal and catalytic cracking: fixed bed and fluid bed catalytic cracking, aviation gasoline.

Gaseous fuels:

CNG and Significance of flue gas analysis by Orsat apparatus.

Numericals based on Combustion Calculations:

Numericals based on combustion calculations for solid fuels. Numericals based on combustion calculations for liquid and gaseous fuels.

Friction, Wear and Lubricants :

Introduction, lubrication mechanism : Hydrodynamic, Boundary and Extreme pressure lubrication. Classification of lubricants- Solid, Semisolid and Liquid lubricants, Blended oils using different additives viz.:-

Anti-oxidants, E. P. additive, corrosion inhibitor, viscosity index improver, etc. synthetic lubricants viz.:-Dibasic acid esters, Polyglycol ethers and Silicones, Lubricating Emulsions. Properties of Greases: Drop point and consistency test, Properties of liquid lubricants: Viscosity and Viscosity Index, Aniline point, Cloud & Pour point and Decomposition stability. Criteria for selection of lubricants under different conditions of load and speeds.

Corrosion :

Electrochemistry and Theories of Corrosion :

Introduction to corrosion, Cause and Consequences of corrosion, Measurement of corrosion rate, Galvanic series, Dry and Wet corrosion, Pilling-Bedworth rule, factors affecting the rate of corrosion. Types of corrosion and Preventive Methods; Different types of corrosion (Pitting, Stress, Intergranular and

Galvanic), protection against corrosion, design and selection of engineering materials, cathodic and anodic protection, Brief discussion about Protective Coatings: Metallic, Inorganic, Organic coatings, Corrosion inhibitors.

Text Books :

1. Text Book of Engineering Chemistry, S. S. Dara, S. Chand and Company Ltd., New Delhi.
2. Textbook of Engineering Chemistry, P. C. Jain and Monica Jain, Dhanpat Rai and Sons, New Delhi.
3. Text Book of Environmental Chemistry and Pollution Control, S. S. Dara; S. Chand and Company Ltd., New Delhi.
4. Textbook of Engineering Chemistry, S. N. Narkhede, R. T. Jadhav, A. B. Bhake, A. U. Zadgaonkar, Das Ganu Prakashan, Nagpur.
5. Applied Chemistry, A. V. Bharati and Walekar, Tech Max Publications, Pune.
6. Engineering Chemistry, Arty Dixit, Dr. Kirtiwardhan Dixit, Harivansh Prakashan, Chandrapur.

Reference Books :

1. Engineering Chemistry by Gyngell, McGraw Hill Publishing Company, New Delhi.
2. Engineering Chemistry (Vol I), Rajaram and Curiacose, Tata McGraw Hill Publishing Company, New Delhi.
3. Engineering Chemistry (Vol II), Rajaram and Curiacose, Tata McGraw Hill Publishing Company, New Delhi.
4. Engineering Chemistry, Saraswat and Thakur, Vikas Publication, New Delhi.
5. Engineering Chemistry, B. S. Sivasankar, Tata Mcgraw Hill Publishing Company, New Delhi.
6. Engineering Chemistry, O. G. Palan, Tata Mcgraw Hill Publishing Company, New Delhi.
7. Engineering Chemistry, R. Shivakumar, Tata Mcgraw Hill Publishing Company, New Delhi.
8. Chemistry of Cement, J. D. Lee, Mcgraw Hill Publishing Company, New Delhi.
9. Nanomaterials Chemistry, C. N. R. Rao, A. Muller, A. K. Cheetam, Wiley VCH verlag GmbH and Company, Weinheim.

Syllabus of Group 1 - Semester I and Group 2 - Semester II, Bachelor of Engineering

Course Code : CHP101 **Course: Engineering Chemistry Lab**
L:0 Hr., T:0Hrs., P:3 Hrs., Per week **Total Credits : 03**

Course Outcomes of Engineering Chemistry Lab

After successful completion of the course, the student will be able to

1. Be conversant with various chemical processes involved in qualitative as well as quantitative analysis of different materials, water pertaining to various impurities and to record the information in the scientific way.
2. Understand applicability of different physico-chemical properties of fluids such as viscosity and flash point for various industrial machineries.

Text Books :

1. Text Book on Experiments and Calculations in Engineering Chemistry: S. S. Dara; S. Chand and Company Ltd., New Delhi.
2. Practical Engineering Chemistry : S. N. Narkhede, R. T. Jadhav, A. B. Bhake, A.U. Zadgaonkar, Das Ganu Prakashan, Nagpur.

Reference Books :

1. Concise Laboratory Manual in Engineering Chemistry: R. Shivakumarand J. Prakasan, Tata McGraw Hill Publishing Company, New Delhi.

Syllabus of Group 1 - Semester II and Group 2 - Semester I, Bachelor of Engineering

Course Code: CET101   Course: Engineering Mechanics

L:3 Hr., T:1 Hrs., P:0 Hrs., Per week   Total Credits : 07

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Course Outcomes

After Completion of the course in Engineering Mechanics, the student should be able to

1.   Define and Describe various parameters related to static and dynamic behaviour of the rigid bodies.
2.   Understand and describe physical phenomenon with the help of various theories.
3.   Explain and analyse various physical phenomenon with the help of diagrams.
4.   Describe and analyse the engineering problems with the acquired knowledge of engineering mechanics

Syllabus

Unit-I:

Fundamental of Engineering Mechanics:

Fundamentals of Engineering Mechanics, axiom's of mechanics, resultant of concurrent force system. Moment of a force, couples, resultant of non-concurrent force system

Unit-II:

Equilibrium of Force System :

Equilibrium of concurrent force system, Equilibrium of non-concurrent force system Friction: Law's of friction, simple application, wedge friction, belt friction.

Unit-III:

3-D Force system & Analysis of trusses :

Moment of a force about a point and about an axis, resultant of spatial concurrent & Non concurrent force system, wrench, equilibrium of concurrent and non-concurrent force system. Analysis of simple trusses (Joint & Section Method)

Unit-IV:

Centroids and moment of inertia :

Centroids locating by first principle, centroid of composite areas, Second moment and product of inertia of plane areas. Moment of Inertia of composite areas. Transfer theorems for moment of Inertia and Product of Inertia.

Virtual work method

Virtual work principle, application of virtual work principle.

Unit-V

Kinematics & Kinetics of Particles :

Rectilinear motion of a particle with variable acceleration, Projectile motion, normal and tangential components of acceleration, kinetics of particle and several interconnected particles. D'Alembert's principle, problems on connected system of particles.

Unit-VI:

Collision of elastic bodies:

Principle of conservation of momentum, Impulse momentum equation, work energy equation, coefficient of restitution, impact of elastic bodies.

Text Books:

1.   Engineering Mechanics: F. L. Singer, Harper & Row Publications.
2.   Fundamentals of Engineering Mechanics : A.K. Sharma, Sai Publications.
3.   Engineering Mechanics :A.K.Tayal, Umesh Publications, New Delhi.
4.   Engineering Mechanics : P.B. Kulkarni, Professional Publishing House Pvt. Ltd.

Reference Books:

1.   Engineering Mechanics: Timoshenko & Young, Tata McGraw Hill Publications, New Delhi.
2.   Engineering Mechanics: Bear and Johnston, Tata McGraw Hill Publications, New Delhi.
3.   Engineering Mechanics: I. H. Shames, Phi Pvt. Ltd., India.

Syllabus of Group 1 - Semester II and Group 2 - Semester I, Bachelor of Engineering

Course Code : CEP101   Course : Engineering Mechanics Lab

L:0 Hr., T:0Hrs., P:2 Hrs., Per week   Total Credits : 02

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Course Outcome

After Completion of the course in Engineering Mechanics Lab; the student should be able to

1. Define and explain different terminologies of simple lifting machines.
2. Understand and perform practicals on equilibrium of concurrent and non-concurrent force systems.
3. Describe various terminologies related to friction and mass moment of inertia.
4. Explain graphical solutions of equilibrium conditions in engineering mechanics.
5. Analyse the experimental data collected based on practicals and discuss the results.

Minimum of Eight Practical will be performed based on the theory

List of Experiment

Experiments On "Simple Lifting Machines"

1. Law of machine for Differential Axle and Wheel
2. Law of machine for Single Purchase Crab
3. Law of machine for Double Purchse Crab

Experiments On "Equilibrium of force systems"

4. Jib Crane (Equilibrium of concurrent Forces)
5. Simple Beam (Equilibrium of Non-concurrent Forces)
6. Shear Leg Apparatus(Equilibrium of 3-D concurrent forces)

Experiments On "Friction & Inertia"

7. Inclined Plane (Coefficient of friction using Inclined Plane)
8. Belt Friction(Coefficient of friction using coil friction set-up)
9. Fly-Wheel (Mass moment of Inertia of fly-wheel)

Graphical Methods in Engineering Mechanics

10. Resultant of concurrent force systems
11. Resultant of Non-concurrent force system
12. Reactions for simply supported beams
13. Forces in members of simple Trusses
14. Moment of Inertia (Mohr's Circle)

Syllabus of Group 1- Semester II & Group 2- Semester I, Bachelor of Engineering

Course Code: MET101   Course : Engineering Drawing

L: 3 Hrs. T: 0 Hrs. P: 0 Hrs. Per week   Total Credits: 06

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Course Outcomes : The expected learning outcome is that, the students shall be able to :

1. Draw & interpret technical drawings.
2. Convert 2-D drawing to 3-D drawing & vice-versa.
3. Represent the various positions of planes & solids in different orientations.
4. Develop the solid surface for sheet metal working.

Syllabus (Only First Angle Method of Projection)

UNIT 1

Introduction: Lines, Lettering & Dimensioning, Preparation of Sheet Layout.

Scales - Plain Scale, Diagonal Scale, Vernier Scale.

Engineering Curves; Ellipse: Directrix Focus, Concentric Circles & Rectangle Method.

Parabola: Directrix Focus, Rectangle Method, Tangent Method.

Hyperbola: Directrix Focus & Asymptote Method.

UNIT 2

Theory of Projections - Concept of Projection, First & Third angle projection methods.

Orthographic Projections: Conversion of given 3 dimensional View to 2 dimensional representation.

UNIT 3

Projections of Lines: Oblique Lines, Traces, Applications of lines.

UNIT 4

Projections of Planes - Polygonal Lamina, Circular Lamina.

Projections of Solids- Cube, Prism, Pyramid, Tetrahedron, Cylinder, Cone.

UNIT 5

Sections of Solids & Development of Lateral Surfaces- Cube, Prism, Pyramid, Tetrahedron, Cylinder, Cone.

UNIT 6

Isometric Projections: Isometric Scale, Conversion of given 2 dimensional views to Isometric Projection/View.

Books:

1. Engineering Drawing by N.D. Bhatt, Charotar Publishing House Pvt. Ltd.
2. Engineering Drawing by D. A. Jolhe, Tata McGraw Hill Publications
3. Engineering Graphics by H. G. Phakatkar, Nirali Publication.
4. Engineering Graphics by A. R. Bapat, Allied Publishers

References:

1. Engineering Drawing by R.K. Dhawan, S. Chand Publications
2. Engineering Drawing by K.L. Narayana & P. Kannaiah, SciTech Publication.

Syllabus of Group 1- Semester II & Group 2- Semester I, Bachelor of Engineering

Course Code: MEP101   Course: Engineering Drawing Lab

L: 0 Hrs. T: 0 Hrs. P: 3 Hrs. Per week   Total Credits: 03

Course Outcome : The expected learning outcome is that, the students shall be able to:

1. Draw & interpret technical drawings.
2. Plan the sheet layout for the given drawing.
3. Convert 2-D drawing to 3-D drawing & vice-versa.
4. Represent the various positions of planes & solids in different orientations.
5. Develop the solid surface for sheet metal working.
6. Use & demonstrate drafting package.

List of Sheets: (50% of the sheets to be drawn in Auto CAD)

Sheet No.1: Engineering Scales & Curves

Sheet No.2: Orthographic Projections

Sheet No.3: Projection of Lines

Sheet No.4: Application of Lines

Sheet No.5: Projection of Planes

Sheet No.6: Projection of Solids

Sheet No.7: Section & Development of Solids

Sheet No.8: Isometric Projections

Books:

1. Engineering Drawing by N.D. Bhatt, Charotar Publishing House Pvt. Ltd.
2. Engineering Drawing by D. A. Jolhe, Tata McGraw Hill Publications
3. Engineering Graphics by H. G. Phakatkar, Nirali Publication.
4. Engineering Graphics by A. R. Bapat, Allied Publishers

References:

1. Engineering Drawing by R.K. Dhawan, S. Chand Publications
2. Engineering Drawing by K.L. Narayana & P. Kannaiah, SciTech Publication.
3. AutoCAD 14 for Engineering Drawing by P. Nageshwara Rao, Tata McGraw Hill Publications

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Syllabus of Group 1- Semester II and Group 2-Semester I, Bachelor of Engineering

Course Code: HUT102   Course:-Social Skills

L:2 Hrs.,T:0Hrs.,P:0Hrs.,Per week   Total Credits:4

Course Outcomes

On successful completion of the course, students will be able to

1. Learn the basic concepts of personnel management or manpower planning and the process of recruitment and selection that they will go through as engineers.
2. Learn leadership skills, industrial relations, work organizations, and impact of industry on society.
3. Learn about the political systems and institutions working in India, laws and legislations affecting industry and the application of political principles like democracy in industry.
4. Learn the importance and application of Economics in Engineering.
5. Learn about culture/civilization and develop cross cultural capacity.
6. Learn about Personal, Professional and social ethics.

Syllabus

Unit-I:

Industrial Sociology:-

- Meaning and scope of Industrial Sociology
- Work Organization and its types.
- Concept of Leadership: Meaning, changing roles and its types.
- Concept of Power and Authority: Meaning, Importance, sources and Delegation
- Industrial Culture in India: Effects of Industrialization and Urbanization on Indian Society.

Unit-II:

Industrial Psychology:-

- Meaning and scope of Industrial Psychology
- Recruitment, Selection and Training
- Industrial fatigue
- Motivation, Theories of motivation: Maslow's Need Priority Theory, Macgregor's X And Y Theory, McClelland's Needs Theory
- Dealing with Self: Stress, health, and coping; interpersonal relationships; gender roles; environmental adjustments.

Unit-III:

Political Orientation:-

- Indian Constitution, features and federal structure.
- Fundamental rights
- Directive principles of state policy
- Industrial Democracy.
- Role of Bureaucracy in Modern Democratic states.

Unit-IV:

Economics:-
- Development of Indian Economy
- Infrastructure in the Indian Economy: Energy, power, transport system, road transport system, Rail-Road co ordination, water transport, Civil aviation, communication system, urban infrastructure, science and technology, private investment in infrastructure.
- Role of Public and Private sector in Indian Economy.
- Challenges before Indian Economy in 21st Century.
  Poverty, Unemployment, Corruption, Regional Imbalance, Growth of educational sector.

Unit-V:

Culture and Civilization:-
- Concept of Culture and Civilization.
- Study of engineering skills with special reference to Egyptian and Indus Valley Civilization.
- Role of Engineers as agent of change with specific reference to change in Indian Society during 20th and 21st century.
- Multiculturalism: Meaning, scope and significance especially in Indian context.

Unit-VI:

Ethics and social responsibility:-
- Personal and professional ethics
- Corporate social responsibility
- Social capital, social audit.
- Role of entrepreneurship in nation building.
- Developing scientific and humanitarian outlook for the welfare of nation and society.

Text Books :
1. A new look into Social Sciences by Sheikh and Shabbir
2. RuddarDatt and K.P.M.Sundharam, (67th Revised edition-2013), Indian Economy, S .Chand and Company Ltd, New Delhi.
3. Edmund G. Seebauer and Robert L Barry (2010 reprint) Fundamental of Ethics for Scientists and Engineers, Oxford University Press.

Reference Books:
1. P.C. Tripathi and P.N. Reddy, Principles of Management, (4th edition, 2008), Tata MacGraw Hill Publishing Co. Ltd., New Delhi
2. Martand.T. Telsang, Industrial and Business Management, (2001), S.Chand and Co. Ltd. New Delhi
3. Dr. V.H. Asudani: An Easy Approach To Social Science, (3rd edition, 2008), Astha Publication, Nagpur
4. Tariq Modood, Multiculturalism (Themes for 21st Century Series)(1st Publication 2007), Polity Press, Cambridge, U.K. ISBN-13:97807456-3288-9.
5. Social & Human Skills by Dr. Vinod Asudani and Dr. Monika Seth.

Syllabus of Groups 1- Semester II and Group 2 – Semester I, Bachelor of Engineering

Course Code : INP102	**Course: Workshop**
L: 0 Hr., T: 0 Hrs., P : 02 Hrs., Per week	**Total Credits : 02**

Course Objectives :
To impart practical training (hands-on experience) regarding use and operations of various tools, equipment and machine with basic knowledge of manufacturing process and materials.

Course Outcomes :
1. Student will be able to read job drawing, identity and select proper material, tools, equipments and process / machines for manufacturing the required job.
2. Student will be able to use basic marking and measuring instruments to inspect the job for confirming desired dimensions and shape.
3. Student will be able to observe and follow precautions during operation.

List of Experiments :

SHOP	No. of Experiments /Jobs
Fitting Shop	1. Introduction of fitting tools, equipments, machines, material & processes.
	2. Manufacturing & fitting practice for various joints & assembly.
	3. Drilling, tapping & pipe threading operations.
Carpentry Shop	1. Introduction of carpentry tools, equipments, machines, material & processes.
	2. Manufacturing of carpentry joints.
	3. Turning practice on wood working lathe.
	4. Demonstration & practice on universal wood working machine.
Welding Shop	1. Introduction of welding tools, equipments, machines, material & processes.
	2. Fabrication of joints like lap, butt, corner, T etc.
	3. Fabrication of lap joint by spot welding process.
Smithy Shop	1. Introduction of smithy tools, equipments, machines, material & processes.
	2. Forging of combine circular/square/hexagonal cross section.

Text Books :
1. Elements of workshop technology vol -1 by Hajra Choudhari
2. Elements of workshop technology vol -1 by Raghuwanshi

Reference Book:
1. Manufacturing technology by P.C. Sharma
2. Workshop manual by Kannaiah Narayan

Semester III

Syllabus for Semester III, B.E. (Electronics Design Technology)

Course Code: MAT203   **Course : Engineering Mathematics-III**

L:3Hr., T:1 Hrs., P:0 Hrs., Per week   **Total Credits : 07**

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Course Objectives :

The objective of this course is to expose student to understand the basic concepts of Laplace transform, fourier series and Fourier Transforms. It also focuses on matrices, Partial Differential Equations and Function of a Complex Variable.

Course Outcomes :

On successful completion of the course, student shall be able to

1. Understand Laplace transforms, Fourier series, Transforms and Partial Differential equations to solve engineering problems.
2. Understand Matrices to solve system of equations.
3. Make use of complex variable to evaluate Contour Integrations.

