J.B INSTITUTE OF ENGINEERING & TECHNOLOGY

AUTONOMOUS

Bhaskar Nagar, Moinabad(M), RR Dist., Telangana-500075

ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE STRUCTURE – R18

I B. Tech – I Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	F110A	Mathematics – I	3	1-0-0	4
2	F113A	Engineering Drawing and Computer Graphics	1	0-0-4	3
3	F115A	Programming for Problem Solving	3	0-0-0	3
4	F110D	Engineering Chemistry	3	1-0-0	4
5	F1107	Programming for Problem Solving Lab	0	0-4-0	2
6	F1102	Chemistry Lab	0	0-3-0	1.5
7		Induction Programme			
		Total	**10**	**2-7-4**	**17.5**

I B. Tech – II Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	F120A	Mathematics – II	3	1-0-0	4
2	F120B	English	2	0-0-0	2
3	F122A	Basic Electrical Engineering	3	1-0-0	4
4	F120C	Applied Physics	3	1-0-0	4
5	F1201	English Language and Communication Skills Lab	0	0-2-0	1
6	F1204	Basic Electrical Engineering Lab	0	0-2-0	1
7	F1202	Applied Physics Lab	0	0-3-0	1.5
8	F1205	Workshop and Manufacturing Practices	1	0-4-0	3
		Total	**12**	**3-11-0**	**20.5**

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ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE STRUCTURE – R18

II B. Tech – I Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	F214A	Electronic Devices and Circuits	3	0-0-0	3
2	F214B	Digital Electronics	3	0-0-0	3
3	F214C	Signals and Systems	3	0-0-0	3
4	F214D	Probability Theory and Stochastic Processes	3	1-0-0	3
5	F210A	Mathematics – III	3	1-0-0	4
6	F210E	Professional Ethics	3	0-0-0	3
7	F2141	Electronic Devices and Circuits Lab	0	0-2-0	1
8	F2142	Basic Simulation Lab	0	0-2-0	1
9	F2143	Digital Electronics lab	0	0-2-0	1
10	F210C	Gender Sensitization	2	0-0-0	0
		Total	**20**	**2-6-0**	**22**

II B. Tech – II Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	F224A	Analog Communications	3	0-0-0	3
2	F224B	Analog Circuits	3	0-0-0	3
3	F224C	Microprocessors and Microcontrollers	3	0-0-0	3
4	F220D	Biological sciences	2	0-0-0	2
5	F224D	Electrical Circuit Analysis	3	1-0-0	4
6	F220B	Managerial Economics and Financial Analysis	3	0-0-0	3
7	F2241	Analog Circuits Lab	0	0-2-0	1
8	F2242	Analog Communications Lab	0	0-2-0	1
9	F220F	Environmental Science	2	0-0-0	0
		Total	**19**	**1-4-0**	**20**

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ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE STRUCTURE – R18

III B. Tech – I Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	F314A	Electromagnetic Waves and Transmission Lines	3	1-0-0	4
2	F314B	Computer Architecture	3	0-0-0	3
3	F314C	Control Systems	3	0-0-0	3
4	F314D	Digital Signal Processing	3	0-0-0	3
5	F314E	Digital Communications	3	0-0-0	3
6	F310A	Management Science	3	0-0-0	3
7	F3141	Microprocessors and Microcontrollers Lab	0	0-2-0	1
8	F3142	Digital Signal Processing Lab	0	0-2-0	1
9	F3143	Summer Internship	0	0-2-0	1
		Total	**18**	**1-6-0**	**22**

III B. Tech – II Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	F324A	Computer Networks	3	0-0-0	3
2	F324B	VLSI Design	3	0-0-0	3
3	F324C	Microwave Engineering	3	0-0-0	3
4		**Professional Elective – I**	3	0-0-0	3
5		**Professional Elective – II**	3	0-0-0	3
6		**Open Elective – I**	3	0-0-0	3
7	F3241	Digital Communications and Microwave Engineering Lab	0	0-2-0	1
8	F3242	VLSI Lab	0	0-2-0	1
		Total	**18**	**0-4-0**	**20**

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COURSE STRUCTURE – R18

IV B. Tech – I Semester

Sl. No.	Code	Subject	L	T-P-D	C
1		**Professional Elective – III**	3	0-0-0	3
2		**Professional Elective – IV**	3	0-0-0	3
3		**Open Elective – II**	3	0-0-0	3
4		**Open Elective – III**	3	0-0-0	3
5	F4141	Project Stage – I	0	0-8-0	4
6	F4142	Industrial Oriented Mini Project	0	0-4-0	2
7	F4101	Life Skills and Professional Skills Lab	0	0-4-0	2
		Total	**12**	**0-16-0**	**20**

IV B. Tech – II Semester

Sl. No.	Code	Subject	L	T-P-D	C
1		**Professional Elective – V**	3	0-0-0	3
2		**Professional Elective – VI**	3	0-0-0	3
3		**Open Elective – IV**	3	0-0-0	3
4	F4241	Seminar	0	0-2-0	1
5	F4242	Project Stage – II	0	0-16-0	8
		Total	**9**	**0-18-0**	**18**

Note: All End Examinations (Theory and Practical) are of three hours duration.

L – Lecture, T – Tutorial, P – Practical, D – Drawing, C – Credits.

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ELECTRONICS AND COMMUNICATION ENGINEERING

PROFESSIONAL ELECTIVE SUBJECTS

Professional Elective – I

Sl. No.	Code	Subject	L	T-P-D	C
1	F324D	Antenna and Propagation	3	0-0-0	3
2	F324E	Embedded Systems	3	0-0-0	3
3	F324F	Digital Image Processing	3	0-0-0	3

Professional Elective – II

Sl. No.	Code	Subject	L	T-P-D	C
1	F324G	Introduction to MEMS	3	0-0-0	3
2	F324H	Speech and Audio Processing	3	0-0-0	3
3	F324I	CMOS Design	3	0-0-0	3

Professional Elective – III

Sl. No.	Code	Subject	L	T-P-D	C
1	F414A	Image and Computer Vision	3	0-0-0	3
2	F414B	Electronic Measurements and Instrumentation	3	0-0-0	3
3	F414C	Adaptive Signal Processing	3	0-0-0	3

Professional Elective – IV

Sl. No.	Code	Subject	L	T-P-D	C
1	F414D	Embedded Real Time Operating Systems	3	0-0-0	3
2	F414E	Nano Electronics	3	0-0-0	3
3	F414F	Fiber Optic Communications	3	0-0-0	3

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PROFESSIONAL ELECTIVE SUBJECTS

Professional Elective – V

Sl. No.	Code	Subject	L	T-P-D	C
1	F424A	Mixed Signal Design	3	0-0-0	3
2	F424B	Satellite Communication	3	0-0-0	3
3	F424C	Information Theory and Coding	3	0-0-0	3

Professional Elective – VI

Sl. No.	Code	Subject	L	T-P-D	C
1	F424D	Wireless Sensor Networks	3	0-0-0	3
2	F424E	Consumer Electronics	3	0-0-0	3
3	F424F	Wavelets Signal Processing	3	0-0-0	3

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COURSE STRUCTURE – R18

List of Subjects offered by various Board of Studies

Open Elective – I

S.No.	Code	Name of the Subject	Name of the BOS offering the Subject
1	F32OA	Energy Audit and Green Building	Civil Engineering
2	F32OB	Environmental Impact Assessment	Civil Engineering
3	F32OC	Energy Storage systems	Electrical and Electronics Engineering
4	F32OD	Energy Auditing, Conservation and Management	Electrical and Electronics Engineering
5	F32OE	Automotive Technology	Mechanical Engineering
6	F32OF	Matlab Programming Language	Electronics and Communication Engineering
7	F32OG	Principles of communications	Electronics and Communication Engineering
8	F32OH	Database Management Systems	Computer Science and Engineering
9	F32OI	Operating Systems	Computer Science and Engineering
10	F32OJ	Introduction to Data Structures	Information Technology
11	F32OK	Introduction to web Design	Information Technology
12	F32OL	Internet of things	Electronics and Computer Engineering
13	F32OM	Introduction to Mining Technology	Mining Engineering

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COURSE STRUCTURE – R18

List of Subjects offered by various Board of Studies

Open Elective – II

S.No.	Code	Name of the Subject	Name of the BOS offering the Subject
1	F41OA	Waste Management	Civil Engineering
2	F41OB	Estimation, Quantity Surveying and Valuation	Civil Engineering
3	F41OC	Electric and Hybrid vehicles	Electrical and Electronics Engineering
4	F41OD	Materials in Electrical Systems	Electrical and Electronics Engineering
5	F41OE	Fundamentals of Operations Research	Mechanical Engineering
6	F41OF	Digital systems Using VHDL	Electronics and Communication Engineering
7	F41OG	IC Technology	Electronics and Communication Engineering
8	F41OH	Computer Networks	Computer Science and Engineering
9	F41OI	Python Programming	Computer Science and Engineering
10	F41OJ	Computer Organization	Information Technology
11	F41OK	Human Computer Interaction	Information Technology
12	F41OL	Introduction to Embedded systems	Electronics and Computer Engineering
13	F41OM	Introduction to Surface Mining	Mining Engineering