Syllabus

Unit I :

Laplace Transforms: Laplace transforms and their properties, Application for Laplace Transform to solve ordinary differential equations including simultaneous Differential Equations. Solution of one dimensional Partial differential equations by Laplace Transform method.

Unit II :

Functions of a Complex Variable: Function of a complex variable, Analytic functions, Cauchy-Riemann conditions, Conjugate functions, singularities, Cauchy's integral theorem and integral formula, Taylor's and Laurent's theorem, Residue theorem, contour integration.

Unit III :

Fourier Series: Periodic Function and their Fourier series expansion, Fourier Series for even and odd function, Change of interval, half range expansions. Practical Harmonic Analysis.

Unit IV :

Fourier Transform: Definition, Fourier Integral Theorem, Fourier Sine and Cosine Integrals, Finite Fourier Sine and Cosine Transform.

Unit V :

Partial Differential equations : Partial differential equation of first order first degree i.e. Lagrange's form. Linear homogeneous PDE of nth order with constant coefficient, method of separation of variables, Applications of partial differential equations.

Unit VI :

Matrices: Rank of matrix, consistency of system of equations, Linear dependence, linear and orthogonal transformations. Characteristics equations, eigen values and eigen vectors. Reduction to diagonal form, Cayley Hamilton theorem, Sylvester's theorem, determination of largest eigen values and eigen vector by iteration method.

Text Book :

1. Higher Engineering Mathematics: B. S. Grewal, 43rd ed: Khanna Publishers, Delhi (India).
2. A text book of Applied Mathematics Volume I & II: P. N. Wartikar & J. N. Wartikar, 9th ed: Pune Vidhyarthi Griha Prakashan, Pune-411030 (India).

Reference Books :

1. Advanced Engineering Mathematics,8th ed: Erwin Kreyszig Neekunj print process, Delhi.
2. Schaum's Outline of Complex Variables, 2nd ed: Murray R Spiegel, Seymour Lipschutz, John J. Schiller, Dennis Spellman, TMH, New Delhi.
3. Advanced Engineering Mathematics, 2nd ed :Jain, Iyengar , Narosa publication.

    Advanced Engineering Mathematics: H K Dass, S. Chand Publications**.**

Syllabus for Semester III, B.E. (Electronics Design Technology)

Course Code: EET205

L: 3 Hrs, T: 1 Hr, P: 0 Hrs. Per week

Course : Network Theory

Total Credits : 07

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Course Objectives :

1. The course will prepare students to write the equilibrium equation and apply the matrix approach.
2. The course will prepare students to apply basic tools for converting physical circuits and networks into their mathematical models and develop the s-plane for them.
3. The course will prepare the students to understand all theorems and transformation tools.
4. The course will prepare students to analyze the circuits and networks with all sort of synthesized signals.

Course Outcomes :

1. To understand the equilibrium equation on mesh and nodal basis and apply the matrix approach for solution of electrical circuits with and without mutual coupling
2. To understand various network theorems and use them for getting exact solution of all type of balanced single and unbalanced three phase network
3. To understand how to analyze the initial and final conditions of a network circuit.
4. To understand s-domain of the circuit and study how to find out the time domain response using s-plane.
5. To understand application of two port network in network analysis and to find symmetry and reciprocity of a two port network and its network parameters.

Syllabus

Unit- I :

Nodal and mesh-basis equilibrium equation, matrix approach for complicated network containing voltage current sources and reactance's, source transformations, duality, Mesh basis equation for coupled circuits.

Unit- II :

Network Theorems : Superposition, Reciprocity, Thevenin's Norton's Maximum Power transfer, Compensation, Tellegen's theorem as applied to AC circuits.

Unit- III :

Three phase unbalanced circuit and power calculations, Duality, Behavior of series and parallel resonant circuit. Introduction to band pass, high pass, low pass and band reject filters.

Unit – IV :

Laplace transforms and properties, partial fractions, singularity functions, waveform synthesis, analysis of RC, RL, and RLC networks with and without initial conditions with Laplace transforms, Evaluation of initial conditions.

Unit -V :

Transient behavior, concept of complex frequency, Driving points and transfer functions, poles and zeros of Immitance function, their properties, sinusoidal response from pole-zero locations,convolution Theorem and integral solutions.

Unit -VI :

Two port Network Parameters and inter-connections, Symmetrical and reciprocal conditions, Problems on all parameters and control sources.

Text Book :

1. Network Analysis: M. E. Van Valkenburg, 3rd Edition, PHI Learning (2011).
2. Linear Network Theory : Kelkar, Pandit.

Reference Books :

1. Networks and Systems by D. Roy Choudhury, 2nd Edition, April 15, 2009 .
2. Network Analysis, Gk Mithal.
3. Modern Network Analysis: Reza and Seely, Tata McGraw Hill Publication.
4. Circuit Theory : Analysis and Synthesis, by Abhijit Chakrabarti, Dhanpat Rai Publications (2004) 6th Edition.

Syllabus for Semester III, B.E. (Electronics Design Technology)

Course Code: EDT201   **Course : Electronic Devices**

L: 4 Hrs, T: 1 Hr, P: 0 Hrs. Per week   **Total Credits : 09**

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Course Objectives :

The objective of this course is to provide students with

1. Understanding operating principles of electronic devices and their models.
2. Knowledge of semiconductor device physics of diodes, transistors (BJT&MOSFET).
3. Concepts of load line, biasing and stability, BJT/FET based amplifier configurations.
4. Performance analysis of BJT amplifier using low frequency small signal model.
5. Working principles of power semiconductor and optical devices with applications.

Course Outcomes :

Upon completion of this course, students will demonstrate the ability to:

1. Utilize electronic devices in electronic circuits.
2. Analyze the characteristics and biasing of diode, BJT, FET and MOSFET.
3. To understand low frequency BJT Parameters.
4. Understand fundamentals of Optical & Power devices.
5. Explore the role of electronic devices in real world applications.

Syllabus

Unit- I :

Diode Theory: P N Junction diode, Zener diode, Tunnel, Schottky diode – operation, characteristics and applications such as Rectifiers.

Unit -II :

Bipolar Junction Transistor: - Operation, characteristics, Ebers-Moll model, biasing, Load line concept, Bias stabilization, Stabilization Techniques.

Unit- III :

Low frequency analysis of BJT:- Hybrid model, Determination of h-parameters from characteristics, Analysis of BJT amplifier circuit using h-parameters, simplified Hybrid model, Miller's theorem.

Unit- IV :

Field effect Transistor: - JFET and MOSFET – Classification, construction, Operation, Characteristics, Biasing, CMOS inverter circuit.

Unit -V :

Power Electronic devices - SCR, DIAC, TRIAC & UJT

Unit -VI :

Optical Semiconductor devices – LED, Photo diode, photo transistor, recent trends/developments.

Text Books :

1. Integrated Electronics, 2nd Edition: Millman, Halkias,Parikh TMH ,2010

Reference Books :

1. Electronic devices and Circuit Theory, 10th edition: R. Boylestad, Pearson Education,2009
2. Foundation of Electronics Circuits and Devices, 4th Edition: Meade Thompson, 2003
3. Electronic Devices and Circuits, 5th Edition: David A. Bell, Oxford university press,2008
4. Power Electronics: P.C. Sen, 30th reprint Tata-McGraw Hill,2008
5. Optical semiconductor devices: Mitsuo Fukuda, 1st edition Wiley & Sons Publications, 1998

An Introduction to semiconductor Devices: Donald Nemen, 1st edition Tata-McGraw Hill Higher Education,2006

Syllabus for Semester III, B.E. (Electronics Design Technology)

Course Code: EDP201   Course: Electronic Devices lab

L: 0 Hrs, T: 0 Hr, P: 2 Hrs. Per week   Total Credits: 02

Course objectives :

The objective of this course is to provide students with

1. Familiarization of various electronic components and their specifications.
2. Understanding of Lab Equipments such as CRO, bread-board, Function Generator, Multi-meter etc.
3. Basic concepts of DC analysis of diodes and transistors.
4. Understanding of transistor bias configurations.

Course Outcomes :

Upon completion of this course, student shall demonstrate ability to:

1. Understand various electronic components and their specifications.
2. Use the Lab Equipments such as CRO, bread-board, Function Generator, Multi-meter etc.
3. Perform DC analysis of diodes and transistors.
4. Design and analyze common rectifier circuit such as half wave, full wave and bridge rectifiers and compute rectifier parameters with resistive load.
5. Analyze transistor bias configurations.
6. Apply knowledge gained in interpretation and design of various electronic circuits.

Syllabus for Semester III, B.E. (Electronics Design Technology)

Course Code: EDT202   Course: Digital Logic Design

L: 4 Hrs, T: 1 Hr, P: 0 Hrs. Per week   Total Credits: 09

Course Objectives :

The objective of this course is to provide students with

1. Concepts of Boolean algebra & logical data representation format.
2. Understanding of different digital logic design and optimization techniques.
3. Knowledge of logic families and their performance parameters.
4. Understanding of combinational, sequential, arithmetic circuits & their hierarchical implementation.
5. Introduction to finite state machine

Course Outcomes :

On completion of this course, the students shall be able to,

1. Perform mathematical operations with different number systems
2. Use logic/function minimization techniques for digital circuits.
3. Design and analyze combinational, sequential and arithmetic circuits.
4. To design a digital system, components or process to meet desired needs within realistic constraints.

Syllabus

Unit I :

Number Systems & Codes : Analog V/s Digital systems, Number Systems, Boolean algebra, Boolean identities, Digital Codes – Binary, Gray, Hex, ASCII, BCD, Self Complimentary, Conversion, D Morgan's laws, SOP, POS, representation of signed numbers.

Unit II :

Logic Families : Transistor as a switch, Logic families (TTL, ECL) and their characteristics - Fan-In,Fan-Out, Propagation Delay, Power dissipation, Noise Margin, Timing issues. Comparison of different logic Families.

Unit III :

Combinational Circuits : Basic and Universal, Implementation of Boolean expression using logic gates, Karnaugh Map, simplification using K-Maps, Decoders, Encoders, Multiplexers, Demultiplexers.

Unit IV :

Sequential Elements : Latches, Flip Flops – RS, D, JK, Master Slave JK, T flip flop, their excitation and truth tables, Conversion of one Flip Flop to another, Timing and Clocking issues: setup and hold time, Rise time, fall time, metastability, clock skew & jitter.

Unit V :

FSM Design : Introduction to finite state machine, synchronous/asynchronous counter, Shift Registers.

Unit VI :

Arithmetic Circuits : Adders and Subtractors, Comparators, Multipliers, Recent trends/developments.

Text Books :

1. Digital Logic and Computer Design: M. Morris Mano, PHI, 4th Edition.
2. Modern Digital Electronics: RP Jain, Tata McGraw Hill, 4th Edition, 2010.

Reference Books :

1. Introduction to Digital Systems, 2nd Edition 2003:James E. Palmer, David E. Perlman, Tata McGraw Hill Publishing company Ltd
2. Digital Integrated Electronics : H.Taub & D.Shilling, Mc Graw Hill Publication. 2004
3. Digital Electronics: Ryan,Tata Mc Graw Hill.
4. Fundamentals of digital circuits : A. Anand Kumar, Prentice-Hall of India, 2nd edition, 2010
5. Digital Electronic Principles, 3rd Edition : Malvino, PHI

Syllabus for Semester III, B.E. (Electronics Design Technology)

Course Code: EDP202   **Course: Digital Logic Design Lab**

L: 0 Hrs, T: 0 Hr, P: 2 Hrs. Per week   **Total Credits: 02**

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Digital Logic Design Laboratory :

Course objectives :

1. To use Digital / Universal Trainer kits for design and functional verification.
2. To design combinational and sequential digital circuits with different ICs.

Course Outcomes :

Student will be able to,

1. Use the different ICs and components to design logical Circuit.
2. Apply logic minimization techniques.
3. Acquire skills for designing mini projects using different ICs.

Syllabus for Semester III, B.E. (Electronics Design Technology)

Course Code: PHT201	Course: Electronic Engineering Material and IC Fabrication
L: 3 Hrs, T: 1 Hr, P: 0 Hrs. Per week	Total Credits: 07

Course Objectives

1. Understand electronic, magnetic and optical properties of materials and their physical origins;
2. Learn about materials and methods used in fabrication of electronic components;
3. Understand materials used in and working principles of some semiconductor opto-electronic devices;
4. Exposure to elements of IC fabrications techniques

Course Outcomes :

1. The student will understand concepts such as polarizability, susceptibility, dielectric constant, superconductivity, magnetic permeability magnetization and hysteresis as applicable to materials.
2. The student will have some understanding of why materials show electrical properties like conduction, Joule losses, magnetic properties like ferromagnetism, antiferromgnetism, ferrimagnetism and optical properties of emission and absorption.
3. The student will understand the behaviour of dielectric under external static and electric fields.
4. The student will understand the classification of magnetic materials and their importance in electric devices.
5. The student will know about processes used in fabrication of resistors, inductors, capacitors and relays.
6. The student will understand choice of materials for and working of LEDs, semiconductor LASERs, semiconductor heterostructures and solar cells.
7. The student will know about the different stages in IC fabrication and some details of processes used in each stage.

Syllabus

Unit – I :

Dielectrics in static fields: Polarisation, dielectric constant; Dielectric behavior of mono-atomic and polyatomic gases, liquids and solids, polar and non-polar dielectrics, Clausius-Mosotti equation; Elementary ideas of ferroelectric, piezoelectric and pyroelectric materials.

Unit – II :

Dielectics in alternating fields Dielectric properties of insulators in alternating fields: Complex dielectric constant, dipolar relaxation, dielectric loss, loss tangent, dielectric breakdown.

Unit – III :

Conductors and Super Conductors : Conductivity of pure metals and alloys; Ohm's law and the relaxation time of electrons, Relaxation time, collision time, and mean free path, Electron

scattering and the resistivity of metals, The heat developed in a current-carrying conductor, The thermal conductivity of metals, Super- conductivity.

Unit – IV :

Magnetic Materials: Origin of permanent magnetic moment, spin and orbital magnetic moment of electron; Dia, para, ferro, ferri, and anti-ferromagnetism, soft and hard magnetic materials, ferrites.

Unit –V :

Photonics: Double hetero-structures: General characteristics, materials used,discussion in the context of LED, LASER, solar cells; Solar Cells: Photovoltaic effect, Applications.

Unit –VI :

Passive components and elements of IC fabrication : Resistors: Carbon-composition resistors, insulated resistors, moulded resistors, film type resistors, alloy resistors, metallic oxide film resistors, wire-wound resistors, nonlinear resistors,variable resistors; Capacitors: Paper capacitors, impregnated paper capacitors metallized paper capacitors, ceramic dielectric capacitors, plastic dielectric capacitors, electrolytic capacitor,variable capacitors; Inductors: Air cored coils, ferrite core coils; Relays: Electromagnetic relays, Reed type, induction type, thermal type, general purpose relays, electronic relays. IC Fabrication: IC fabrication: Integrated circuits, IC elements, fabrication of epitaxial diffused ICs; Doping of semiconductor: Epitaxial doping, doping by diffusion, ion implantation; Etching: Wet chemical, Plasma Etching.

Text Books :

1. Electrical Engineering Materials, A.J. Dekker, Prentice Hall of India.
   Optoelectronics and Photonics [Principles and Practices]
2. S. O. Kasap, Pearson Edu., Prentice Hall 2013.
3. Semiconductor physics and devices, S.S. ISLAM, OXFORD University Press.

Reference Books :

1. Electrical Engineering Materials, C.S. Indulkar and S. Thruvengadam, S. Chand and Company.
2. Introduction to Semiconductor Materials and Devices, M. S. Tyagi, John Willey and Sons.
3. Principles of Electronic ceramics, L. L. Hench and J. K. West, John Wiley and Sons
4. Semiconductor devices: Basic Principles, Jasprit Singh, Wiley Student Edition.
5. Materials Science and Engineering, V. Raghavan, Prentice-Hall of India.

Syllabus for Semester III, B.E. (Electronics Design Technology)

Course Code: CSP211	Course : Object Oriented Data Structure
L: 0 Hrs, T: 0 Hr, P: 2 Hrs. Per week	Total Credits : 02

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Course Objective :

The objective of this course is to provide students

1. The understanding of concepts of data structures and their implementation.
2. The understanding of fundamentals of Object Oriented programming like defining classes, objects, invoking methods, etc.
3. The ability to apply Object Oriented Techniques to design programs and solve specified problems.
4. The Understanding to implement efficient programs by reusing the existing code using Inheritance.

Course Outcomes :

On completion of course, the student will be able to,

1. To perform operations on data structures like Stacks, Queues & Linked List.
2. To perform operation on Classes, Objects, Constructors & destructor.
3. To perform operations based on concepts like Function Overloading, Operator Overloading, Friend Function, Static Accessors.
4. To perform operations based on concepts like Inheritance, Overriding.

Syllabus

Practicals based on following topics in C language :

1. File handling
2. Linked List
3. Structures
4. Stacks and Queues

Practicals based on following topics in C + + language :

1. Simple programs in C + +
2. Friend and virtual functions (Inline functions)
3. Classes, Objects, Constructor and Destructor
4. Operator overloading
5. Inheritance
6. Polymorphism

Syllabus for Semester III, B.E. (Electronics Design Technology)

Course Code: CHT201	Course: Environmental Studies-I
L:2 Hr., T:0 Hrs., P:0 Hrs., Per week	Total Credits : 0

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Course Objective :

1. Main objective of the course is to make the students aware of environmental issues which often come across.
2. It is envisaged to provide the students' with basic scientific background which is needed to understand how the Earth works, how we, as human beings, fit into it, prerequisites to understand environmental issues.
3. To adopt multidisciplinary approach which encompasses chemical sciences, biological sciences, environmental engineering and sciences to protect the mother earth and environment.
4. Course is to develop concern for our own environment which will lead us to act at our own level to surmount over the environment problems we face.
5. One of the objectives of the course is to make the students aware about importance of natural resources, ecosystems, biodiversity and its conservation, environmental pollution, social issues and environment human population and environment.

Course Outcomes :

1. Students will get the wealth of information that will clearly clarify modern environmental concepts like equitable use of natural resources, more sustainable life styles etc.
2. Students will realize the need to change the way in which we view our own environment, using practical approach based on observation and self learning.
3. Students will be aware about the fact that there is a need to create a concern for our environment that will trigger pro-environmental action; including simple activities we can do in our daily life to protect it.
4. By studying environmental science, students may develop a breadth of the interdisciplinary and methodological knowledge in the environmental fields that enables them to facilitate the definition and solution of environmental problems.
5. At the end of the course, it is expected that students will be able to identify and analyze environmental problems as well as the risks associated with these problems and understand what it is to be a steward in the environment, studying how to live their lives in a more sustainable manner.

Syllabus

Unit – I :

Multidisciplinary Nature of Environmental Studies: Definition, scope and importance; Need for public awareness.

Unit – II :

Natural Resources Renewable and Non-renewable Resources: Natural resources and associated problems. (a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. (b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. (c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. (d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. (e) Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies. (f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources.Equitable use of resources for sustainable lifestyles.