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COURSE STRUCTURE – R18

List of Subjects offered by various Board of Studies

Open Elective – III

S.No.	Code	Name of the Subject	Name of the BOS offering the Subject
1	F41ON	Elements of CIVIL Engineering	Civil Engineering
2	F41OO	Disaster Management	Civil Engineering
3	F41OP	Electric Costing And Estimation	Electrical and Electronics Engineering
4	F41OQ	Power Plant Engineering	Electrical and Electronics Engineering
5	F41OR	Fundamentals of Robotics	Mechanical Engineering
6	F41OS	Digital systems Using Verilog	Electronics and Communication Engineering
7	F41OT	Advanced Computer Architecture	Electronics and Communication Engineering
8	F41OU	Software Engineering	Computer Science and Engineering
9	F41OV	Cloud Computing	Computer Science and Engineering
10	F41OW	Java Programming	Information Technology
11	F41OX	Software Project Management	Information Technology
12	F41OY	Introduction to Intelligent System	Electronics and Computer Engineering
13	F41OZ	Introduction to Geology	Mining Engineering

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COURSE STRUCTURE – R18

List of Subjects offered by various Board of Studies

Open Elective – IV

S.No.	Code	Name of the Subject	Name of the BOS offering the Subject
1	F42OA	Industrial Waste Water Treatment	Civil Engineering
2	F42OB	Air pollution and Control	Civil Engineering
3	F42OC	Distributed Generation And Micro grid	Electrical and Electronics Engineering
4	F42OD	Renewable Energy Sources	Electrical and Electronics Engineering
5	F42OE	Digital Manufacturing	Mechanical Engineering
6	F42OF	Embedded System Design	Electronics and Communication Engineering
7	F42OG	Software Defined Radio	Electronics and Communication Engineering
8	F42OH	E-commerce	Computer Science and Engineering
9	F42OI	Big Data Analytics	Computer Science and Engineering
10	F42OJ	Computer Forensics	Information Technology
11	F42OK	E-Disaster Management	Information Technology
12	F42OL	Introduction to Neural Networks	Electronics and Computer Engineering
13	F42OM	Introduction to Mine Environment	Mining Engineering

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UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
I Year - I Semester	**3**	**1-0-0**	**4**

(F110A) MATHEMATICS-I

(LINEAR ALGEBRA & DIFFERENTIAL EQUATIONS)
(COMMON TO CE, EEE, ME, ECE, CSE, IT, ECM & MIE)

Course Objectives:

The student will

1. understand the concept of matrices and solutions of system of linear equations.
2. learn the concept of eigen values and eigen vectors and cayley Hamilton theorem.
3. learn the concept of sequences and series and nature.
4. get an idea to find the solutions of differential equations of first order and first degree.
5. find the solutions of second and higher order.

UNIT – I: MATRICES:

Matrices: Types of Matrices, Symmetric; Hermitian; Skew-symmetric; Skew-Hermitian; orthogonal matrices; Unitary Matrices; rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; System of linear equations; solving system of Homogeneous and Non-Homogeneous equations. Gauss elimination method; Gauss Seidel Iteration Method.

UNIT–II: EIGEN VALUES AND EIGEN VECTORS:

Linear Transformation and Orthogonal Transformation: Eigen values and Eigenvectors and their properties: Diagonalization of a matrix; Cayley-Hamilton Theorem (without proof); finding inverse and power of a matrix by Cayley-Hamilton Theorem; Quadratic forms and Nature of the Quadratic Forms; Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

UNIT – III : SEQUENCES AND SERIES:

Sequence: Definition of a Sequence, limit; Convergent, Divergent and Oscillatory sequences.

Series: Convergent, Divergent and Oscillatory Series; Series of positive terms; Comparison test, p-test, D-Alembert's ratio test; Raabe's test; Cauchy's Integral test; Cauchy's root test; logarithmic test. Alternating series: Leibnitz test; Alternating Convergent series: Absolute and Conditionally Convergence.

UNIT – IV: FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS:

Exact, linear and Bernoulli's equations; Applications: Newton's law of cooling, Law of natural growth and decay; Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT – V : ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER :

Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type $e^{ax}, \sin ax, \cos ax,$ polynomials in x, $e^{ax}V(x)$ and $x\,V(x)$; method of variation of parameters; Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation.

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. R.K.Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 4th Edition, 2014.

REFERENCES:

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010.

Course Outcomes:

The student will able to

1. solve system of linear equations.
2. analyze the Eigen values and Eigen vectors which come across under linear transformations.
3. find the nature of the given series by different tests.
4. identify whether the given differential equation of first order is exact or not.
5. solve higher differential equation and apply the concept of differential equation to real world problems.

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B.Tech. ECE	**L**	**T-P-D**	**C**
I Year - I Semester	**1**	**0-0-4**	**3**

(F113A) ENGINEERING DRAWING AND COMPUTER GRAPHICS
(COMMON TO ME, ECE & MIE)

Course Objectives:

The student will

1. learn a system, component, using conventional graphics for manufacturability.
2. prepare to communicate the projections of points, lines and planes effectively.
3. learn to use the techniques, skills, and modern graphic tools for generating projections of solids.
4. learn to convert an object into isometric views and vice versa.
5. learn computer-aided drawings.

UNIT – I: INTRODUCTION TO ENGINEERING DRAWING (2 Lecture classes and 8 Practical's): Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloids, Hypocycloid and In volute.

UNIT – II: ORTHOGRAPHIC PROJECTIONS AND PROJECTIONS OF POINTS, LINES AND PLANES (2 Lecture classes and 12 Practical's): Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined to both the Planes- Draw simple annotation, dimensioning and scale.

UNIT – III: PROJECTIONS OF REGULAR SOLIDS AND SECTIONAL VIEWS OF RIGHT REGULAR SOLIDS (2 Lecture Classes And 12 Practical's): Projections of regular solids - Prism, Cylinder, Pyramid, Cone – Auxiliary Views; , Draw the sectional views of geometrical solids.

UNIT – IV: ISOMETRIC AND ORTHOGRAPHIC PROJECTIONS(2 Lecture classes and 12 Practical's): Principles of Isometric projection – Isometric Scale, Isometric Views, Conversion of Isometric Views to Orthographic Views and Vice-versa.

UNIT – V: OVERVIEW OF COMPUTER GRAPHICS (**2 Lecture classes and 16 Practical's):** *Drafting Software*:Computer Aided Drafting (CAD) – Drafting Software – Manual Drafting vs Auto CAD Drafting. *Auto CAD commands*: Starting Auto CAD - Auto CAD commands – (Generation of Points, Lines, Curves and Polygons) - Editing and Modifications - Drafting Settings - Dimensioning and Text - Geometrical Constructions. Projection of Points - Straight Lines - Plane surfaces – Solids - Isometric projections

Note: CAD Lab facility is required for this unit.

(Only theory Question to be set from this Unit for Examinations)

TEXT BOOKS :

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2. K. Venugopal& V. Prabhu Raja (2011), Engineering Drawing + Auto CAD, New Age International Publishers. Fifth Edition.
3. CAD Software Theory and User Manuals.

REFERENCES:

1. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers.
2. Agrawal B. &Agrawal C. M. (2012), Engineering Graphics, TMH Publication.

Course Outcomes:

The student will be able to:

1. identify the principals of engineering drawings.
2. examine visual aspects of engineering drawing and graphics.
3. draw the three dimensional objects.
4. demonstrate the ideas of engineering components in the form of a drawing.
5. design creative Engineering working drawings.

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B.Tech. ECE	**L**	**T-P-D**	**C**
I Year - I Semester	**3**	**0-0-0**	**3**

(F115A) PROGRAMMING FOR PROBLEM SOLVING
(COMMON TO EEE, ECE & ECM)

Course Objectives:
The students will

1. learn the fundamentals of computers.
2. understand the various steps in program development.
3. understand the syntax and semantics of C programming language.
4. learn the usage of structured programming approach in solving problems.
5. gain the knowledge on searching and Sorting methods.

UNIT – I:INTRODUCTION TO PROGRAMMING :

Introduction to components of a computer system: disks, primary and secondary memory, processor, operating system, compilers, creating, compiling and executing a program etc., Number systems.

Introduction to Algorithms: steps to solve logical and numerical problems. Representation of Algorithm, Flowchart/Pseudo code with examples, Program design and structured programming.

Introduction to C Programming Language: variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code , Operators, expressions and precedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion, The main method and command linear arguments.

Bitwise operations: Bitwise AND, OR, XOR and NOT operators Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, ternary operator, goto, Iteration with for, while, do- while loops.I/O: Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout and stderr.

UNIT – II: ARRAYS, STRINGS, STRUCTURES AND PREPROCESSOR:

Arrays: one and two dimensional arrays, creating, accessing and manipulating elements of arrays.

Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings

Structures: Defining structures, initializing structures, unions, Array of structures

Preprocessor: Commonly used Preprocessor commands like include, define, undef, if, ifdef, ifndef.

UNIT – III: POINTERS AND FILE HANDLING IN C:

Pointers: Idea of pointers, Defining pointers, Pointers to Arrays and Structures, Use of Pointers in self-referential structures, usage of self referential structures in linked list (no implementation) Enumeration data type.