Unit – III :

Ecosystems: Concept of an ecosystem; Structure and function of an ecosystem; Producers, consumers, and decomposers; Energy flow in the ecosystem; Ecological succession; Food chains, food webs and ecological pyramids.Introduction, types, characteristic features, structure and function of the following ecosystem (Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems i. e. ponds, streams, lakes, rivers, oceans, estuaries)

Unit – IV :

Biodiversity and its Conservation: Introduction : Definition: genetic, species and ecosystem diversity; Biogeographical classification of India; Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values; Biodiversity at global, National and local levels; India as a mega-diversity nation; Hot-sports of biodiversity; Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; Endangered and endemic species of India; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Text Books :

1. Environmental Chemistry and Pollution Control: N. W. Ingole, D. M. Dharmadhikari, S. S. Patil, Das GanuPrakashan, Nagpur. First Edition
2. Environmental Chemistry: K. Bhute, A. Dhamani, A. Lonkar, S. Bakare, Celebration Infomedia, India. First Edition

Reference Books :

1. Text Book of Environmental Chemistry and Pollution Control:S. S. Dara; S. Chand and Company Ltd., New Delhi. Thirteenth Edition
2. Environmental Studies-From Crisis to Cure, Second Edition:R. Rajagopalan, Oxford University Press, New Delhi.
3. Text Book of Environmental Studies:E. Bharucha, University Press (India) Private Ltd., Hyderabad, India. First Edition

Syllabus for Semester IV, B.E. (Electronics Design Technology)

Course Code: MAT243 **Course: Engineering Mathematics–IV**

L:3Hr., T:1 Hrs., P:0 Hrs., Per week **Total Credits : 07**

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Course Objectives :

The Objective of this course is to expose student to understand the basic concept of Numerical methods, Z-Transforms and special functions. It also focuses on probability theory and its applications in engineering.

Course Outcomes :

On successful completion of the course, student shall be able to

1. Understand numerical method to solve algebraic equations and differential equations. Make use of Z-transform to solve difference equations.
2. Prepare student to understand Probability Theory and use it for analysis of data.
3. Use special functions for solving differential equation by series solution method.

Syllabus

Unit I :

Numerical Methods: Error analysis, solution of algebraic and transcendental equations. False position method, Newton Raphson method and their convergence. Solution of system of linear equations, Gauss elimination method, Gauss Seidal method, Crout's method. Numerical solution of ordinary differential equation by Taylor's series method, Euler modified method, Runge Kutta method, Milne's Predictor Corrector method.

Unit II :

Z Transform : Formation and solution of difference equations, definition and properties of Z- Transform, its inversion, relation with Laplace transform and Fourier transform, application of z-transform to solve difference equations with constant coefficient.

Unit III :

Random Variable and Probability distribution: Random Variables: Discrete and continuous, Probability density function, probability distribution function for Discrete and continuous random variables, joint distributions.

Unit IV :

Mathematical expectations: Definitions of Mathematical expectations, functions of random variables, the variance and standard deviation, moment generating function, other measures of central tendency and dispersion, skewness and kurtosis.

Unit V :

Probability distribution: Bernoulli distribution, Poisson distribution, relation between binomial and Poisson distribution, Normal distribution, relation between binomial and normal distribution. The central limit theorem, exponential distribution.

Unit VI :

Special functions and series solution: Series solution of differential equations by Frobenius method, Bessel's functions, Legendre's polynomials, recurrence relations, Rodrigue's formula, generating function, orthogonal properties Bessel's and Legendre's functions.

Text Books :

1.   Higher Engineering Mathematics :B. S. Grewal., 43rd ed: Khanna Publishers, Delhi (India).
2.   Theory and Problems of probability and statistics : 2nd ed :J. R. Spiegal, Schaum series

Reference Books :

1.   Introductory method of numerical analysis, 4edition :S. S. Sastry, 4th ed:PHI, New Delhi
2.   Advanced Engineering Mathematics, 8th edition :Erwin Kreyszig,8th ed: Wiley India, Delhi.
3.   Advanced Engineering Mathematics, 2nd edition: Jain, Iyengar, Narosa publications

Syllabus for Semester IV, B.E. (Electronics Design Technology)

Course Code: EDT203   **Course: Electromagnetic Fields**

L: 4 Hrs, T: 1 Hr, P: 0 Hrs. Per week   **Total Credits: 09**

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Course Objectives :

The objective of this course is to provide students with

1.   Concepts and applications of vector calculus to three dimensional space.
2.   Understanding to solve the problems related to physical laws governing electromagnetic fields in different media.
3.   Basic understanding of Maxwell's equations and its application in static and time-varying fields.
4.   An insight to electromagnetic wave propagation phenomenon & its properties.

Course Outcomes :

Upon completion of this course, students will demonstrate the ability to:

1.   Identify, analyze and solve electrostatic and magneto static engineering problems by applying basic electromagnetic laws and mathematical concepts.
2.   Apply Maxwell's equations to problems involving static & time-varying fields.
3.   Determine various parameters of uniform plane waves in different Media
4.   Apply field theory concepts in Microwave engineering.

Syllabus

Unit I :

Vector Algebra & Co-ordinate Geometry: Scalars and Vectors, Vector Algebra, Cartesian, co-ordinate system, differential lengths, surfaces and volumes., Dot and cross product, Cylindrical and Spherical co-ordinate system, Irrotational and Solenoidal fields, Coulombs law.

Unit II :

Electric Fields: Electric field Intensity , Field due to different charge distributions, Electric Flux density, Gauss law & its applications, Divergence and its significance, Divergence theorem.

Unit III :

Energy and Potential: Energy expended in moving a point charge in an electric field, Potential and potential difference, Gradient and its physical significance, Dipole, Energy Density in the Electrostatic field, Poisson's & Laplace's equations, Uniqueness theorem.

Unit IV

Steady Magnetic Fields: Biot-Savert law, Amperes Circuital law, Curl and its physical significance, Stokes theorem, Magnetic flux and magnetic flux density, Scalar and Vector Magnetic potential.

Unit V

Time varying Magnetic Fields: Faradays law, Displacement current, Maxwell's equations for steady and time varying fields in point form and integral form, Retarded potentials, Maxwell's equations in phasor form

Unit VI

Uniform Plane Wave: Uniform plane wave, Wave equations, Propagation constant, attenuation constant, phase constant, Solution of wave equation in free space, Perfect dielectric, lossy dielectric, Poynting vector theorem & its proof, relation between E & H vectors, intrinsic impedance, frequency, wavelength, velocity, Skin Depth.

Text Books:

1. Engineering Electromagnetics: William Hyat, John Buck , Tata McGraw Hill. 5h edition.
2. Electromagnetic Waves & Radiating Systems, Second Edition: Advard C. Jordan, Keith G. Balman, , Prentice-Hall of India Pvt. Ltd. 2nd edition.

Reference Books :

1. Problems and Solutions in Electromagnetics: W. H. Hyat, J. A. Buck, Tata McGraw Hill Education Private Limited, New Delhi, 1st edition.
2. Theory and Problems of Electromagnetics: Joseph A. Edminister, Schaum's outline series in Engineering, McGraw Hill Book Company 2 edition (1994).
3. Principles of Electromagnetics: Matthew N. O. Sadiku, , Oxford University Press, 4th Edition.
4. Electromagnetic Fields (Theory and Problem): T.V.S. Arun Murthy, S. Chand & Company Ltd, 1st edition.

Syllabus for Semester IV, B.E. (Electronics Design Technology)

Course Code : EDT204	Course : Analog Circuits
L: 4 Hrs, T: 1 Hr, P: 0 Hrs. Per week	Total Credits : 09

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Course objectives :
The objective of this course is to provide students with
1. Fundamental concepts and application of operational amplifier.
2. Techniques to design electronic circuits/systems using discrete components & operational amplifier IC to meet the desired specifications.
3. Understanding theory and applications of Industrial timer IC 555, ADC/DAC and PLL IC 565.

Course Outcomes:
Upon the completion of this course, students will demonstrate the ability to:
1. Analyze differential amplifier for design and analysis of operational amplifier.
2. Evaluate performance parameters of operational amplifier and utilize operational amplifiers for basic linear and non linear applications.
3. Utilize operational amplifier to design electronic circuits/systems to meet desired specifications.
4. Use Industrial timer IC 555, ADC/DAC and PLL IC 565 IC and other linear ICs for designing electronic circuits / systems for desired application.

Syllabus
Unit I :
Differential amplifier, DC and AC analysis, Constant current Bias circuits, Level shifting techniques, cascaded differential amplifier stages,

Unit II :
Characteristics of an operational amplifiers, Open loop and closed loop Op-amp Configuration, Op-amp Parameters & their analysis.

Unit III :
Simple Op-amp Circuits: inverting, non-inverting amplifiers, summers, integrators and differentiators, log, antilog circuits. Differential amplifier configurations, instrumentation amplifiers. Current to voltage and voltage to current converter

Unit IV :
Precision rectifiers, sinusoidal oscillators: RC phase shift, Wein bridge, Quadrature oscillator, with frequency and amplitude stabilization, elementary idea of active filter, First /second order Low pass and High pass Butterworth filters, Band pass and Band reject filters.

Unit V :

Op-amp's non-Linear application : Clipper, clamper, comparator, zero crossing detector, Schmitt trigger circuits, Triangular wave generator, Monostable, astable multivibrator circuits using op-amps, sample/hold circuits, D/A converter: Binary weighted resistor type and R-2R ladder, A/D converter: The parallel comparator (Flash) type, Successive approximation converter.

Unit VI :

Timer IC LM-555 : Internal block schematic, astable, monostable configurations and its application, PLL IC 565: Operating principle lock range and capture range, PLL application:
frequency multiplier and FSK demodulator, Recent trends/developments.

Text Books :

1.   Linear Integrated Circuits: D. Roy Choudhary, Shail Jain, 4th Edition, New Age International.
2.   Operational Amplifiers Design & Applications: Tobey Graeme, Huelsman, 3rd Edition, McGraw hill

Reference Books :

1.   Design with Operational Amplifiers and Analog Integrated Circuits, 3rd Edition: Sergio Franco, TMH,
2.   Operational Amplifiers: G. B. Clayton,5th Edition, International Edition
3.   Operational Amplifiers and Linear Integrated Circuits, 4th Edition: Coughlin Driscoll, PHI Analog Filter
        Design: M. E. Van Valkenburg ,PHI.
4.   Operational Amplifier: Ramakant Gaikwad,2nd Edition, Prentice Hall
5.   Op-Amps and linear ICs: Fiore J. M, Thomson Delmar learning.2001.

Syllabus for Semester IV, B.E. (Electronics Design Technology)

Course Code: EDP204   **Course: Analog Circuits Lab**

L: 0 Hrs, T: 0 Hr, P: 2 Hrs. Per week   **Total Credits: 02**

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Analog Circuits Laboratory :

Course objectives :

1. To identify and use different electronic components to design OPAMP based circuits.
2. To use OPAMP and Timer IC 555 for designing electronic circuits.
3. To assemble, test, analyze and troubleshoot electronic circuits using various analog ICs.
4. To impart skills required to use EDA tools for electronic circuit design.

Course Outcomes :

Student will be able to:

1. Design practical electronic circuits using OPAMP, Timer IC 555 and other Linear ICs
2. Interpret data manual and select different analog ICs to design, assemble and test electronic circuits for various applications.
3. Use EDA tool in the design and analysis of eletronic circuits.
4. Communicate effectively and work as team member through Lab performance and minor projects.

Syllabus for Semester IV, B.E. (Electronics Design Technology)

Course Code: EDT205   Course : Electronic Circuits

L: 3 Hrs, T: 1 Hr, P: 0 Hrs. Per week   Total Credits : 07

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Course Objectives :

The objective of this course is to provide students with

1. Understanding fundamental concepts of Amplifier & its Mathematical analysis.
2. Techniques for analyzing variety of circuits like regulators, amplifiers, sinusoidal and non-sinusoidal oscillators.
3. Comprehensive understanding of Power amplifier classification and its performance analysis.
4. Knowledge of feedback concepts and its application in amplifier and oscillators.
5. Understanding of design aspects of voltage regulator circuits.

Course Outcomes :

Upon completion of this course, students will demonstrate the ability to:

1. Understand and evaluation the performance parameters of regulator, amplifier and oscillators.
2. Apply feedback techniques in amplifier, oscillator and voltage regulators.
3. Design basic voltage regulator circuits using transistors and its analysis.
4. Use electronic devices in design of electronic circuits.

Syllabus

Unit I :

Amplifiers : Classification of amplifiers, distortions in amplifiers, RC coupled amplifier, Low frequency response of RC coupled stage, effect of emitter (or source) bypass capacitor on low frequency response.

Unit II :

Large-signal Amplifiers : Class A large signal amplifiers and derivation of efficiency, second harmonic distortion, Higher order harmonic generation and calculation of power output, The transformer coupled audio power amplifier, impedance matching and derivation of its efficiency, Class B amplifiers, push-pull amplifiers, power considerations, Class AB operation

Unit III:

Feedback in amplifiers : Classification of Feedback amplifiers, the feedback concept, Nyquist Criterion, general characteristics of negative feedback amplifier, effect of feedback on output & input resistances, effect of feedback on bandwidth and gain, feedback and stability, Gain and Phase Margins,

Unit IV :

Oscillators : Barkhausen Criterion, classification, LC Oscillators – Hartley and Colpitts, derivation of frequency, RC Oscillators – RC phase shift and Wein bridge oscillators, derivation of frequency, Crystal oscillator, frequency stability

Unit V :

Wave shaping circuits : Introduction, types of wave shaping circuits – high pass RC circuit, low pass RC circuit, Multivibrators – Astable, monostable and bi-stable, Schmitt trigger.

Unit VI :

Regulated Power Supply : Fundamentals of regulated power supply, stabilization, Design of - Zener shunt regulator, emitter follower regulators, series voltage regulator with Darlington pair. Design factors to consider – output peak to peak ripple, over voltage and over load protection.

Text Books :

1. Integrated Electronics, 2nd Edition: Millman, Halkias,Parikh Tata-McGraw Hill, 2010
2. Microelectronic Circuits: Theory and Applications, Adel S. Sedra, Kenneth C. Smith, Arun N. Chandorkar, 5th edition Oxford University Press, 2010
3. Pulse digital and switching waveform, Millman and H.Taub , 3rd edition, Tata-McGraw Hill

Reference Books :

1. Electronic Devices and Circuit Theory, 10th   Edition: R. Boylestad, Pearson Education, 2009
2. Foundation of Electronics Circuits and Devices, 4th Edition: Meade, Thompson (Delmar Learning), 2003
3. Electronic Devices and Circuits, 5th Edition: David A. Bell, Oxford University press, 2008
4. Microelectronics: Circuit Analysis and Design: Donald Nemen, 4th edition Tata-McGraw Hill publication, 2010

Syllabus for Semester IV, B.E. (Electronics Design Technology)

Course Code: EDP205 **Course : Electronic Circuits**

L: 0 Hrs, T: 0 Hr, P: 2 Hrs. Per week **Total Credits : 02**

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Course objectives :

The objective of this course is to provide students with

1. Understanding frequency response of amplifiers and computation of bandwidth.
2. Understanding of oscillator fundamentals and determination of its frequency.
3. Design of voltage regulator circuits using diodes and transistors.
4. Design and simulation of various electronic circuits.

Course Outcomes :

Upon completion of this course, student shall demonstrate ability to:

1. Analyse performance of amplifiers and oscillators using equipment set-up like Power Supply, Signal generators, Oscilloscope.
2. Design of basic voltage regulator circuits using diodes and transistors and its analysis.
3. Simulate a few of the circuit applications using appropriate Circuit Simulation package.

Syllabus for Semester IV, B.E. (Electronics Design Technology)

Course Code: EDT206 **Course : Electronic Measurement & Instrumentation**

L: 3 Hrs, T: 1 Hr, P: 0 Hrs. Per week **Total Credits: 07**

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Course Objectives:

The objective of this course is to provide students with understanding of

1. Necessary foundation of electronic measurement techniques and its use for voltage, current, power, energy, frequency & time measurement.
2. Working principal and use of moving coil instruments for measurements of voltage, current, power, energy etc.
3. Understanding application of bridges in resistance, capacitance and Inductance measurement and their use in real life industrial applications.
4. Knowledge of working principle of various instruments like CRO, DSO, LCR, and Spectrum Analyzer for testing and measurement.

Course Outcomes:

Upon completion of this course, students will demonstrate the ability to:

1. Select and use precise/accurate instrument for measurement of various electrical parameters.
2. Understand the technical specifications associated with different electrical/electronic equipments and their application areas.
3. Identify and minimize errors in electrical/electronic measurement.
4. Select suitable transducer for measurement of physical parameters.
5. Interpret the data using statistical analysis.
6. Understand Modern trends in data acquisition systems.

Unit – I :

Indicating Instruments : purpose of instrumentation, Basic elements of instrumentation, Statistical analysis and measurement of errors, Static and dynamic characteristics methods of producing deflecting, controlling and damping torques. Principle and operation of ammeters, voltmeters and wattmeters, moving iron and moving coil, dynamometer. Extension of instrument range.

Unit – II :

Detectors : PMMC galvanometer, dc & ac voltmeter, ammeter, multimeter, watt-hour meter, three phase wattmeter, power factor meter, instrument transformers. Measurement of low, medium and high resistance. Sensors - pressure, temperature, light. Transducer – thermocouple, RTD(resistance temperature detector).

Unit – III :

Bridges : General Balance Equation; Circuit diagram; Phasor diagram and Advantages as well as Disadvantages and Applications of Wheat stone, Kelvin, Max-well, Hay, Schering, Weinbridge Potentiometers, Measurement of Inductance, capacitance using AC bridges like Anderson, Ownens; De-Sauty's. Shielding and earthing.

Unit – IV :

Analog/Digital Meters : signal conditioning measurement meters, AC voltmeter using rectifiers, True RMS voltmeter, Electronic multimeter, Digital voltmeter, Q-meter, RF power and voltage measurements. Measurement of Energy- A.C. single phase and poly-phase induction type energy meters.

Unit – V :

Oscilloscope : Digital storage oscilloscope – 2 and 4 channel, delay line, multiple trace, Triggering, delayed sweep.

Unit – VI :

Frequency and Power Measurement : Frequency, and Time measurement, signal analysis. frequency counters – measurement of frequency and time interval – extension of frequency range. Function generators – RF signal generators – Sweep generators – Frequency synthesizer –wave analyzer – Harmonic distortion analyzer – spectrum analyzer, Recent trends/developments.

Text Book :

1. Electrical Measurement: A.K.Sawhney, Dhanpat Rai & Sons Publication, 11th Edition

2. Electronic Measurement Systems, 2nd revised edition, 2009: U. A. Bakshi, A. V. Bakshi, K. A. Bakshi, Technical Publications Pune.