Files: Text and Binary files, Creating and Reading and writing text and binary files, Appending data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell and rewind functions.

UNIT – IV : FUNCTION AND DYNAMIC MEMORY ALLOCATION:

Functions: Designing structured programs, Declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, Passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries.

Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions.

Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays of different data types.

UNIT – V : INTRODUCTION TO ALGORITHMS:

Basic searching algorithms (linear and binary search techniques), Basic sorting algorithms (Bubble, Insertion, Quick, Merge and Selection sort algorithms) Basic concept of order of complexity through the example programs.

TEXT BOOKS:

1. ReemaThareja ,Programming in C, Oxford university press.
2. B.A. Forouzan and R.F. Gilberg, C Programming and Data Structures, Cengage Learning, (3rdEdition).

REFERENCES:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language,Prentice Hall of India.
2. R.G. Dromey, How to solve it by Computer, Pearson (16thImpression).
3. Stephen G. Kochan, Programming in C, Fourth Edition, PearsonEducation.
4. Herbert Schildt, C: The Complete Reference, McGrawHill, 4thEdition.
5. Byron Gottfried, Schaum's Outline of Programming with C,McGraw-Hill.

Course Outcomes:

The Student will be able to:

1. design the algorithms/flowcharts to C programs.
2. write the code and test a given logic in C programming language.
3. decompose a problem into functions and to develop modular reusable code.
4. make use arrays, pointers, strings and structures to write C programs.
5. apply searching and sorting algorithms.

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B.Tech. ECE	**L**	**T-P-D**	**C**
I Year - I Semester	**3**	**1-0-0**	**4**

(F110D) ENGINEERING CHEMISTRY
(COMMON TO EEE, ECE & ECM)

Course Objectives:

The student will

1. know the suitability of water for domestic and industrial purposes.
2. bring adaptability to new developments in Engineering Chemistry and to acquire the skills required to become a perfect engineer.
3. study the principles of electrochemistry and corrosion.
4. acquire knowledge of chemical reactions those are used in the synthesis of molecules.
5. understand the importance of spectroscopic techniques and molecular energy levels.

UNIT – I: ATOMIC STRUCTURE AND THEORIES OF BONDING:

Atomic and Molecular orbitals. Linear Combination of Atomic Orbitals (LCAO), molecular orbitals of diatomic molecules, molecular orbital energy level diagrams of N_2, O_2, F_2, CO and NO. Crystal Field Theory (CFT): Salient Features of CFT – Crystal Field Splitting of transition metal ion d- orbitals in Tetrahedral, Octahedral and square planar geometries. Band structure of solids and effect of doping on conductance.

UNIT – II: WATER AND ITS TREATMENT:

Introduction – hardness of water – Causes of hardness - Types of hardness: temporary and permanent – expression and units of hardness – Estimation of hardness of water by complexometric method. Potable water and its specifications. Steps involved in treatment of water – Disinfection of water by chlorination and ozonization. Boiler feed water and its treatment – Calgon conditioning, Phosphate conditioning and Colloidal conditioning. External treatment of water – Ion exchange process. Desalination of water – Reverse osmosis. Numerical problems.

UNIT – III : ELECTROCHEMISTRY AND CORROSSION:

Electro chemical cells – electrode potential, standard electrode potential, types of electrodes – calomel, Quinhydrone and glass electrode. Nernst equation, determination of pH of a solution by using quinhydrone and glass electrode. Electrochemical series and its applications. Numerical problems. Batteries – Primary (Lithium cell) and secondary batteries (Lead – acid storage battery).

Corrossion: Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods-

Cathodic protection – Sacrificial anode and impressed current cathodic methods. Surface coatings – metallic coatings – techniques of coating-hot dipping, cementation and electroplating of Copper.

UNIT–IV: SPECTROSCOPIC TECHNIQUES AND APPLICATIONS:

Principles of spectroscopy, selection rules and applications of electronic spectroscopy. Vibrational and rotational spectroscopy. Basic concepts of Nuclear magnetic resonance Spectroscopy, chemical shift. Introduction to Magnetic resonance imaging.

UNIT – V: REACTION MECHANISM AND SYNTHESIS OF DRUG MOLECULES:

Substitution reactions: Nucleophilic substitution reactions: Mechanism of S_N1, S_N2 reactions. Electrophilic and nucleophilic addition reactions: Addition of HBr to propene. Markownikoff and anti Markownikoff's additions. Grignard additions on carbonyl compounds. Elimination reactions: Dehydro halogenation of alkylhalides. Saytzeff rule. Oxidation reactions: Oxidation of alcohols using KMnO4 and chromic acid. Reduction reactions: reduction of carbonyl compounds using $LiAlH_4$ and $NaBH_4$. Structure, synthesis and pharmaceutical applications of Paracetamol and Aspirin.

TEXT BOOKS:

1. Engineering Chemistry by P. C. Jain & M. Jain; DhanpatRai Publishing Company (P) Ltd., New Delhi.
2. Fundamentals of Molecular Spectroscopy, by C.N. Banwell
3. Organic Chemistry: Structure and Function by K.P.C. Volhardt and N. E. Schore, 5th Edition.
4. University Chemistry, by B.M. Mahan, Pearson IV Edition.
5. Physical Chemistry, by P.W. Atkins

REFERENCES:

1. Engineering Chemistry(NPTEL web book) by B. L. Tembe, Kamaluddin and M.S.Krishnan.
2. Stereochemistry of organic compounds by D.Narsipuri published by New age international publishers.

Course Outcomes:

The student will be able to:

1. analyze microscopic chemistry in terms of atomic and molecular orbitals.
2. identify the suitability of water for domestic and industrial purposes.
3. apply the basic principle of electro chemistry.
4. prepare the drug molecules.
5. distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
I Year - I Semester	**0**	**0-4-0**	**2**

(F1107) PROGRAMMING FOR PROBLEM SOLVING LAB
(COMMON TO EEE, ECE & ECM)

Course Objectives:

The student will

1. work with an IDE to create, edit, compile, run and debug programs
2. analyze the various steps in program development.
3. develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
4. develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.
5. write programs using the Dynamic Memory Allocation concept, files.

1. SIMPLE NUMERIC PROBLEMS:

a) Write a program for find the max and min from the three numbers.
b) Write the program for the simple, compound interest.
c) Write program that declares Class awarded for a given percentage of marks, where mark<40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >=70% = Distinction. Read percentage from standard input.

2. EXPRESSION EVALUATION:

a) Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result (Consider the operators +,-,*, /, % and use Switch Statement).
b) Write a program that finds if a given number is a prime number.
c) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of these sequence.
d) Write a C program to find the roots of a Quadratic equation.

3. ARRAYS AND POINTERS AND FUNCTIONS:

a) Write a C program to find the minimum, maximum and average in an array of integers.
b) Write a C program to find Addition of Two Matrices.
c) Write a C program to find Multiplication of Two Matrices.
d) Write C programs that use both recursive and non-recursive functions.
Write a program for reading elements using pointer into array and display the values using array.

4. Files:

a) Write a C program to display the contents of a file to standard output device.
b) Write a C program which copies one file to another, replacing all lowercase

characters with their upper case equivalents.

c) Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command line arguments.

5. Strings:

a) Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)

b) Write a C program to count the lines, words and characters in a given text.

6. Sorting and Searching:

a) Write a C program for using binary search method.
b) Write a C program for linear search.
c) Write a C program that implements the Bubble sort method.
d) Write a C program that implements the Insertion sort method.
e) Write a C program that implements the Quick sort method.
f) Write a C program that implements the Merge sort method.

ADDITIONAL PROGRAMS (Given to Students as Assignment):

1) Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:
   a. 5 x 1 = 5
   b. 5 x 2 =10
   c. 5 x 3 =15
2) Write a program that shows the binary equivalent of a given positive number between 0 to 255.
3) Write a C program to find the sum of individual digits of a positive integer and test given Number is palindrome.
4) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
5) Write a C program to calculate the following, where x is a fractional value. 1-x/2+x^2/4-x^3/6.
6) Write a C program to read in two numbers, x and n, and then compute the sum of this geometricprogression:1+x+x^2+x^3+.....+x^n. For example: if n is 3 and x is 5, then the program computes 1+5+25+125.
7) Write a C program to find the minimum, maximum and average in an array of integers.
8) Write a functions to compute mean, variance, Standard Deviation, sorting of n

elements in single dimension array.

9) Write a C program that uses functions to perform the following:
   (a) Transpose of a matrix with memory dynamically allocated for the new matrix as row and column counts may not be same.
   (b) To find the factorial of a given integer.
   (c) To find the GCD (greatest common divisor) of two given integers.

10) Write a C program that does the following:
   (a) It should first create a binary file and store 10 integers, where the file name and 10 values are given in the command line. (hint: convert the strings using atoi function) Now the program asks for an index and a value from the user and the value at that index should be changed to the new value in the file. (hint: use fseek function). The program should then read all 10 values and print them back.
   (b) Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file).

11) Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.

12) Write a C program that converts a number ranging from 1 to 50 to Romane quivalent.

13) Write a C program that uses functions to perform the following operations:
   (a) To insert a sub-string in to a given main string from a given position.
   (b) To delete n Characters from a given position in a given string.