Reference Books :

1. Electronic Instrumentation & Measurement Technique: W.D. Cooper & A.D.

    Helfrick., 3rd Edition

Syllabus for Semester IV, B.E. (Electronics Design Technology)

Course Code: EDP206	**Course : Electronic Measurement & Instrumentation**
L: 0 Hrs, T: 0 Hr, P: 2 Hrs. Per week	**Total Credits : 02**

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Electronic Measurement and Instrumentation Laboratory:

Course Objective :

The objective of this course is to

1. Introduce to students the theory and applications of measurement and instrumentation systems for electrical & electronics engineering

2. Prepare students to know the characteristics of different instrumentation systems

3. Provide students a brief look on electrical, electronic measurement and their application, terms and error calculation

4. Learn the basic operations of DC and AC meters

5. Get students familiar with oscilloscope operations & signal generators

6. Learn the basic operations of power meters

Course Outcomes :

At the end of this course, students will be able to:

1. Explain basic concepts and definitions in measurement.

2. Perform the operation on electronic instruments for parameter measurement

3. Explain the operation of oscilloscopes and the basic circuit blocks in the design of an oscilloscope.

4. Explain the techniques used in signal analysis

Syllabus for Semester IV, B.E. (Electronics Design Technology)

Course Code : CHT202   Course : Environmental Studies-II

L:2 Hr., T:0 Hrs., P:0 Hrs., Per week   Total Credits : 0

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Course Objective :

1. Main objective of the course is to make the students aware of environmental issues which often come across.

2. It is envisaged to provide the students' with basic scientific background which is needed to understand how the Earth works, how we, as human beings, fit into it, prerequisites to understand environmental issues.

3. To adopt multidisciplinary approach which encompasses chemical sciences, biological sciences, environmental engineering and sciences to protect the mother earth and environment.

4. Course is to develop concern for our own environment which will lead us to act at our own level to surmount over the environment problems we face.

5. One of the objectives of the course is to make the students aware about importance of natural resources, ecosystems, biodiversity and its conservation, environmental pollution, social issues and environment human population and environment.

Course Outcomes :

1. Students will get the wealth of information that will clearly clarify modern environmental concepts like equitable use of natural resources, more sustainable life styles etc.

2. Students will realize the need to change the way in which we view our own environment, using practical approach based on observation and self learning.

3. Students will be aware about the fact that there is a need to create a concern for our environment that will trigger pro-environmental action; including simple activities we can do in our daily life to protect it.

4. By studying environmental science, students may develop a breadth of the interdisciplinary and methodological knowledge in the environmental fields that enables them to facilitate the definition and solution of environmental problems.

5. At the end of the course, it is expected that students will be able to identify and analyze environmental problems as well as the risks associated with these problems and understand what it is to be a steward in the environment, studying how to live their lives in a more sustainable manner.

Syllabus

Unit – I :

Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, and Nuclear hazards. Solid waste Management : Causes, effects and control measures of urban and industrial wastes; Role of an individual in prevention of pollution, Pollution case studies; Diaster management: floods, earthquake, cyclone and landslides.

Unit – II :

Social Issues and the Environment : From Unsustainable to Sustainable development; Urban problems related to energy; Water conservation, rain water harvesting, watershed management; Resettlement and rehabilitation of people; its problems and concerns, Case Studies; Environmental ethics: Issues and possible solutions; Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Case Studies; Wasteland reclamation; Consumerism and waste products; Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement ofenvironmental legislation; Public awareness.

Unit – III :

Human Population and the Environment : Population growth, variation among nations, Population explosion – Family Welfare Programme; Environment and human health; Human Rights; Value Education; HIV/AIDS; Women and Child Welfare; Role of Information Technology in Environment and human health, Case Studies.

Field work

Visit to a local area to document environmental assetsriver/forest/grassland/hill/mountain; Visit to a local polluted site-Urban/Rural/Industrial/Agricultural; Study of common plants, insects, birds; Study of simple ecosystems-pond, river, hill slopes, etc.

Text Books :

1. Environmental Chemistry and Pollution Control: N. W. Ingole, D. M. Dharmadhikari, S. S. Patil, Das GanuPrakashan, Nagpur. First Edition

2. Environmental Chemistry: K. Bhute, A. Dhamani, A. Lonkar, S. Bakare, Celebration Infomedia, India. First Edition

Reference Books :

1. Text Book of Environmental Chemistry and Pollution Control:S. S. Dara; S. Chand and Company Ltd., New Delhi. Thirteenth Edition

2. Environmental Studies-From Crisis to Cure, Second Edition:R. Rajagopalan, Oxford University Press, New Delhi.

3. Text Book of Environmental Studies : E. Bharucha, University Press (India) Private Ltd., Hyderabad, India. First Edition

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Syllabus of V Semester B.E. (Electronics Design Technology)

Course Code: HUT301	**Course : Principles of Economics And Management**
L: 3 Hrs, T: 1 Hr. P = 0 Per week	**Total Credits: 07**

Course Objectives :

1. To orient the student in basic and relevant principles of economics and management.

Course Outcome:

1. Students will understand the basic concepts of economics.
2. Students will develop the understanding of micro economics with reference to various laws.
3. Students will develop the understanding of operation of economy.
4. Students will be familiar with basic principles of management
5. Students will be familiar with concept of Human Resource.
6. Students will be familiar with Finance.

Syllabus

Unit-I :

Introduction to Economics

Meaning and scope, Basic Ecomomics concepts: Goods, Utility, Value, Wealth, Income, Saving, Investment, Eqilibrium, Static, Dynamics , Types of Business Organizations: Individual, Partnership, Joint-stock, Cooperative Enterprise, public Enterprises.

Unit-II :

Micro-Economics

Law of Diminishing Marginal Utility, Concept of Demand, Law of Demand, Elasticity of Demand, Concept of Supply, Law of Supply, Elasticity of Supply, Indifference curve, Types of Market(Perfect and Imperfect Competition)

Unit-III :

Macro-Economics

Concepts of Inflation and Deflation, Business cycles, Functions of Central Bank and Commercial banks, Monetary and Fiscal Policies, Direct and indirect taxes, Evolution of IndianEconomy: Mixed Economy and LPG

Unit-IV:

Introduction to Management

Definition, nature and scope of Management, Functions of Management – Planning, Organizing, Directing and Controlling.

Unit-V :

Human Resource Management

Human resource planning, Analyzing work and designing Job, Incentives and Performance Based Payments, Job safety, and health, Work Stress

Unit-VI :

Financial Management

Meaning, nature and scope of financial management, Profit and loss account, Balance sheet,

Budgets, Ratio analysis, Depreciation and its methods.

Text Books :

1. K.K. Dewett; Modern Economic Theory ; , (43rd edition); S. Chand and Co. Ltd. New Delhi.
2. P.C. Tripathi, P. N. Reddy ; Principles of Management; Tata MacGraw Hill Publishing Co. Ltd. New Delhi.
3. K Aswathappa; Human Resource Management: Tata McGraw-Hill Publishing Company Ltd., New Delhi.
4. Financial Management: Ravi M. Kishore, Taxman Allied Services(P)Ltd., New Delhi.

Reference Books :

1. K.K. Dewett and J.D. Verma; Elementary Economic Theory ;(28th edition)   S. Chand and Co. Ltd; New Delhi.
2. Rudradutt, K. P. M. Sundaram; Indian Economy (45th revisededition); S. Chand and Co. Ltd. New Delhi.
3. Martand.T. Telsang; Industrial and Business Management ; S.Chand and Co. Ltd. New Delhi.
4. T. Ramasamy; Principles of Management; Himalaya Publishing House,(10th edition) Mumbai.

Syllabus of V Semester B.E. (Electronics Design Technology)

Course Code: EDT 301   **Course: Digital Systems Design With HDL**

L: 3Hrs, T: 1 P:0 Hr. Per week   **Total Credits: 07**

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Course Objective:

The objective of this course is to provide students with

1. Introduction to digital system design flow and approaches.
2. Need and language basics of Hardware description language.
3. Design of combinational and sequential circuits using VHDL.
4. Ability to develop test bench for digital designs.
5. Architectural understanding of Programmable Logic Devices like FPGA and CPLD.
6. Timing, synthesis issues and constraints for digital system design.

Course Outcomes :

Upon completion of this course, students will demonstrate the ability to:

1. Design a digital system, components or process to meet desired needs within realistic   constraints.
2. Effectively code and testing of   digital systems .
3. Understand digital system design flow , timing, synthesis and FPGA implementation issues.
4. Solve engineering problems in the area of digital system design

Syllabus

Unit-I :

Introduction to VHDL, design units, data objects, signal drivers, inertial and transport delays, delta delay, VHDL data types, concurrent and sequential statements.

Unit-II :

Subprograms - functions, procedures, attributes, generic, generate, package, IEEE standard logic library, file I/O, test bench, component declaration, instantiation, configuration.

Unit-III :

Combinational logic circuit design and VHDL implementation of following circuits – fast adder, subtractor, decoder, encoder, multiplexer, ALU, barrel shifter, 4X4 key board encoder and multiplier.

Unit-IV :

Synchronous sequential circuits design – flip flops, counters, registers, finite state machines, Mealy and Moore, FSM design and its VHDL implementation, linear feedback shift register.

Unit-V :

Design issues race, hazards, metastability, clock skew and timing considerations, synchronizers. Introduction to synthesis , synthesis constraint , stages of synthesis, technology mapping. Static timing analysis.

Unit-VI :

Introduction to place & route process, introduction to ROM, PLA, PAL, Architecture of CPLD and FPGA (Xilinx /Altera).

Text Books :

1. VHDL Primer ; J Bhasker ; Pretice Hall learning, 3rd Edition
2. VHDL-A Design Oriented Approach; S. S. Limaye; McGraw-Hill Education (India)
3. Fundamentals of Digital Logic with VHDL design ; Stephen Brown, Zvonko Vranesic ;TMH 4th Edition.

Reference Books :

1. Digital System Design Using VHDL ; Charles H. Roth; Thomson, 2nd edition, PWS publishing.
2. VHDL Synthesis Primer; J Bhasker; Prentice Hall,2nd edition.
3. VHDL: Analysis & modeling of digital systems by Zainalabedin Navabi; McGraw Hill Professional, 1st edition.

Syllabus of V Semester B.E. (Electronics Design Technology)

Course Code: EDP 301 **Course: Digital Systems Design With Hdl Lab**

L: 0 Hrs, T: 0 Hr., P: 2 Hr. Per week **Total Credits: 02**

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Digital System Design with HDL Laboratory:

Course Objectives :

1. To understand different modeling styles in VHDL.
2. To understand combinational / sequential building blocks in VHDL.
3. To design and analyze finite state machines.
4. To gain and understanding of Electronic Design Automation (EDA) tools for digital system design
5. Understand internal architecture of PLDs like CPLDs & FPGAs.

Course Outcomes :

Student will be able to :

1. Design and simulate combinational and sequential building blocks and their hierarchical implementation.
2. Design finite state machine and implement it manually or with VHDL
3. Use EDA tool to implement digital/embedded systems on FPGA boards
4. Understand internal architecture of various CPLDs and FPGAs and impact on design performance
5. Debug VHDL design, document and efficiently communicate in lab report.
6. Design digital system as an individual or in group to meet specific need using modern design techniques.

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Syllabus of V Semester B.E. (Electronics Design Technology)

Course Code: EDT 302 **Course : Statistical Signal Analysis**

L: 3 Hrs, T: 1 Hr., P: 0 Hr. Per week **Total Credits : 07**

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Course Objectives :

The objective of this course is to provide students with

1. Understanding of the fundamentals of signals and systems and representation in time and frequency domain.
2. Establishing theoretical foundations for probabilistic and statistical processes related to information theory.
3. In-depth knowledge of signal analysis techniques in analog and digital communication systems.
4. Concept of sampling and its importance in signal transmission and reconstruction.

Course Outcomes :

Upon the completion of this course, students will demonstrate the ability to:

1. Skillfully use concepts mathematics for the analysis of signals and systems in time domain.
2. Understand and appreciate the importance of Fourier transform techniques for frequency domain analysis of signals.
3. Analyze the process of signal sampling and reconstruction & its application in communication engineering.
4. Apply statistical and probabilistic techniques for signal processing.
5. Build necessary foundation for Digital Signal Processing, Digital Communication, and Image Processing.

Unit I :

Elementary continuous & discrete time signal, basic operations on signals, classification of signals, signals and vectors, vector space, orthogonality in signals, system classification.

Unit II :

Time domain analysis of CT/DT system, convolution and their properties, causality, correlation, impulse response of interconnected systems.

Unit III :

Fourier series analysis of CT periodic signals, properties, Fourier spectrum, Gibb's phenomenon, Continuous Time Fourier transform, properties, FT of periodic signals, application to signal modulation and demodulation, system analysis with FT.

Unit IV :

Fourier analysis of Discrete Time signals, properties, frequency response of Discrete Time systems, Discrete Fourier Transform(DFT), properties of DFT.

Unit V :

Sampling, Nyquist Criteria of sampling, analog to digital conversion, sampling types, sampling theorem, anti aliasing filter, signal reconstruction, signal transmission though linear system, distortion less transmission through a system, linear phase system, ideal filter, signal and system bandwidth, relationship between bandwidth and rise time.

Unit VI :

Probability, permutations and combinations, probability density function, mean, moments, properties of expectation and variance, Binomial, Poisson's Uniform, Gaussian and Rayleigh Distribution, Random variables, random process, power spectral density, cross spectral density, white noise, LTI system with random input signals.

Text Books :

1. Signals and Systems; Simon Haykin, Barry van Veen; John Wiley and Sons. 2nd edition, 2002
2. Modern Digital and Analog Communication Systems; B. P. Lathi; Oxford University Press.4th edition 2009

Reference Books :

1. Signals and Systems; A.V. Oppenheim, A.S. Willsky and I.T. Young; Prentice Hall. 1st edition ,1983
2. Signal and System; P. Rameshbabu, R. Ananandanatarajan; Scitech Publication, 1st edition, 2003
3. Signals and Systems; Nagrath, S. N. Sharan, R. Ranjan, S. Kumar; Tata McGraw Hill.1st edition, 2001
4. Fundamentals of Signals & Systems; Michael J Roberts; Tata McGraw Hill.1st edition, 2011

Syllabus of V Semester B.E. (Electronics Design Technology)

Course Code: EDT 303	**Course : PCB Technology**
L: 4 Hrs, T: 1 P:0 Hr. Per week	**Total Credits : 09**

Course Objectives :

The objective of this course is to provide students with

1. understanding of the designing and generation of artwork of the PCBs for analog, digital, high frequency and power electronics applications.
2. understanding of Fabrication of different types of PCBs such as SSB, DSB, PTH.
3. understanding of fabrication techniques such as photo printing, screen printing.
4. knowledge of different mechanical and electrical operations required for fabrication of PCBs.
5. knowledge of chemicals and materials used for the PCB fabrication.
6. understanding of the fabrication of small series of highly reliable, professional quality PCBs with low investment cost

Course Outcomes

1. The students will be able to design electrical and electronic circuits and conduct experiments, analyze and interpret data.
2. The students will be able to use advance techniques, skills and modern tools for designing PCBs.
3. The student will be able to apply creativity in the design of systems, components or processes appropriate to program objectives.
4. The students will be able to work in R&D laboratories in telecommunication and biomedical electronics.
5. The students will be able to understand advance technology such as CMOS VLSI and nanotechnology fabrication techniques.

Syllabus

Unit I :

Introduction to Printed circuit board, Basics of printed circuit board designing : Layout planning, general rules and parameters, ground conductor considerations, component placing and mounting considerations, check and inspection of artwork.

Unit II :

Design rules for Digital circuit PCBs, design rules for PCBs in high frequency and fast pulse applications. Design rules for Analog circuit PCBs, Power electronic applications.

Unit III :

Introduction printed circuit board production: Photo printing, film-master production, film emulsion, stability, reprographic camera, basic process for double sided PCBs photo resists, wet film, dry film, Screen printing process.

Unit IV :

Plating, immersion plating, Electroless-plating, Electro-plating, tinning, relative performance and quality control, Etching machines. Etchants and its comparative study. Solders alloys, corrosive and non-corrosive fluxes, soldering techniques, Mechanical operations.

Unit V :

Multilayer PCBs. Multiwire PCB, Flexible PCBs, Surface mount PCBs, Laminating process, PCB Technology Trends, Introduction to High-Density Interconnection (HDI) Technology.

Unit VI :

PCB design for EMI/EMC: Component placement, Subsystem/PCB Placement in an enclosure, Filtering circuit placement, decoupling and bypassing, Electronic discharge protection, Introduction to Integrated Circuit Packaging and footprints.

Text Books :

1. Printed circuit Board Design and technology, Walter C. Bosshart

2. Printed circuit board design ,fabrication assembly and testing By R. S. Khandpur,Tata Mc Graw Hill 2005

Reference Books :

1. EMC and Printed circuit board ,Design theory and layout, Mark I Montrose IEEE compatibility society

2. Flexible Printed circuit board Design and manufacturing ,By Robert torzwell

3. Printed Circuits Handbook, Sixth Edition,by Clyde F. Coombs, Jr.

4. Printed Circuit Board Designer's Reference: Basics,Christopher T. Robertson Prentice Hall Professional, 2004

Syllabus of V Semester B.E. (Electronics Design Technology)

Course Code: EDP 303	**Course: PCB Technology Lab**
L: 0 Hrs, T: 0 Hr., P: 2 Hr. Per week	**Total Credits: 02**

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Course Objectives :

The objective of this course is to provide students with

1. Understanding of the designing and generation of artwork of the PCB's for analog digital, high frequency and power electronics applications.

2. Understanding of Fabrication of different types of PCB's such as SSB, DSB, PTH.

3. Understanding of fabrication techniques such as photo printing, screen printing.

4. Knowledge of different mechanical and electrical operations required for fabrication of PCB's.

5. Knowledge of chemicals and materials used for the PCB fabrication.

6. Understanding of the fabrication of small series of highly reliable, professional quality PCB's with low investment cost

Course Outcomes :

1. The students will be able to design the PCBs of Analog circuits, Digital Circuits ,High Frequency circuits and Power electronic circuits .

2. The students will be use advance techniques, skills and modern tools(Machines and   Software) for designing PCBs.

3. The student will be able to apply creativity in the design of systems, components or processes appropriate to program objectives.

4. The students will be able to work in R&D laboratories in telecommunication and biomedical electronics.

5. The students will be able to understand advance technology such as CMOS VLSI and nanotechnology fabrication techniques.

Syllabus of V Semester B.E. (Electronics Design Technology)

Course Code: EDT 304   Course : Microprocessor & Interfacing

L: 4 Hrs, T: 1 P:0 Hr. Per week   Total Credits : 09

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Course Objectives :

The objective of this course is to provide students with

1. Introduction to microprocessor 8085, architecture and organization.
2. Knowledge of various assembler directives and assembly language instructions with usages.
3. Understanding the program execution with timing diagrams.
4. Knowledge of interfacing techniques for memory, I/O subsystems and peripheral devices.
5. Basic knowledge of 8086 architecture and features.

Course Outcomes :

Upon the completion of this course, students will demonstrate the ability to:

1. Implement programs understanding the architectural features of microprocessor.
2. Verify some of the physical features of microprocessor based system by interfacing peripheral devices with it.
3. Apply in depth knowledge of the subject to develop proto types of real time application.

Syllabus

Unit-I :

Introduction to RISC and CISC processors, Harvard and Von Neumann architecture,

organization of a computer with MPU, Introduction to Intel's 8085, architecture, pin diagram,

bus concepts, addressing modes.

Unit-II :

Instruction set, stack and subroutines- simple & nested, stack manipulation, simple programs,

timing diagrams.

Unit-III :

Memory mapping, interrupts-concept and structure, interrupt service routines, interrupt

programming of 8085.

Unit-IV :

Methods of data transfer-serial, parallel, synchronous & asynchronous, IN/OUT instructions,

handshaking concepts, architecture and interface of 8255 with 8085.

Unit-V :

Interfacing of LED, ADC, DAC, stepper motor, simple & multiplexed SSD, keyboard, display interface, hardware considerations-bus contention.

Unit-VI :

Introduction to Intel's 8086 processor architecture, segmentation, pipelining, addressing mode, assembler directives.

Text Books :

1. Microprocessor: Architecture, Programming & applications with 8085; Ramesh S.Gaonkar; Penram International, 5th Edition.
2. Microprocessors and Digital Systems; D. V. Hall; McGraw Hill, 2nd Edition
3. Advanced Microprocessors and Peripherals; A. K. Ray & K. M. Bhurchandi; McGraw Hill, 3rd Edition.

Reference Books :

1. 8085 Microprocessor: Programming and Interfacing; N. K. Srinath; PHI, 1st Edition.
2. Microcomputer systems: the 8086/8088 family: Architecture, Programming, and Design; Yu-cheng Liu, Glenn A. Gibson; Prentice-Hall, 2nd Edition.
3. Experiments in Microprocessor and Digital Systems; D.V. Hall, Marybelle B. Hall; ; McGraw Hill, 2nd Edition.

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Syllabus of V Semester B.E. (Electronics Design Technology)

Course Code: EDP 304   Course : Microprocessor & Interfacing Lab

L: 0 Hrs, T: 0 Hr., P: 2 Hr. Per week   Total Credits: 02

Microprocessor & Interfacing Laboratory

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Course objectives :

1. To develop the skills for assembly language programming.
2. To interface peripherals with microprocessor.

Course Outcomes :

Student will be able to :

1. Understand working of microprocessor based systems.
2. Design Microprocessor based mini project.

Syllabus of V Semester B.E. (Electronics Design Technology)

Course Code : EDP 305   Course : Circuit Simulation-I

L: 0 Hrs, T: 0 Hr., P: 2 Hr. Per week   Total Credits : 00

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Course Objective :

The objective of this course is to provide students with:

1) Understanding of PSPICE net-list and commands.
2) Knowledge to Create and simulate circuit schematics with PSPICE.
3) Knowledge of various types of stimulus and their corresponding analysis.

Course Outcomes :

Upon the completion of this course, the student will be able to:

1) Write a net-list file for a given circuit.
2) Simulate the circuit schematic using net-list created in PSPICE.
3) Apply the various types of stimulus and do the analysis of the circuit.

Syllabus

Introduction, Schematic Design with Capture, Creating Part, Circuit Simulation using P-Spice.

Books :

ORCAD Instruction Manual

Syllabus of VI Semester B.E. (Electronics Design Technology)

Course Code : EDT306   Course : Field and Radiating System

L: 3Hrs, T: 1 P:0 Hr.Per week   Total Credits : 07

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Course Objectives :

The objective of this course is to provide students with

1.   Fundamental concepts of Electromagnetic wave theory.

2.   Understanding of wave propagation in transmission lines and waveguides.

3.   Importance of the basic antenna parameters such as radiation pattern, effective area, radiation intensity, directivity, gain, beam efficiency, aperture efficiency and radiation efficiency.

4.   Design of antenna arrays for specific patterns.

5.   Understanding and knowledge of various antennas and their applications

Course Outcomes :

Upon completion of this course, students will demonstrate the ability to:

1.   Understand wave propagation in transmission line and waveguides.

2.   Predict and analyze behavior of Electromagnetic waves in transmission lines and waveguides.

3.   Understand the antenna structure, its design, limitations and tradeoffs.

Unit-I :

Guided Waves, Waves between parallel planes, TE, TM, TEM, waves and their characteristics, attenuation in parallel plane guides, wave impedances.

Unit-II :

Rectangular Waveguides, TM, TE waves in rectangular waveguides and their characteristics,

wave impedance.

Unit-III :

Transmission lines, transmission line equations and their solutions. Transmission line parameters, characteristic impedance, propagation constant, attenuation constant and phase constant, waveforms distortion, distortion less transmission lines, loading of transmission lines, reflection coefficient and VSWR, Equivalent circuits of transmission lines. Smith chart, Stub matching.

Unit-IV :

Concept of radiation, Scalar and vector potentials, retarded potentials, field due to a current elements, power radiated and radiation resistance, reciprocity theorem applied to antennas, gain and aperture of antenna, radiation intensity, impedance, directivity.

Unit-V :

Two elements arrays and their directional characteristics, linear arrays analysis, broadside and end fire arrays, pattern multiplication, binomial arrays.

Unit-VI :

Study of parabolic antenna, folded dipole, Yagi-Uda antenna, log–periodic antenna, horn antenna, traveling wave antenna and cassegrain antenna.

Text Books :

1.   Electromagnetic Waves and Radiating Systems ; Edward C, Jordan and Keith G. Balmain;Prentice Hall India, 2nd Edition

2.   Antennas and Wave Propagation ; John D. Kraus ; Tata McGraw Hill, 4th Edition

Reference Books :

1.   Electromagnetic Waves ; R K Shevgaonkar ;Tata McGraw Hill, 1st Edition

2.   Antenna Theory : Analysis and Design ; C.A. Balanis ; Wiley India, 3rd Edition

3.   Antenna and Propagation ; G.S. Raju ; Pearson Publication, 1st Edition

Syllabus of VI Semester B.E. (Electronics Design Technology)

Course Code: EET315

L: 3Hrs, T: 1 P: 0 Hr. Per week

Course : Control System Engineering

Total Credits: 07

Course Objectives :

The course will prepare students

1. To understand the concept of feedback systems and operation of various practical control systems.

2. To understand how to analyze the system by time response and frequency response techniques.

3. To analyze the performance of the system by classical and modern control system techniques

Course outcome :

Upon the completion of this course, the students :

1. Will be able to convert physical models into physical systems and then formulating the appropriate mathematical model and converting mathematical models into the block diagrams/ signal flow graphs and then find the transfer function of the system

2. Will be able to understand various time response specifications, perform time response analysis and understand techniques of compensation for improving the system response.

3. Will be able to apply various tools to determine the absolute stability of the systems by applying Routh's Criterion and to understand how the same can be applied to evaluate relative stability.

4. Will be able to understand the concept of root locus, Bode plots, Nyquist plots for design and analysis of a system

5. Will be able to understand the concept of modern control system theory for design and analysis of a system

Syllabus

Unit I :

Introduction to need for automation and automatic control. Use of Feedback, broad spectrum of system application. Mathematical modeling, differential equations, transfer functions, block diagram, signal flow graphs, Application to elementary system simplifications, Effect of feedback on parameter variation, disturbance signal, servomechanisms and regulators. Control system components, Electrical, Electromechanical, hydraulic, pneumatic and other components. Their functional analysis and input output representation.

Unit II :

Time response of systems, First order and second order system, standard inputs concept of gain and time constants. Steady state error, type of control system, approximate methods for higher order system.

Unit III :

Root location and its effect on time response, Elementary idea of Root Locus, effect of adding pole and zero in proximity of imaginary axis.

Unit IV :

Stability control systems, conditions of stability, characteristic equation, Routh Hurwitz criterion, special cases for determining relative stability.

Unit V :

Frequency response method of analyzing linear system. Nyquist and Bode plots, stability and accuracy analysis from frequency responses, open loop and close loop frequency response. Nyquist criterion, effect of variation of gain and addition of pole and zero on response plot, stability margins in frequency response.

Unit VI :

State variable method of analysis, characteristic of system state, choice of state representation in vector matrix, different standard form, relation between transfer function and state variable.

Text Books :

1. Control Systems Engineering, I. J. Nagrath, M. Gopal, New Age International Publishers, 2005 Edition.

2. Automatic Control Systems, 9th Edition , Farid Golnaraghi, Benjamin C. Kuo , June 2009.

3. Modern Control Engineering; Katsuhiko Ogata; Prentice Hall. , 2010 - Technology & Engineering

Reference Books :

1. Control Systems Engineering, 6th Edition, Norman S. Nise , December 2010, ©2011

2. Control Systems: Principles and Design M. Gopal, Tata McGraw-Hill Education, 2002 - Automatic control - 971 pages

Syllabus of VI Semester B.E. (Electronics Design Technology)

Course Code: EDT307 **Course : Microcontroller Based Design**

L: 3Hrs, T: 1 P: 0 Hr. Per week **Total Credits : 07**

Course Objective:

The objective of this course is to provide students with:

1. Introduction to microcontroller PIC18, its organization and architecture.
2. Understanding assembly language imstructions with usages.
3. Knowledge of interfacing of external peripherals with microcontroller.
4. Familiarization of different protocols required for communication with external world through Mircocontroller.

Course Outcomes:

Upon the completion of this course, the student will be able to:

1. Understand the architecture and organization of mircocontroller and its programming.
2. Acquire the knowledge, techniques and skill to integrate microcontroller hardware and software.
3. Interface microcontroller based system to real world.

Syllabus

Unit I :

Introduction of Microcontroller, Difference between Microprocessor and Microcontroller, Criteria for selection of Microcontroller, PIC Family Microcontrollers, PIC18 Architecture, Pin diagram & description.

Unit II :

Input & output ports, Memory organization: Program Memory, Data RAM & Data EEPROM, Instruction set and Assembly Language Programming.

Unit III :

Interrupts, Timers, Watch-Dog Timer (WDT), Enhanced capture, Compare & PWM module and programming. Serial port (USART) programming.

Unit IV :

Analog-to-Digital Converter (ADC) module and programming, Interfacing of LED, SSD, LCD, Graphics LCD, 4x4 keyboard interfacing.

Unit V :

Interfacing of Switches & Relays, Stepper motor, DC motor. Power management in PIC controller: Sleep mode, Idle mode, Run Mode.

Unit VI :

Communication protocol used Like SPI, I2C, and USB. In-Circuit Serial Programming, Code protection and fuse bit programming.

Text Books :

1. PIC Microcontroller And Embedded Systems: Using Assembly and C for PIC18; M. Mazidi, R. Mckinlay, D. Causey; Pearson Education 1st Ed 2008.
2. Programming and customizing the PIC microcontroller; Myke Predko, McGraw Hill 3rd Ed. 2008.

Reference Books :

1. Microchip, "28/40/44-Pin, High-Performance, Enhanced Flash, USB Microcontrollers with nanoWatt Technology" PIC18F2455/2550/4455/4550 Datasheet, DS39632C 2006.
2. Design with PIC Microcontrollers ; John B. Peatman; Pearson Education 1st 1998

Syllabus of VI Semester B.E. (Electronics Design Technology)

Course Code: EDP307   Course: Microcontroller Based Design Lab

L: 0 Hrs, T: 0 Hr., P: 2 Hr. Per week   Total Credits: 02

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Course Objective :

The objective of this course is to provide students with

1. Understanding of assembly language instruction and programming for PIC microcontroller.
2. Understanding the programming of on chip peripherals available in microcontroller.
3. Knowledge of interfacing of external peripherals with PIC microcontroller.
4. Knowledge of communication protocol like I2C, SPI, ICSP etc.

Course Outcomes :

Upon the completion of this course, the student will be able to:

1. Write assembly language program to solve the basic arithmetic and logical operations using Microcontroller.
2. Interface external I/O peripherals with microcontroller.
3. Write a program for external I/O peripherals Interface with Microcontroller.
4. Use communication of protocol for microcontroller based system design.

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Syllabus of VI Semester B.E. (EDT)

Course Code: EDT308   Course : Computer Organization

L: 3Hrs, T: 0 Hr. P:0   Per week   Total Credits: 06

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Course Objectives :

The objective of this course is to provide students with

1. The ability to understand computer system possessimg datapath, control and memory.
2. The understanding of Arithmetic for Computers and processor organization.
3. The ability to understand the concepts of memory, pipelining and parallel processing.

Course Outcomes:

Upon completion of this course, students will demonstrate the ability to:

1. Evaluate common principles of computer organization and classify RISC/CISC architectures.
2. Design and analyze different arithmetic algorithms, processor datapath and control unit.
3. Apply the concept of cache and virtual memory management in computer system.
4. Investigate pipelining and multiprocessing for computer system design.

Syllabus

Unit I :

Introduction to computer system and its sub modules, Introduction to RISC and CISC paradigm, Performance Equation, Common Principles of Computer organization : Amdahl's Law, Principle of Locality.

Unit II :

Processor organization, instruction set (MIPS), instruction formats, Arithmetic for Computers : Addition and Subtraction, Multiplication, Division, IEEE 754 floating point format.

Unit III :

Processor Design-Introduction, Datapath and control unit design, Performance Considerations, Multi-cycle design, Micro Programmed control design, Exception Handling.

Unit IV :

Mativation for Pipeling, Clock period and CPI, Pipelined datapath, graphical representation, Pipelining Hazards.

Unit V :

Memory organization, concepts of semiconductor memory, memory management, concept of cache and associative memories, virtual memory.

Unit VI :

Parallel processing concepts, multiprocessors and its characteristics.

Text Books :

1. Computer Organization and Design - The Hardware / Software Interface, David A. Patterson, John L. Hennessy, Fifth Edition, 2014.

Reference Books :

1. Computer Architecture and Organization; J.P. Hayes; Third Edition (Fifth Reprint), McGraw Hill, 2012.
2. Computer Architecture and Parallel Processing; Ki Hawang, Faye A. Briggs, McGraw Hill, 2012
3. Computer Organization; Safwat G. Zaky, Zvonko G. Vranesic, Carl Hammacher; Fifth Edition, McGraw Hill, 2002.
4. Structured Computer Organization; Andrew. S. Tanenbum; Fifth Edition, Pearson, 2005.

Syllabus of VI Semester B.E. (Electronics Design Technology)

Course Code: EDT309	**Course : Analog Communication Engineering**
L: 3Hrs, T: 1 P: 0 Hr. Per week	**Total Credits : 07**

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Course Objective :

The objective of this course is to provide students with

1. Concepts of wave propagation.
2. Fundamentals of Analog modulation schemes and their generation.
3. Theoretical foundation of Pulse modulation schemes.
4. Awareness of radio receiver architectures and their current trends.
5. Understanding of effect of noise on different analog modulation schemes.

Course Outcomes:

Upon the completion of this course, students will demonstrate the ability to :

1. Analyze and compare the performance of various analog modulation schemes.
2. Use super heterodyne principle for the design of radio receiver and analyze different characteristics of radio receiver.
3. Develop and Compare functional blocks of different pulse modulation schemes.
4. Evaluate the effect of noise on communication system.
5. Determine suitable methods of wave propagation.

Unit I :

Frequency spectrum of electromagnetic waves, wave propagation: Ground wave, sky wave, space wave. Amplitude modulation, DSB-FC, DSB-SC, SSB-SC modulation, Independent Sideband(ISB), Vestigial Sideband(VSB), AM demodulators, Square Law detector, Envelope detector, Synchronous detectors for SSB Modulation.

Unit II :

Angle modulation: FM and PM, Wide band and narrow band FM, FM generation methods:- Direct and indirect, FM transmitters with frequency stabilization Methods, pre-emphasis and deemphasis, FM/PM discriminators, Noise Triangle.

Unit III :

Analog Pulse modulation and demodulation: Pulse amplitude modulation (PAM), pulse width modulation (PWM), Pulse position modulation (PPM), Pulse code modulation (PCM), Differential PCM, Delta Modulation (DM), Adaptive Delta Modulation (ADM) and Demodulation, FDM & TDM.

Unit IV :

Radio receivers: TRF receivers, super heterodyne receivers, Automatic Gain Control (AGC), FMradio receivers. Receiver Measurement: Sensitivity, selectivity, image frequency rejection, intermodulation. Communication receiver: Block schematic.

Unit V :

Receiver architecture and design basics, receiver architecture overview; quadrature down conversion, Hartley image rejection receiver, Barber Weaver receiver, direct conversion/zero IF receiver, low IF receiver. Receiver technology trends.

Unit VI :

Noise types, sources, Signal to Noise Ratio (SNR) for SSB-SC, DSB-SC, AM/FM, Noise figure calculations, Equivalent Noise temperature.

Text Books :

1. Electronics Communication Systems; Kennedy, Davis; Tata McGraw-Hill 4thEdition, 1999
2. Analog Communication; P Ramakrishna Rao; Tata McGraw-Hill.1st edition , 2011
3. Communication Receivers: Principles and Design, U.L Rohde, J. C. Whitaker McGraw- Hill. 2nd edition, 1997

Reference Books :

1. Electronic Communication System; Roy Blake; Cenage Learning.1st edition, 2012.
2. Electronics Communication; Dennis Roddy, John Coolen; Prentice Hall India.4th edition, 1977
3. Modern Receiver Front-Ends : Systems, Circuits and Integration; Joy Laskar, Babak Matinpour, Sudipto Chakraborty; Wiley.1st edition ,2004
4. Electronic Communication Systems;Wayne Tomasi; Pearson Education, 5th edition ,2008

Syllabus of VI Semester B.E. (Electronics Design Technology)

Course Code : EDP309	**Course: Analog Communication Engineering Lab**
L: 0 Hrs, T: 0 Hr., P: 2 Hr. Per week	**Total Credits: 02**

Analog communication Engineering Practical

Course Objective:

The objective of this practical course is to provide students with

1. Deep understanding of representation of various forms of amplitude/frequency modulation, pulse modulation and digital modulation
2. Knowledge of S/N ratio in analog communication system and demonstrate the effect of noise in the communication system.
3. Understanding of time division multiplexing process.
4. Opportunity to conduct project requiring understanding of practical aspects of communication.

Course Outcomes:

Upon the completion of this course, students will demonstrate the ability to:

1. Evaluate analog modulated waveform in time/frequency domain and also find modulation index.
2. Analyze pulse modulation techniques.
3. Develop understanding of superheterodyne receiver and its performance characteristics.
4. Use modern equipments and software design tools in group/individual to model, simulate and analyze communication systems.
5. Evaluate the effect of noise on performance of communication systems.

Syllabus of VI Semester B.E. (Electronics Design Technology)

Course Code : EDP310   **Course : Electronic Product Design**

L: 0 Hrs, T: 0 Hr., P: 2 Hr. Per week   **Total Credits : 02**

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Objectives:

The objective of this course is to make students

1. Aware of Electronic component and their applications.
2. Understand various lab equipments and their usage.
3. Identify, analyze, formulate and solve the engineering problems associated with Electronics Product Design.
4. Communicate effectively with team as well as professional people.
5. Demonstrate commitment and progress in lifelong learning, professional development and leadership.