14) Write a C program to construct a pyramid of numbers as follows:

```
1          *          1          1          *
1 2        * *        2 3        2 2          * *
1 2 3      * * *      4 5 6      3 3 3          * * *
                                 4 4 4 4      * *
                                              *
```

Write a C program that sorts a given array of names.

Suggested Reference Books for solving the problems:

1. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rdEdition).
2. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language Prentice Hall ofIndia.
3. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression).
4. Stephen G. Kochan, Programming in C, Fourth Edition, Pearson Education.
5. Herbert Schildt, C: The Complete Reference, McGrawHill, 4th Edition.
6. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.

Course Outcomes:

The student will be able to:

1. formulate the algorithms for simple problems.
2. examine syntax errors as reported by the compilers.
3. define and manipulate data with arrays, strings and structures.
4. make use pointers of different types, functions.
5. create, read and write to and from simple text and binary files.

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B.Tech. ECE	**L**	**T-P-D**	**C**
I Year - I Semester	**0**	**0-3-0**	**1.5**

(F1102) CHEMISTRY LAB
(COMMON TO EEE, ECE & ECM)

Course Objectives:
The student will

1. study estimation of hardness and chloride content in water to check its suitability for drinking purpose.
2. determine the rate constant of reactions from concentrations as a function of time.
3. demonstrate measurement of physical properties like absorption and viscosity.
4. synthesize the drug molecules and check the purity of organic molecules by thin layer chromatographic (TLC) technique.
5. measure the conductance and EMF values of solutions.

EXPERIMENTS:

1. Determination of total hardness of water by complexometric method using EDTA.
2. Determination of chloride content of water by Argentometry.
3. Estimation of an HCL by Conductometric titrations.
4. Estimation of Acetic acid by Conductometric titrations.
5. Estimation of HCL by Potentiometric titrations.
6. Estimation of Fe^{2+} by Potentiometry using KMnO4.
7. Estimation of amount of Cu^{+2} by Colorimetry.
8. Estimation of amount of $KMnO_4$ by Colorimetry.
9. Synthesis of Aspirin and Paracetamol.
10. Determination of acid value of coconut oil.
11. Thin layer chromatography calculation of R_f values,egortho and para nitro phenols.
12. Determination of viscosity of castor oil and ground nut oil by using Ostwald's viscometer.
13. Determination of partition coefficient of acetic acid between n-butanol and water.
14. Determination of surface tension of a give liquid using stalagmometer.

REFERENCES:

1. B.D. Khosla, A. Gulati and V. Garg ,Senior practical physical chemistry, B (R. Chand & Co., Delhi).
2. K.K. Sharma and D. S. Sharma , An introduction to practical chemistry, (Vikas publishing, N. Delhi).
3. Vogel's text book of practical organic chemistry 5th edition.
4. Text book on Experiments and calculations in engineering chemistry – S.S. Dara.

Course Outcomes: The student will be able to

1. estimate the parameters like hardness and chloride content in water.
2. determine the rate constant of a reaction from concentration – time relationships.
3. Measure the physical properties like absorption and viscosity.
4. Evaluate the R_f values of some organic molecules by TLC technique.
5. determine the partition coefficient of a organic compound in two immissible liquids.

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B.Tech. ECE	**L**	**T-P-D**	**C**
I Year - II Semester	**3**	**1-0-0**	**4**

(F120A) MATHEMATICS-II
(ADVANCED CALCULUS)
(COMMON TO CE, EEE, ME, ECE, CSE, IT, ECM & MIE)

Course Objectives:

The student will

1. study geometrical approach to the mean value theorems and their application to the mathematical problems & Evaluation of improper integrals using Beta and Gamma functions.
2. understand finding maxima and minima of function of two and three variables.
3. evaluate multiple integrals and their applications.
4. study the physical quantities involved in engineering field related to vector valued functions.
5. understand the basic properties of vector valued functions and their applications to line, surface and volume integrals.

UNIT - UNIT – I: CALCULUS:

Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem. Taylor's Series.

Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates), Definition of Improper Integral: Beta and Gamma functions and their applications.

UNIT – II: MULTIVARIABLE CALCULUS (PARTIAL DIFFERENTIATION AND APPLICATIONS):

Definitions of Limit and continuity. Partial Differentiation; Euler's Theorem; Total derivative; Jacobian; Functional dependence & independence, Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

UNIT – III: MULTIVARIABLE CALCULUS (INTEGRATION):

Evaluation of Double Integrals (Cartesian and polar coordinates); change of order of integration (only Cartesian form); Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals.

Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals), Centre of mass and Gravity (constant and variable densities) by double and triple integrals (applications involving cubes, sphere and rectangular parallelopiped).