Outcomes :

The outcomes of this course is to enhance understanding of practical aspect of electronic design such as

1. Apply knowledge of math, science and engineering.
2. Identify, formulate, and solve engineering problems.
3. Design a system or process.
4. Function in multi-disciplinary teams.
5. Use techniques, skills and modern engineering tools.

Syllabus :

Fabrication and testing of small electronic circuit, PCB design, technical report, presentation. Study of standards in electronic industry manufacturing practicers in electronic industry.

Reference Book :

1) Printed circuit board design, fabrication assembly and testing By R.S. Khandpur, Tata MC Graw Hill 2005.

Syllabus of VI Semester B.E. (Electronics Design Technology)

Course Code: EDT311-1   **Course : Industrial Electronic System Design (open Elective-i)**

L: 3 Hrs, T: 1 P:0 Hr.Per week   **Total Credits : 07**

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Course Objectives :

The objective of this course is to provide students with

1. Knowledge of electronic product development process.
2. Knowledge to design small electronic system based on microcontroller 8051.
3. Understanding the working of various communication protocol
4. The knowledge of PCB design.

Course Outcomes :

Upon the completion of this course

1. The students will be able to design small electronic system based on microcontroller 8051.
2. The students will be able to apply creativity in the design of system.
3. The students will be able to understand the working of various communication protocol.

Syllabus

Unit I :

Introduction to industrial electronic system Design, Product development process, Product architecture, Electronic Product design and development Methodology, product innovations.

Unit II :

Introduction to Microcontroller based industrial System Design, study of general architecture of microcontroller, memory organization and Input/output systems.

Unit III :

Study of on chip peripherals, interrupts, and data communication protocols like RS232, I2C etc.

Unit IV :

Interfacing of LED, LCD, Switches, relays, DC motors, Stepper motor, sensors, transducers etc.

Unit V :

Basics concept of PCB board design, Types of PCB's, general rules and parameters of PCB board design.

Unit VI :

Introduction to the concept of reliability and quality, Reliability mathematics, Calculation of system Reliability.

Text Books :

1. Industrial Design in Engineering Flurschiem C.H Design Council London & Springer Verlag.

2. Microcontrollers by Ayala (TMH Publication).

3. The 8051 microcontroller by M.Mazidi

Reference Books :

1. Architecture, Programming, interfacing and system design by Raj Kamal, Pearson Education.

2. Printed circuit Board Design and technology by Walter C. Bosshart.

3. PCB Technology by Khandpur.

4. Concept in Reliability by Srinath L.S, East West Press

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Proposed Syllabus of VI Semester B.E. (Electronics Design Technology)

Course Code: EDP312	Course : Circuit Simulation-II
L: 0 Hrs, T: 0 Hr., P: 2 Hr. Per week	Total Credits : 0

Course Objectives :

The objective of this practical course is to provide students with

1. Knowledge to use Matlab for interactive computations.

2. Understanding to develop system in MATLAB simulink environment.

3. Knowledge to design small electronic system based on MATLAB.

Course Outcomes

1. The students will be able to use Matlab for interactive computations.

2. The students will be able to generate plots and export this for use in reports and presentations.

3. The students will be able to program scripts and functions using the Matlab development environment.

4. The students will be able to use basic flow controls (if-else, for, while).

5. The students will be able to be familiarized with strings and matrices and their use.

6. The students will be able to develop system in MATLAB simulink environment.

*Practical Based on the syllabus given below

Introduction to MATLAB, Study of MATLAB programming environment, Modeling, Design and development of System.

Reference Books:

1. Chapman Stephan J.: MATLAB programming for engineers Third Edition, Thomson/Cengage.

2. Rudra Pratap: Getting started with MATLAB7, Oxford University Press, Indian Edition.

3. Palm: MATLAB7.4: TMH

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Syllabus of VII Semester B.E. (Electronics Design Technology)

Course Code: EDT401   Course : Design of Electronic Equipments

L: 4 Hrs, T: 1 Hr., P: 0 Hr. Per week   Total Credits : 09

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Course objectives :

The objective of this course is to provide students with the

1.   Concept of Industrial Design Process.

2.   Concept of electronic Product designs methodology.

3.   Concept of Ergonomics & aesthetics in product design.

4.   Knowledge regarding the design of product packaging and working environment.

5.   Knowledge of different industrial standard.

6.   Concept of value analysis.

Course outcomes :

After completion of this course, students will demonstrate the ability to:

1.   Visualize the concept for product design with respect to ergonomics and aesthetics.

2.   Analyze, design and draw control panels, front panel of electronic equipments.

3.   Apply creativity in the design of system, placement of components etc.

4.   Understand the concept of visual communication techniques in product design.

5.   Understand the process of value analysis of existing product.

SYLLABUS

Units I :

Introduction to industrial design, Role of industrial design in the domain of industry, Generic product development process, ID process, product innovations, tools and methods.

Unit II :

Management of ID process, Product architecture, Structure: standard and non-standard structures. Product prototypes.

Unit III :

Electronic product design and development Methodology, Creativity techniques, brainstorming documentation. Product planning: Defining the task, scheduling the task and its execution. Costing and Pricing of Industrial design,

Unit IV :

Ergonomics: Ergonomics of electronic equipments, Ergonomics of control panel design. Use of ergonomics at work places and plant layout. Aesthetics: Elements of aesthetics, aesthetics of control panel design.

Unit V:

Visual Communication Techniques: perspectives, hand sketching and rendering techniques. Assembly drawing, part drawing, exploded views. Graphic User Interface (GUI) design.

Unit VI :

Value engineering, Product quality and design management. Industrial standards, Graphics and packaging.

Text Books :

1.   Carl T. Ulrich ,Steven. D. Eppinger," "Product Design and Development",McGraw Hill Companies.

Reference Books :

1.   Ernest J Mccormick ,"Human factors in Engineering and Design" -, McGraw-Hill Co.

2.   Yammiyavar P," Control Panel Design and Ergonomics", CEDT / IISc Publication.

3.   Murrell K, Chapman," & Hall Londan : "Ergonomics : Man in his Working Environment" .

4.   Flurschiem C H, "Industrial Design in Engineering" Design Council, London and Springer Verlag, Berlin Heidelberg.

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Syllabus of VII Semester B.E. (Electronics Design Technology)

Course Code: EDT402	**Course: CMOS VLSI Design**
L: 3 Hrs, T: 1 Hr., P: 0 Hr. Per week	**Total Credits-07**

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Course Objectives :

The objective of this course is to provide students with understanding of

1. Mathematical methods and circuit analysis models in analysis of digital CMOS circuits, including logic components and their interconnect.

2. Moderately sized CMOS circuits that realize specified digital functions.

3. CMOS technology specific layout rules in the placement and routing of CMOS transistors and interconnects and to verify the functionality, timing, power, and parasitic effects using simulation/hand calculation.

4. The characteristics of CMOS circuit construction and the comparison between various CMOS process and emerging nanometer-scale electronic circuit technologies and processes.

5. Elements of Data path and Memory Design.

Course Outcome :

Upon the completion of this course, students will demonstrate the ability to:

1. Analyze and design NMOS, PMOS and CMOS digital circuits and interconnect.

2. Estimate area, parasitic elements, delays, and determine speed bottlenecks in digital circuits using various matrices.

3. Create small Layouts.

4. Evaluate circuits using different CMOS styles and Investigate emerging nanometer-scale electronic circuit technologies and processes.

5. Analyze Data path and Memory Elements.

Syllabus

Unit I :

Overview of VLSI Design Methodology, Design Flow & hierarchy, Introduction to MOS Transistors, Threshold voltage, body effect, MOS device design equations, second order effects, MOS Models-Level-1, Level-2, Level-3.

Unit II :

Static Load MOS Inverters, CMOS Inverter: The Static Behavior, Switching threshold, Noise Margins, The Dynamic Behavior, Power, Energy, and Energy-Delay, the Tri State Inverter, Transmission Gate. CMOS

fabrication process flow, N-well, P-well, Twin-tub process flow, Silicon on insulator, Latch-up, Layout design rules (DRC).

Unit III :

Circuit Characterization and Performance Estimation: Introduction, Resistance Estimation Capacitance Estimation, CMOS gate transistor sizing, Driving Large capacitive loads, Scaling of MOS transistors.

Unit IV :

Designing combinational logic gates in CMOS: Complementary CMOS, Ratioed Logic, Pass-Transistor Logic, Dynamic CMOS Design, Dynamic Logic: Basic Principles, Issues in Dynamic Design, Cascading of Dynamic Gates, Domino Logic.

Unit V :

Sequential logic design : Timing Metrics for Sequential Circuits, Classification of Memory Elements, Static Latches and Registers, Dynamic Latches and Registers, Clocking Strategies.

Unit VI :

CMOS Sub System Design : Data Path Operations-Addition/Subtraction, Multiplication, Shifters.

Memory elements: SRAM, DRAM.

Text Books :

1. CMOS VLSI Design: A circuits and systems perspective: N. Weste and K. Eshranghian, 2nd edition PHI

Reference Books :

1. Digital Integrated Circuits: A Design Perspective: J. Rabaey, 2nd edition PHI

2. CMOS Digital Integrated Circuits Analysis & Design: S M Kang, Yusuf Lablebici, 3rd TMH

3. VLSI Design Technique for Analog and Digital Circuit: Randel Geiger, P Allen, N Strader , 2nd TMH

4. Introduction to VLSI System : Carver Mead, Lynn Conway, 1st edition Addison-Wesley

5. MOS Integrated Circuits- Theory, Fabrication, Design and System Applications of MOS LSI: William M. Penny, Lillian Lau, Van Nostrand Reihold Company. 1st edition

6. Basic VLSI Systems and Circuits: Dougles Pucknell and K. Eshraghian 3rd edition , PHI

Syllabus of VII Semester B.E. (Electronics Design Technology)

Course Code: EDP402   **Course: CMOS VLSI Design Lab**

L: 0 Hrs, T: 0 Hr., P: 2 Hr. Per week   **Total Credits : 02**

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Objectives :

The objective of this course is to provide students with understanding of

1. Simulation moderately sized CMOS circuits that realize specified digital functions.
2. Various types of analysis methods available for CMOS circuits using design tools.
3. CMOS technology specific layout of CMOS circuits and to verify the functionality, timing, power, and parasitic effects using SPICE simulation/hand calculation

Outcomes :

Upon completion of this course, students will demonstrate the ability to:

1. Simulate moderately sized CMOS circuits that realize specified digital functions.
2. Do various types of analysis methods available for CMOS circuits using design tools.
3. Draw CMOS technology specific layout of CMOS circuits and to verify the functionality, timing, power, and parasitic effects using SPICE simulation/hand calculation.

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Syllabus of VII Semester B.E. (Electronics Design Technology)

Course Code: EDT403   **Course: Digital Signal Processing**

L: 3 Hrs, T: 1 Hr., P: 0 Hr. Per week   **Total Credits-07**

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Course objectives:

The objective of this course is to provide students with understanding of

1. Discrete time signal processing in z domain. Its relationship with other domain and analysis.
2. Representation of discrete time systems in different forms.
3. Concepts of frequency domain analysis using different FFT architectures.
4. Design aspects of FIR and IIR digital filters.
5. Various finite word length effects in discrete time signal processing.

Course Outcome:

Upon the completion of this course, students will demonstrate the ability to:

1. Process the signal in z domain for various discrete time systems.
2. Draw the structures of various discrete time systems in DFI, DFII, cascade and parallel form.
3. Analyze the discrete time systems in frequency domain.
4. Understand the filter design techniques for discrete time, IIR and FIR filter and will be able to determine parameters affecting its response.
5. Analyze the various finite world length effects while rounding and truncating the signal.

Syllabus

Unit I :

Z-transform, Unilateral Z- transform, ROC, properties, analysis of LTI discrete time system using z transform, Relation between Laplace and Z transform, Inverse Z-transform.

Unit II :

Block diagram and signal flow graph representation of linear constant coefficient difference equations, Structures for IIR and FIR systems- DFI, DFII, Cascade and Parallel

Unit III :

Introduction to DTFT, Frequency Domain sampling: DFT, concepts of FFT, Architectures radix 2

Unit IV :

FIR filters Design techniques: Fourier series, windowing using: Rectangular, Bartlett, Hanning, Hamming, Blackman, Kaiser, Optimal Frequency sampling

Unit V :

Digital filter concepts, Frequency Response, Design of IIR filter: Impulse invariance transformation, Bilinear Transformation, Design of Butterworth and Chebyshev filters

Unit VI :

Finite word length effects: Quantization by truncation and Rounding, Quantization of Input data and filter coefficients, limit cycles in recursive systems, Introduction to multirate signal processing.

Text Books :

1. Digital Signal Processing: Principles, Algorithms & Applications, Proakis & Monalkis, PHI,4th Edition

reference Books :

1. Digital Signal Processing A Computer based Approach, Mitra S,4th edition Mc-Graw Hill
2. Digital Signal Processing , Nagoor Kani, 2nd Edition Mc-Graw Hill
3. Discrete Time Signal Processing, Oppenheim & Schafer, 2nd Edition PHI
4. Digital Signal Processing, Cavicchi Thomas J., Wille Publication, 2000

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Syllabus of VII Semester B.E. (Electronics Design Technology)

Course Code: EDP403	**Course : Digital Signal Processing Lab**
L: 0 Hrs, T: 0 Hr., P: 2 Hrs. Per week	**Total Credits : 02**

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Course Objectives :

The objective of this course is to provide students with understanding of

1. Analyzing the signals in time/Frequency domain.
2. Analyzing the stability of discrete time system.
3. Designing of FIR and IIR filters.
4. The DSP processor.

Course Outcomes :

Upon the completion of this course, students will demonstrate the ability to:

1. Generate or classify different types of signals in Discrete Time domain
2. Plot and analyze frequency spectrum of a signal.
3. Design and plot response of FIR and IIR filters.
4. Determine the stability of the given system using transfer function.

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Syllabus of VII Semester B.E. (Electronics Design Technology)

Course Code: EDT 404-1	**Course : Electronic System Design (Departmental Elective-I)**
L: 4 Hrs, T: 0 Hr., P: 0 Hr. Per week	**Total Credits-08**

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Course Objectives:

1. Electronic system design specifications
2. Techniques for analyzing and designing variety of analog circuits like power supplies, amplifiers and oscillators.
3. Design of electronic circuits/systems using discrete components & IC's meeting realistic constraints.

Course Outcomes:

Upon the completion of this course, students will demonstrate the ability to:

1. Interpret the data using data manuals related to the specification of circuit/system
2. Apply knowledge of basic electronics devices in electronic circuit/systems to meet the needs with realistic constraints.

Syllabus

Unit I :

Design aspects of regulators: Linear Design aspects of integrated regulators LM78xx, LM79xx, LM317, LM723, Protection circuits.

Unit II :

Design aspects of Switching regulators, Design of boost type SMPS, Buck Type SMPS, LM78S40 , DC-DC Converters

Unit III :

Power amplifier fundamentals and Classification based on application, Design aspects of Audio Power Amplifiers, Design aspects of class D switching amplifier, Design aspects of integrated power amplifier TBA810, TDA 2005.

Unit IV :

Design fundamentals of sinusoidal oscillators, Performance specification, Design aspects of VCO, PLL-Introduction, Concept of Synchronization, Basic Structure of PLL, Transfer function, PLL Applications.

Unit V :

Architecture of Isolation amplifier, Grounding and shielding, Architecture of DAC and ADC, Design aspects of Data acquisition system.

Unit VI :

Design of active Butterworth filters upto sixth order, Infinite Gain Multiple Feedback filter, Sallen Key filters.

Text Books :

1. A Monograph on Electronic Design Principles, N.C. Goyal , R.K. Khetan, Khanna Publications, 5th Edition.

Reference Books :

1. TI - Design considerations for class D audio Power Amplifiers, Application report
2. Texas Instruments Datasheets Catalog
3. TI - Op amps for Everyone, Ron Mancini, Design reference manual.
4. Regulated Power supply Handbook, Texas Instruments.

Syllabus of VII Semester B.E. (Electronics Design Technology)

Course Code: EDT 404-2	**Course : Wireless Communication (Departmental Elective-I)**
L: 4 Hrs, T: 0 Hr., P: 0 Hr. Per week	**Total Credits : 08**

Course Objectives :

The objective of this course is to provide students with the understanding of

1. The concept of cellular telephone system.

2. Mobile radio environment, equalization and diversity.

3. Different modulation and different multiple access technologies for mobile communication.

4. Insight to different wireless communication systems

Course Outcomes :

Upon the completion of this course, students will demonstrate the ability to:

1. Understand the concepts of cellular telephone system.

2. Use equalization and diversity techniques to improve the performance of mobile communication systems.

3. Understand the concept of modulation and multiple access techniques for mobile communication.

4. Understand the working of global system for mobile(GSM),GPRS,WCDMA & MIMO.

Syllabus

Unit I :

Cellular concept : Evolution of Mobile radio communication. Cellular telephone system, frequency reuse, channel assignment and handoff strategies, Interference and system capacity, trunking and grade of service ,improving capacity in cellular system.

Unit II :

Mobile radio environment : Propagation path loss, Fading- long term and short term, level crossing rate and average duration of fade, delay spread, and coherence bandwidth.

Unit III :

Modulation techniques for mobile communication : Linear Modulation techniques-QPSK Transmission and detection techniques, Offset QPSK, Π/4 QPSK transmission and detection techniques. GMSK (Gaussian Minimum Shift Keying), QAM, OFDM.

Unit IV :

Equalization & diversity : Fundamentals of equalization, space polarization, frequency and time diversity techniques, Space diversity, polarization diversity, fundamentals of channel coding.

Unit V :

Multiple access techniques : Introduction to Multiple Access, FDMA, TDMA, Spread spectrum multiple access, frequency hopped multiple access (FHMA), code division multiple access (CDMA), Space division multiple access.

Unit VI :

Introduction to Wireless systems : GSM, GPRS, WCDMA, MIMO- service and features, system architecture, radio subsystem, channel types, frame structure.

Text Books :

1. Wireless Communication, Principles and Practice; T.S. Rappaport, Pearson Education, 2nd   Edition.

Reference Book :

1. Wireless and Digital Communications; Modulation and Spectrum Applications Kamilo Feher, PHI, 1st Edition.

2. Mobile Cellular Communications, William C. Y. Lee, Mc Graw Hill, 2nd Edition.

3. Mobile Communication, Jochen Schiller, 2nd Edition, Adsison Wesley, 2nd Edition.

4. GSM, GPRS, and EDGE Performance: Evolution Towards 3G UMTS, Timo Halonen, Javier   Romero, Juan, Malero, Wiley, 2nd addition

5. Mobile Communication Design Fundaments, William C.Y. Lee, John Willey & Sons, 2nd Edition

6. Fundamentals of Wireless Communication, David Tse and P.Viswanath, Cambridge University Press, 2005,1st Edition.

Syllabus of VII Semester B.E. (Electronics Design Technology)

Course Code: EDT 404-3　　　　　**Course : Digital Communication (Departmental Elective-I)**

L: 4 Hrs, T: 0 Hr., P: 0 Hr. Per week　　　**Total Credits-08**

Course Objectives :

The objective of this course is to provide students with understanding of

1. Digital communication systems.
2. Source coding techniques
3. The knowledge of waveform coding methods, sub band coding.
4. Base band coding, error correction and detection
5. Insight to PN Sequence

Course Outcomes :

Upon completion of this course, students will demonstrate the ability to:

1. Apply digital communication principles for understanding digital communication systems
2. Use mathematical techniques to describe, analyze and synthesize signals.
3. Understand PN sequence Techniques & basics of wireless communication.Syllabus

Unit I :

Basic signal processing operations in digital communication, Functional description, Channel classification, Performance Measure; Bandwidth, Information theory, Hartley- Shannon Law, Huffman and L – Z encoding algorithm, Rate distortion theory for optimum quantization, vector quantization

Unit II :

Baseband coding techniques, Error Control Codes - Hamming code, Block Codes, Cyclic codes, Convolutional Codes, Concept of Error Free Communication, Trellis code and viterbi algorithm, Error control coding, Syndrome decoding for block codes.

Unit III :

Classification of line codes –NRZ and RZ types signaling format for Uni- Polar, Polar, bipolar(AMI) and Manchester Coding, HDB and B8ZS signaling, Memory less modulation methods and its Representation -ASK, FSK,PSK, DPSK, QPSK.

Unit IV :

Detection and estimation: Gram-Schmidt orthogonalization procedure, Correlator type, Matched Filter type, Equalizing Filter, Signal and system design for ISI elimination and implementation, Eye Pattern analysis

Unit V :

Synchronization; Detector - Maximum Likelihood Detector, Error Probability, Figure-of-Merit for Digital Detection, Error performance: Coherent and Non-coherent detection systems.

Unit VI :

Study of PN sequence, Properties of PN sequence, Synchronization methods for spread spectrum, introduction to wireless communication

Text Books :

1. Digital Communications, Simon Haykin, 3rd Edition, John Wiley, 2006.

Reference Books :

1. Digital Communications, Amitabha Bhattacharya , Tata McGraw Hill, 1st Edition,2006.
2. Fundamentals of Communication Systems, John.G. Proakis , Pearson Education, 1st Edition,2006.
3. Introduction to Digital Communication, Michael. B. Purrsley , Pearson Education, 1st Edition,2006.
4. Digital Communication, 2nd Edition, Bernard Sklar, Pearson Education, 2006
5. Principles of Communication Systems (3rd Edition), Herbert Taub & Donald L Schilling ,Tata McGraw Hill, 2008.
6. Digital and Analog Communication Systems, 6th Edition, Leon W. Couch, Pearson Education, 2001.

Syllabus of VII Semester B.E. (Electronics Design Technology)

Course Code: EDT 405-1

Course : Power Electronics & Industrial Automation
(Departmental Elective-II)

L: 4 Hrs, T: 0 Hr., P: 0 Hr. Per week   **Total Credits-08**

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Course Objectives :

The objective of this course is to provide students with the understanding of

1. The course shall make students aware about the necessity of different electronic switches, their operation and role in power conversion and conditioning.

2. The course shall prepare the students to carry out different analysis for power electronic converters.

3. The course will give an insight to the students about all the power electronic controllers and their power conversion mechanism.

4. The course shall prepare the students to understand motor drives

5. The course shall prepare the students to understand industrial automation

6. The course shall make students aware of PLC, SCADA

Course Outcomes:

Upon the completion of this course, students will demonstrate the ability to:

1. Draw the symbolic representation for various power electronic switches and sketch their static and dynamic V-I Characteristics.

2. Design and Draw the control circuit to turn on and turn off the device in controller.

3. Select proper converter for converting the available source to the source required for drive that is driving the load.

4. Carry out analysis of output waveform of inverter and choppers.

5. Understand sensors, its application in industrial automation.

6. Understand and apply the knowledge of PLC, SCADA for Automation.

Unit I :

Power Electronics devices : Thyristor, Triac, IGBT, Power MOSFET, their characteristics, internal structure, Static and dynamic characteristics of these devices, firing circuits, phase control & Turn off methods, protection scheme including snubber,

Unit II :

Single phase half control (one quadratic operation, midpoint two pulse, bridge two pulse of resistive, inductive and motor loads. Three-phase midpoint three pulse, midpoint six pulse for resistive, inductive and motor loads.

Unit III :

Choppers: -Types A, B, C, D,E,, multiphase , one, two, and four quadrant operation of choppers , Commutation methods: voltage, current, load ,SMPS,Introduction to DC drives

Unit IV :

Single phase bridge inverter, three phase bridge inverter, 120 and 180 degree mode of operation, voltage and frequency control in inverters, different methods of PWM, Introduction to UPS, performance parameters,

Unit V :

Industrial automations sensors: Temperature Sensor, Flow sensor, liquid level sensor, pressure sensor, Touch screen sensor.

Introduction to AC/DC drives, Stepper Motor Drives, Servo Motor Drives: types of servo motor, closed loop position and speed control with servo motors.

Unit VI :

History of PLC, PLC architecture, PLC interfacing, PLC programming, ladder diagram, Introduction to SCADA, HMI.

Text Books :

1. Modern Power Electronics, Sen P. C. , Wheeler Publishers,1998

Reference Books :

1. Thyristors and their Applications, M. Ramamoorthy, East West Press ,1977
2. Industrial and power electronics, Deodatta Shingare, 1st edition Electrotech Publication Pune
3. Introduction to programmable logic controllers, Gary Dunning ,3rd edition ,Thomson
4. Power Electronics; Singh. M. G., K.B. Khanchandani, Tata McGraw Hill, 2000
5. Modern Power Electronics and AC Drives, Bose. B. K., Pearson education India, Indian Reprint, 2003
6. Power Electronics Circuits Devices and Applications, M.H. Rashid, Prentice Hall 1993, 2nd Edition
7. Programmable Logic Controllers, W. Boltan, Newens Publishers, 3rd Edition.

Syllabus of VII Semester B.E. (Electronics Design Technology)

Course Code: EDT 405-2   **Course : Optical Communication (Departmental Elective-II)**

L: 4 Hrs, T: 0 Hr., P: 0 Hr. Per week   **Total Credits-08**

Course Objective :

The objective of this course is to provide students with the understanding of

1. The fundamental principles and components of optical communications.

2. Wave propagation in optical fibers.

3. Signal degradation mechanisms.

4. Optical sources and detectors.

5. Introduction to measurements in optical fiber.

Course Outcome :

Upon the completion of this course, students will demonstrate the ability to:

1. Understand light propagation using ray and wave model.

2. Understand various types of dispersions and attenuation in optical media

3. Understand concept of wave propagation in step index, graded index and multi-mode fibers.

4. Understand the working principles of optical sources and detectors.

5. Understand the elements of optical fiber link & optical networks.

Syllabus

Unit I :

Basic optical communication system, Advantages of optical communication system, introduction to vector nature of light , propagation of light in dielectric waveguides, step index and graded index fibers, modes and power flow in fibers.

Unit II :

Composition of Optical fiber cables, fiber joints, splices and connectors, couplers, optical isolators and circulators, Signal degradation in fibers: Attenuation, absorption losses, scattering losses, fiber bend loss. Dispersion: chromatic and intermodal.

Unit III :

Measurement Techniques : OTDR, Eye Diagram., Parameter measurements in Optical fiber: Attenuation, dispersion, Numerical aperture and Refractive Index.

Unit IV :

Optical sources and detectors : LED, LASER, PIN and Avalanche photo detector structures and properties. Sources launching and coupling.

Unit V :

Optical amplifiers : EDFA, Raman amplifier, Wideband optical amplifiers, Receiver structures: low impedance front end, high impedance front end, the transimpedance front end.

Unit VI :

Optical Networks : concepts, optical terminology, optical network node and switching elements, FDDI, SONET/SDH, Recent trends in optical communication.

Text Books :

1. Optical fiber communication, principles and practice: John M Senior PH International, 3rd edition 2009

Reference Book :

1. Optical communication system: J Gower, 1st edition, prentice Hall of India

2. Optical fiber systems: technology, design, and applications: Charles K. Kao (Tata McGraw Hill) 1984

3. Optical fiber communication: B Keiser, 4th edition, McGraw Hill ,2000

Syllabus of VII Semester B.E. (Electronics Design Technology)

Course Code: EDT 405-3	Course : Micro Electro Mechanical Systems (Departmental Elective-II)
L: 4 Hrs, T: 0 Hr., P: 0 Hr. Per week	Total Credits-08

Course Objectives :

The objective of this course is to provide students with the understanding of

1. Standard microfabrication techniques and the issues surrounding them.

2. Major classes, components, and applications of MEMS devices/systems and to demonstrate an understanding of the fundamental principles behind the operation of these devices/systems.

3. Microfabrication techniques and applications to the design and Manufacturing of an MEMS device or a microsystem.

4. Foster interest for further study.

Course Outcomes :

Upon the completion of this course, students will demonstrate the ability to:

1. Understand working principles of currently available microsensors, actuators used in Microsystems.

2. Apply scaling laws that are used extensively in the conceptual design of micro devices and systems.

3. Understand the basic principles and applications of micro-fabrication processes, such as photolithography, ion implantation, diffusion, oxidation, CVD, PVD, and etching.

4. Choose a micromachining technique, such as bulk micromachining and surface micromachining for a specific MEMS fabrication process

5. Consider recent advancements in the field of MEMS and devices.Syllabus

Unit I :

Introduction to MEMS: Benefits of Miniaturization, Types of MEMS : Optical MEMS, Bio- MEMS, RF- MEMS, Microfludics, Success Stories, Pressure sensor, Accelerometer, Micro-mirror TV Projector

Unit II :

Microfabrication and Micromachining : Integrated Circuit Processes, Bulk Micromachining, Isotropic Etching and Anisotropic Etching, Wafer Bonding, High Aspect-Ratio Processes (LIGA), MEMS Device fabrication using Bulk Micromachining

Unit III :

Surface Micromachining : One or two sacrificial layer processes, Surface micromachining requirements, Device fabrication using Surface Micromachining example, Microcantilever fabrication

Unit IV :

RF MEMS Devices : Capacitor, Inductor, Switches, and antennas, RF MEMS components in communications, space and defense applications

Unit V :

Physical Micro sensors : Classification of physical sensors, Integrated, Intelligent, or Smart sensors, Sensor Principles and Examples: Thermal sensors, Electrical Sensors, Mechanical Sensors, Chemical and Biosensors

UNIT VI :

Microactuators : Classification of microactuators, Electrostatic, Electromagnetic and Thermal microactuation, Mechanical design of microactuators, Microactuator examples, microvalves, micropumps, micromotors.

Text Books :

1. Micro and Smart Systems: Ananthasuresh, G. K., Vinoy, K. J., Gopalakrishnan, S., Bhat, K. N., and Aatre, V. K., Wiley-India, New Delhi, 2010. 1st Edition.

2. RF MEMS and Their Applications: Vijay Varadan, K. J. Vinoy, K. A. Jose, Wiley, 2002, 1st Edition.

Reference Books :

1. Microsensors, MEMS and Smart Devices, Julian W. Gardner, Vijay K. Varadan, Osama O. Awadelkarim, Wiley, 2001 by Edition: 1st Edition.

2. VLSI Technology, Sze S.M., Mc Graw Hill, 2nd Edition.

Syllabus of VII Semester B.E. (Electronics Design Technology)

Course Code: EDP 406   **Course : Project Phase -1**

L: 0 Hr , T: 0 Hr., P: 4 Hrs Per week   **Total Credits - 08**

Project Objectives

The objective of this course is

1. To prepare students to synthesize knowledge from various areas of learning.

2. To prepare students to critically and creatively apply knowledge to solve engineering problems.

3. To prepare students to undertake team responsibility.

4. To instill self learning ,lifetime learning and prepare for future challenges.

Project outcome :

Upon the completion of this course, students will demonstrate the ability to:

1. analyze, synthesize and design system to solve real world problems

2. present precise reports, design documentation and demonstrate for engineering activities

3. function effectively as an individual or as a team leader in diverse teams in multidisciplinary fields

4. engage in independent and lifelong learning in context of technological change

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Syllabus of VII Semester B.E. (Electronics Design Technology)

Course Code: EDP 407   **Course : FPGA Based Implémentation**

L: 0Hr , T: 0 Hr., P: 2 Hrs Per week   **Total Credits-00**

Course Objectives :

The objective of this course is to provide students with the

1   knowledge of design flow of hardware implementation on FPGA.

2   knowledge of hardware implementation issues on FPGA.

3   synthesis and optimization of different digital circuits on FPGA.

4   design and development of the small applications based on FPGA.

Course Outcomes :

After completion of this course, students will demonstrate the ability to:

1. understand the basic architecture of FPGA.

2. understand the design flow for development of digital applications based on FPGA.

3. understand the different hardware parameters to implement the digital application based on FPGA.

SYLLABUS

Introduction to flow of Hardware implementation on FPGA, study and implementation of different digital circuits on FPGA using HDL language.

Text Book :

1. VHDL: a Design Oriented Approach By Dr. S.S. Limaye.

References :

1. Datasheet of FPGA/CPLD Devices.

Syllabus of VIII Semester B.E. (Electronics Design Technology)

Course Code: EDT 408

Course : Reliability of Electronic Equipments

L: 3 Hrs , T: 1 Hr., P: 0 Hr Per week

Total Credits-07

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Course objectives :

The objective of this course is to provide students with the

1. Concept of Reliability.
2. Analysis of electronic equipments reliability based on probability theory.
3. Knowledge regarding how to improve the reliability of the system.
4. Knowledge regarding EMI/EMC and its design aspects.

Course outcomes :

After completion of this course, students will demonstrate the ability to:

1. Understand the basic concept of Reliability.
2. Understand the Reliability calculation.
3. Understand the Reliability for design and improvement.
4. Understand the need of EMI/EMC in product design.

SYLLABUS

Unit I :

Introduction to the concept of reliability and definition of Reliability, Elements of Probability theory: Kolmogorov Axioms, Impossible and certain events, Complementary events, independent events, conditional probability, addition and multiplication rule of probability, Venn diagram, Bays Theorem.

Unit II :

Nature of reliability problems in electronic equipment. Failure data analysis technique, Mean failure rate, MTTF (Mean Time To Failure), MTBF (Mean Time Between Failure), Graphical plot, MTTF in terms of failure density, Reliability in terms of hazard rate and failure density,

Unit III :

Reliability modeling, Hazard Models. System Reliability, Mixed configuration, r-out-of-n structure, system not reducible to mix configuration, Logic diagrams.

Unit IV :

Fault tree analysis, Tie-set and Cut-Set method, Availability and maintainability, reparable system, Instantaneous repair rate, MTTR (Mean Time To Repair)

Unit V :

Designing for Reliability, Reliability allocation for a series system, Worst case design consideration. Reliability improvement techniques, Optimization, Reliability-Cost trade-off. Failure mode and effects analysis (FMEA).

Unit VI :

Electromagnetic Compatibility, Designing for Electromagnetic Compatibility. Sources of Electromagnetic Interface, Noise and Methods of Noise Coupling. Electrostatic Discharge ,EMC regulations,

Text Books :

1. Srinath L.S, "Concept in Reliability" By East West Press.

Reference Books :

1. Fuqua, Marcel Dekker, "Reliability Engineering for Electronic Design". -, 1988.
2. Patrick DT O'Connot, "Practical Reliability Engineering" - John Wiley and Sons, 1985.

Syllabus of VIII Semester B.E. (Electronics Design Technology)

Course Code: EDT 409	Course : Advanced Processors & Embedded Systems
L: 4 Hrs , T: 1 Hr., P: 0 Hr Per week	Total Credits-09

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Course Objectives :

The objective of this course is to provide students with understanding of

1. Microcontroller ARM, its organization and architecture.
2. Assembly language instructions as well as interfacing peripherals
3. Real Time Operating System and its concept.
4. Familiarization of mCOS/II RTOS/Linux.

Course Outcomes :

Upon the completion of this course, students will demonstrate the ability to:

1. Understand the architecture and organization of ARM microcontroller and its programming
2. Acquire the knowledge, techniques and skill to integrate microcontroller hardware and software
3. Understand the concept of real time operating system architecture.
4. Interface microcontroller based system to real world.

Syllabus

Unit I :

ARM Architecture: Processor modes, Register organization, Exceptions and its handling, Pipelining, ARM Processor Families.

Unit II :

AMBA Bus: APB, AHB, ASB; ARM7TDMI and THUMB instruction sets, Assembly Language Programming

Unit III :

ARM7TDMI Core microcontroller like LPC2148, programming of internal peripherals ADC, RTC, DAC, UART, I2C,SPI and external I/O interfacing.

Unit IV :

Introduction to embedded systems, Embedded System Design Constraints, Types of Embedded System, Embedded Software Architectures, Scheduling Algorithms

Unit V :

RTOS Concepts-Critical section, Shared Resources, Context Switching, Pre-emptive and non pre-emptive Schedulers, Priority Inversion, Mutual exclusion, Synchronization, Inter task communication mechanisms, Interrupt Latency

Unit VI :

Introduction to μCOS-II-Kernel/ linux kernel.

Text Books :

1. ARM System Developer's Guide: Designing and Optimizing System Software, A. Sloss, D. Symes, C.Wright, Morgan Kaufman Publication, 1st Edition.

Reference Books :

1. ARM Assembly Language: Fundamentals and Techniques by William Hohl, CRC Press, 2nd Edition.
2. ARM Microcontroller Interfacing: Hardware and Software, Warwick A. Smith, Elektor Electronics Publishing, 5th edition.
3. ARM System-on-Chip Architecture, S. Furber, A. Wesley, 2nd Edition.
4. An Embedded Software Primer By David E. Simon Pearson Education, 1st Edition.
5. MicroC/OS-II The Real Time Kernel, Jean Labrosse,CMPBooks, 2nd Edition.

Syllabus of VIII Semester B.E. (Electronics Design Technology)

Course Code: EDP 409   Course : Advanced Processors & Embedded Systems

L:0 Hr , T: 0 Hr., P: 2 Hrs Per week   Total Credits-02

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Course Objective :

The objective of this course is to provide students with understanding of

1. ARM Processor Architecture.
2. The programming of ARM Processor.
3. The interface Internal as well as External peripheral with LPC 2148.
4. The skills, techniques using EDA tool for designing embedded systems for real life application.

Course Outcome :

Upon the completion of this course, students will demonstrate the ability to:

1. Develop skill of programming for ARM Processors.
2. Design ARM Microcontroller Embedded Systems.
3. Realize Embedded based system to solve engineering problem.

Syllabus of VIII Semester B.E. (Electronics Design Technology)

Course Code: EDT410-1   Course : Advanced Digital Signal Processing
                                          (Departmental Elective-III)

L: 4 Hrs , T: 0 Hr., P: 0 Hr Per week   Total Credits-08

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Course objective :

The objective of this course is to provide students with understanding of

1. The concepts of multi rate signal processing, decimation and interpolation.
2. Design aspects of multi rate FIR Filters.
3. Fundamentals of digital filter banks.
4. Various transform techniques.
5. Various Digital signal processor architectures.
6. Techniques of numerical strength reduction using various algorithms

Course Outcome:

Upon the completion of this course, students will demonstrate the ability to:

1. Analyze the Decimation and interpolation effects in multi rate signal processing.
2. Design and analyze the poly phase filter structure.
3. Implement various digital filter bank structures.
4. Convert the signal in different domain using various transform.
5. Differentiate the fixed and floating point architectures of digital signal processors.
6. Reduce the numerical strength of convolution using various algorithms

SYLLABUS

Unit I :

Multi rate Signal Processing, Sampling rate conversion, Decimation, Interpolation, sampling rate conversion by rational factor.

Unit II :

Design and Implementation of sampling rate conversion: Direct form and poly phase filter structure, interchanging down sampler and up sampler

Unit III :

Filter bank implementation, Polyphase structures of uniform filter banks, Two-channel Quadrature Mirror Filter bank, M-channel Quadrature Mirror Filter bank

Unit IV :

Discrete cosine transform, Walsh transform, Hadamard transform, Haar transform, Discrete wavelet transform, Multiresolution analysis and signal representation by wavelet method.

Unit V :

Digital signal processing architectures : Harvard, pipelining, Hardware multiplier accumulator, Special instructions, Extended parallelism, SIMD, VLIW and static superscalar processing, fixed point and floating point, Processor Selection, Special purpose DSP Hardware.

Unit VI :

Fast convolution : concepts of numerical strength reduction, Cook-Toom algorithm, Winograd algorithm, integrated convolution, cyclic convolution.

Text Books :

1. Digital Signal Processing : Principles, Algorithms & Applications, Proakis & Monalkis, PHI,4th Edition, 2007

REFERENCE BOOKS:

1. Discrete Time Signal Processing, Oppenheim & Schafer, 2nd edition ,PHI
2. Digital Signal Processing, Thomas J. Cavicchi, Publisher: John Wiley & Sons (30 November 1999)
3. Digital Signal Processing A Practical Approach, E. C. Ifeachor, B. W. Jervis, 2nd Edition, Pearson Education,2002
4. Digital Signal Processing , A Nagoor Kani, 2nd Edition ,Mc-Graw Hill,2012

Syllabus of VIII Semester B.E. (Electronics Design Technology)

Course Code: EDT410-2	**Course : CMOS & RF Design (Departmental Elective-III)**
L: 4 Hrs , T: 0 Hr., P: 0 Hr Per week	**Total Credits-08**

Course Objectives :

The objective of this course is to provide students with understanding of

1. Complementary metal-oxide-semiconductor field-effect transistor operation and the relationship of process technology to valid models for analysis and design.
2. Analysis, up to and including second-order effects caused by low supply voltages, short channel lengths and modeling deficiencies.
3. Techniques for analyzing and designing a variety of analog circuit such as; amplifiers, oscillators, current sources.
4. Issues encountered in high-frequency circuits, such as impedance matching, realization of passive components and bandwidth enhancement.
5. Designing the active components of radio-frequency systems, including low noise amplifiers, oscillators, mixers and power amplifiers.
6. The effect of individual component's performance on overall radio- frequency transmitter and receiver design and performance.

Course Outcomes :

Upon completion of this course, students should demonstrate the ability to:

1. Use mathematical models for the operation of complementary CMOS transistors in order to perform hand calculations and that predict their behavior in analog and RF circuits/systems.
2. Develop an understanding of design approaches suitable for individual components and then learn to relate these results to overall system performance to realize specific objectives while trading off conflicting requirements.
3. Understand and analyze various analog/RF performance parameters.

SYLLABUS

Unit I :

Introduction to analog VLSI and mixed signal issues in CMOS technologies.MOS Models, Basic Building Blocks for IC: Switches. Current sources and sinks, Current mirrors, Bandgap references.

Unit II :

Amplifiers: MOS amplifiers-Single stage amplifiers- Common Source Stage with resistive, diode connected, current source, triode load, source degeneration, source follower, Cascode amplifiers.

Unit III :

Differential Amplifier- single ended & differential operation, Qualitative and quantitative analysis, common mode response, Gilbert cell.

Amplifier Frequency Response, stability and noise issues in amplifier design.

Unit IV :

Characteristics of passive components for RF circuits. Passive RLC networks, Impedance transformation, S-parameters. The Smith Chart and its applications.

Unit V :

Low Noise Amplifier design, LNA topologies. Linearity and large-signal performance.

Unit VI :

RF Power amplifiers : General properties. Class A, B, AB, C, D, E and F amplifiers. Modulation of power amplifiers. Analog communication circuits: Mixers, oscillators, Transceiver Architecture and Performance Specification

Text Books :

1.   Design of Analog CMOS Integrated circuits : B Razavi, Tata Mcgrw Hill

Reference Books :

1.   CMOS Circuit Design, Layout and simulation: J. Baker, D.E. Boyce., IEEE press.
2.   Analysis and Design Of Analog ICs 3rd ed.: Paul, Grey, and R Mayer, J Willy and Sons.
3.   The Design of CMOS Radio Frequency Integrated Circuits: Thomas H. Lee- Cambridge University Press.
4.   RF Microelectronics, B Razavi, Tata Mcgrw Hill

Syllabus of VIII Semester B.E. (Electronics Design Technology)

Course Code : EDT410-3	Course : Switching Theory & Finite Automata (Departmental Elective-III)
L: 4 Hrs , T: 0 Hr., P: 0 Hr Per week	Total Credits : 08

Course Objectives :

The objective of this course is to provide students with the understanding of

1.   Mathematical background related to switching algebra, and Boolean algebra and K-map for circuit reduction.
2.   Concept of threshold logic and fault diagnosis of logic circuits.
3.   Design of Finite State Machines.
4.   Design of asynchronous circuits.

Course Outcomes :

Upon the completion of this course, students will demonstrate the ability to:

1.   Design combinational logic circuits using advanced minimization techniques.
2.   Analyze fault detection and diagnosis in combinational and sequential circuits.
3.   Design and optimize Mealy and Moore FSM
4.   Understand the basics of asynchronous circuit design.

Syllabus

Unit I :

Switching Algebra and function Boolean algebra, Minimization of Boolean functions using Tabulation Method, and implementation with PAL, PLA Functional Decomposition, and symmetric functions.

Unit II :

Reliable Designs and fault Diagnosis, Hazards, Fault Detection in combinational circuits, Fault location experiments, Fault Detection by Boolean Differences & Path sensitizing method, Fault tolerant Design.

Unit III :

Threshold logic, threshold elements, synthesis of threshold networks, capabilities and limitations of threshold element, Unate function, cascading of threshold elements.

Unit IV :

Finite state Machines- Mealy and Moore synchronous sequential circuits, Design, Capabilities, Minimization and Transformation of sequential Machine, Case study of processor design.

Unit V :

Asynchronous Sequential circuits: Advantages of Asynchronous circuits over synchronous, fundamental mode, pulse mode, primitive flow table, synthesis, state assignment in Asynchronous Sequential circuits, analysis of essential hazards with the primitive flow table, Incompletely specified machines.

Unit VI :

Homing sequence, Synchronizing sequence, Adaptive Distinguishing experiment.Memory, Definiteness and losslessness of finite automata: Memory span w.r.t Input output sequences, Information lossless machine.

Text Books :

1. Switching & Finite Automata Theory- ZVI Kohavi , Tata Mc Graw Hill 2nd Edition.

Reference Books :

1. Switching theory and Logic design, D.A.Godse and A.P.Godse, Technical publications pune, 1st edition.
2. Logical design of switching circuits, Douglas Lewin, American Elsevier, 2nd edition, ELBS & Nelson publisher.
3. Switching Theory and logic Design– A.Anand Kumar, PHI 6th Edition.

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Syllabus of VIII Semester B.E. (Electronics Design Technology)

Course Code: EDT411-1	**Course : Design For Testability**
	(Departmental Elective-IV)
L: 4 Hrs , T: 0 Hr., P: 0 Hr Per week	**Total Credits-08**

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Course Objectives :

The objective of this course is to provide students with understanding of

1. VLSI design verification and testing issues.
2. Test economy of today's modern designs.
3. Modeling & simulating faults in a digital system design
4. Generation of test patterns for faults in a system and how to design a system for testability.

Course Outcomes :

Upon completion of this course, students should demonstrate the ability to:

1. Develop an understanding of VLSI design verification and testing issues.
2. Learn test economy of today's modern designs.
3. Model & simulate faults in a digital system design
4. Generate test patterns for faults in a system and how to design a system for testability.

SYLLABUS

Unit I :

Fundamentals of VLSI testing, Test economics and product quality, Yield, Fault modeling, Functional Versus Structural Testing, Levels of Fault Models, Single Stuck-at Fault, Fault Equivalence, Fault Collapsing, Fault Dominance and Checkpoint Theorem.

Unit II :

Logic and fault simulation, Algorithms for Fault Simulation, Serial Fault Simulation, Parallel Fault Simulation, Deductive Fault Simulation, Concurrent Fault Simulation, Roth's TEST-DETECT Algorithm, Testability measures, SCOAP Controllability and Observability, Combinational Circuit Example.

Unit III :

Combinational Circuit Test Generation, Significant Combinational ATPG Algorithms, D-Calculus and D-Algorithm (Roth), PODEM (Goel), FAN (Fujiwara and Shimino), Test Compaction.

Unit IV :

Design for testability, digital dft and scan design, Ad-Hoc DFT Methods, Scan Design, Partial-Scan Design.

Unit V :
Built-in self-test, Random Logic BIST, Definitions, BIST Process, BIST Pattern Generation, BIST Response Compaction, Built-in Logic Block Observers Boundary scan standard, TAP Controller and Port.

Unit VI :
Test automation, Memory testing, IDDQ testing, MCM Testing.

Text Books :
1. Essentials of Electronic Testing for Digital, Memory and Mixed-Signal VLSI Circuits: M. Bushnell and V. D. Agrawal, Kluwer Academic Publishers, 2000.

Reference Books :
1. Introduction to Formal Hardware Verification: T.Kropf, Springer Verlag, 2000.
2. System-on-a-Chip Verification-Methodology and Techniques: P. Rashinkar, Paterson and L. Singh, Kluwer Academic Publishers, 2001.
3. Digital Systems Testing and Testable Design: M. Abramovici, M. A. Breuer and A. D. Friedman, IEEE Press, 1990.

Syllabus of VIII Semester B.E. (Electronics Design Technology)

Course Code: EDT411-2   Course : EMI/EMC (Departmental Elective-IV)

L: 4 Hrs , T: 0 Hr., P: 0 Hr Per week   Total Credits-08

Course Objectives :
1. To give fundamental knowledge of electromagnetic capability (EMC)
2. To identify EMC requirement of electronic system
3. Estimation and measurement of conducted emission, radiated emission and susceptibility
4. Different means of reducing the effect of radiations
5. Able to design and diagnosis for the EMC

Course Outcomes

Student is able to :
1. Understand fundamental requirement of electromagnetic compatibility
2. To estimate the radiated emissions, conducted emissions and susceptibility
3. Redesign the circuit for EMC requirement
4. To design the architecture of electronic product for EMC requirement.

SYLLABUS

Unit I :

Introduction to Electromagnetic Compatibility : Aspects of EMC, Electrical Dimension waves. EMC requirement of Electronic system : Government requirement of Commercial product and military product, Measurement of Emission for verification of compliance - Radiated emission and conducted emission. Additional product requirement - radiated susceptibility, conducted susceptibility, Electrostatic Discharge (ESD), requirement of commercial vehicle, Advantages of EMC.

Unit II :

Signal spectra: Relationship between Time domain and frequency domain, Spectrum Analyzer, Transmission line and signal integrity.

Unit III :

Non - ideal Behavior of Components : Wires, PCB lands, component leads, Resistors, inductors, capacitors, Ferrite Beads, common mode chokes, Electromechanically Devices, Digital circuit device, mechanical switches

Unit IV :

Conducted Emission and susceptibility : measurement of conducted emission, LISN, power supply filters, Power supplies, Antennas and their characteristics. Radiated emission and susceptibility.

Unit V :

Cabling, Cables Shielding. Source Shielding, Receptor Shielding Near Field Far fields. Shielding Effectiveness, Losses. Grounding. Single point, Multi point, Hybrid grounds. Grounds loop problems. Low frequency and High frequency analysis of Common Mode Choke

Unit VI :

System Design for EMC, System configuration, Diagnostic Tools

Text Books :

1. Henry W. Ott ,"Electromagnetic Compatibility Engineering " , Publisher: John

   Wiley & Sons August 2009.

Reference Books :

1. Henery Ott, " Noise Reduction Technique",. Willy science
2. Mark I Montrose, "EMC and Printed circuit board ,Design theory and layout", IEEE compatibility society
3. www.emctest.com:- EMC Test Systems EMC Antennas/Chambers/TEM Cells
4. www.fair-rite.com :- Ferrite Cores & Beads
5. www.emcs.org :- IEEE EMC Society
6. http://europa.eu.int/comm/enterprise/newapproach/standardization/harmstds/ reflist/emc.html European commission
7. www.emicatalog.com:- EMI Catalog , Web Based Catalog of EMC Products & Services

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Syllabus of VIII Semester B.E. (Electronics Design Technology)

Course Code: EDT411-3	Course : Computer Communication Networks (Departmental Elective-IV)
L: 4 Hrs , T: 0 Hr., P: 0 Hr Per week	Total Credits-08

Course Objective :

The objective of this course is to provide students with the understanding of

1. The concepts of networking, LAN, MAN structure, IEEE 802 protocols.
2. Network architecture i.e. OSI & TCP/IP, packets and addressing.
3. Functional details of protocols related to Physical, data link, network, transmission and application layer.
4. Computer network security concepts.

Course Outcome :

Upon the completion of this course, students will demonstrate the ability to:

1. Understand the basic principles behind internet and networking technologies.
2. Understand protocols and technologies used in computer networking.
3. Understand modern communication trends in computer communication networking

Syllabus

Unit I :

Introduction to Computer Network, types of Network, Concept of layered network architecture: OSI reference model, TCP/IP model, Difference between OSI and TCP/IP model, introduction to circuit, packet and message switching, brief review on various types of transmission medium.

Unit II :

Data link layer design issues, peer to peer protocol, ARQ protocol, sliding window protocol, flow control, error detection and correction, piggy backing, data link control: HDLC, Point to Point Protocol

Unit III :

Media Access Control: multiple access, random access, ALOHA, CSMA, Local Area Network, LAN topologies, FDDI, switches, bridges, hubs, Ethernet, fast Ethernet, gigabyte Ethernet, Wide area network.

Unit IV :

Network layer design issues, routing algorithms, congestion control algorithms, quality of service, internetworking routing techniques, ip addressing, IPV4, IPV6, routing protocols Elements of transport protocol, congestion control TCP, UDP real time transport protocol, DHCP, Socket programming.

Unit V :

Application layer, HTTP, DNS, electronic mail, FTP, SNMP, TELNET, VOIP

Unit VI :

Principles of cryptography, security and cryptography algorithms, authentication, key distribution and certification, symmetric key algorithm, public key algorithm, digital signature, management of public keys, communication security, email security

Text Books :

1. Computer Networking: A top down Approach; James F. Kurose , Keith W. Ross; Pearson Education, 5th edition.

Reference Book :

1. Computer Networks: A system's approach, Peterson and Davie, Morgan Kauffmann series in Networking, Third edition

2. Data Communications and Networking; Behrouz A. Forouzan,TMH, 4th edition

3. Communication Networks by Leon- Garcia, Indra Widjaja; Tata Mc-graw Hill Publication , 4th edition

4. Computer Networks; Andrew S. Tanenbaum; Pearson Education, 6th edition.

Syllabus of VIII Semester B.E. (Electronics Design Technology)

Course Code: EDP412   **Course : Project Phase-II**

L: 0Hr , T: 0 Hr., P:04 Hrs Per week   **Total Credits-08**

Project Objectives :

The objective of this course is

1. To prepare students to synthesize knowledge from various areas of learning.

2. To prepare students to critically and creatively apply knowledge to engineering problems

3. To prepare students to undertake team responsibility

4. To instill self learning , lifetime learning and prepare for future challenges

Project outcome :

Upon the completion of this course, students will demonstrate the ability to :

1. analyze, synthesize and design system to cater real world problems

2. present precise reports, design documentation and demonstrate for engineering activities

3. function effectively as an individual or as a team leader in diverse teams in multidisciplinary fields

4. Engage in independent and lifelong learning in context of technological change.

Syllabus of VIII Semester B.E. (Electronics Design Technology)

Course Code: HUT402   **Course : Technical Communication**

L: 2 Hrs , T: 0 Hr., P: 0 Hr Per week   **Total Credits-00**

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Course Objectives :

1. The course aims at providing the importance and objective of technical communication to engineers, including ethics in writing.
2. It aims to provide an exposure to undergraduate engineers to effectively carryout research and Produce effective research and work place documents.
3. It aims to orient and provide practical exposure to undergraduate engineers in employability skills and public speaking.
4. It aims to give basic exposure to engineers in grammar with specific focus on effective writing.

Course Outcome :

1. Engineers understand the importance and objectives of technical communication.
2. Undergraduate engineers understand the role of audience in effective communication.
3. They develop skills to carryout research and produce effective research and workplace document.
4. They develop skills to enhance visual appeal of the documents and learn basic grammar rules/mechanics to bring accuracy in writing.
5. As undergraduate engineers they develop skills that would make them effective communicators in the placement processes.

Syllabus

- **Foundation of Technical Communication :** Defining technical communication, Objectives of technical communication, Process of producing a technical communication product, Audience recognition and involvement.
- **Research and writing strategies :** Preparation of abstract, proposals, research reports, professional reports, articles for journals, papers for conferences, Document design (graphics and visual appeal), Memos, Letters, Grammar rules, Punctuations, Mechanics, Spellings
- **Speaking strategies and employability skills** : Effective professional presentations, Group discussions, Resume making, Interviews

Text Books :

1. Technical Writing: Process and Product: S. J. Gerson and S. M. Gerson, Pearson Education Inc., (printed in India by Anubha Printers)

Reference Books :

1. Basic Communication Skills for Technology: A. J. Rutherfoord, Dorling Kindersley (India) Pvt. Ltd, India (Printed in India by Saurabh Printers Pvt. Ltd).
2. Effective Technical Communication: Rizvi. M. Ashraf, Tata McGraw-Hill Publishing Company Limited, India.

   Communication Skills: Sanjay Kumar and Pushp Lata, Oxford University Press.
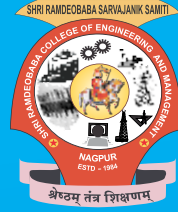
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