UNIT – IV : VECTOR DIFFERENTIATION:

Vector point functions and scalar point functions. Gradient, Divergence and Curl.

Directional derivatives, Tangent plane and normal line. Vector Identities. Scalar potential functions. Solenoidal and Irrotational vectors.

UNIT – V : VECTOR INTEGRATION:

Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and their applications.

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006.
3. R.K.Jain& S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 4th Edition, 2014.

REFERENCES:

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
2. G.B.Thomas and R.L.Finney, Calculus and Analytic Geometry, 9th Edition, Pearson, Reprint, 2010.

Course Outcomes:

The student will be able to:

1. solve the applications on the mean value theorems and also evaluate the improper integrals using Beta and Gamma functions.
2. examine for maximum and minimum extreme values of functions of two variables with/without constraints.
3. evaluate the multiple integrals and apply the concept to find areas, volumes, centre of mass and Gravity for cubes, sphere and rectangular parallelepiped.
4. compute partial derivatives, Derivatives of vector valued functions and gradient functions.
5. evaluate the line, surface and volume integrals and converting them from one to another.

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B.Tech. ECE	**L**	**T-P-D**	**C**
I Year - II Semester	**2**	**0-0-0**	**2**

(F120B) ENGLISH
(COMMON TO EEE, ME, ECE, CSE, IT & MIE)

Course Objectives:
The student will

1. understand the concept of Raman Effect and concept in LSRW skills.
2. acquire the knowledge in ancient architecture in India and Vocabulary.
3. learn how denim jeans were manufactured.
4. know practice of healthy eating.
5. know how to change their fortune.

UNIT –I:

'The Raman Effect' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.
Vocabulary Building: The Concept of Word Formation --The Use of Prefixes and Suffixes.
Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions. **Reading:** Reading and Its Importance- Techniques for Effective Reading.
Basic Writing Skills: Sentence Structures -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for writing precisely – **Paragraph writing** – Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

UNIT – II:

'Ancient Architecture in India' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.
Vocabulary: Synonyms and Antonyms, Homophones, Homonyms, and Homographs.
Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.
Reading: Improving Comprehension Skills – Techniques for Good Comprehension
Writing: Format of a Formal Letter-**Writing Formal Letters** E.g.., Letter of Complaint, Letter of Requisition, and Job Application with Resume.

UNIT – III :

'Blue Jeans' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.
Vocabulary: Acquaintance with Prefixes and Suffixes from Foreign Languages in English to form Derivatives-Words from Foreign Languages and their Use in English.
Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.
Reading: Sub-skills of Reading- Skimming and Scanning
Writing: Nature and Style of Sensible Writing- **Defining- Describing** Objects, Places and

Events – **Classifying**- Providing Examples or Evidence and Essay Writing

UNIT – IV:

'What Should You Be Eating' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Standard Abbreviations in English

Grammar: Redundancies and Clichés in Oral and Written Communication.

Reading: Comprehension**-** Intensive Reading and Extensive Reading

Writing: Writing Practices--Writing Introduction and Conclusion -Précis Writing.

UNIT – V :

'How a Chinese Billionaire Built Her Fortune' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Technical Vocabulary and their usage

Grammar: Common Errors in English

Reading: Reading Comprehension-Exercises for Practice

Writing: Technical Reports- Introduction – Characteristics of a Report – Categories of Reports.

TEXT BOOKS:

1. Sudarshana, N.P. and Savitha, C. (2018). English for Engineers. Cambridge University Press.

REFERENCES:

1. Swan, M. (2016). Practical English Usage. Oxford University Press.
2. Kumar, S and Lata, P.(2018). Communication Skills. Oxford University Press.
3. Wood, F.T. (2007).Remedial English Grammar. Macmillan.
4. Zinsser, William. (2001). On Writing Well. Harper Resource Book.
5. Hamp-Lyons, L. (2006).Study Writing. Cambridge University Press.
6. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. Oxford University Press.

Course Outcomes:

The student will be able to

1. assess the nature of diffraction and use LSRW skills in his day to day life conversations.
2. analyze the ideas in the construction field.
3. design different models in manufacturing jeans.
4. adapt balanced eating habits.
5. focus on their career.

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B.Tech. ECE	**L**	**T-P-D**	**C**
I Year - II Semester	**3**	**1-0-0**	**4**

(F122A) BASIC ELECTRICAL ENGINEERING
(COMMON TO CE, ME, CSE, IT & MIE)

Course Objectives:
The student will

1. study the concept of electrical circuits using network laws and theorems.
2. outline and analyse single phase A.C and three phase A.C circuits.
3. study and understand magnetic circuits and transformers.
4. understand the different types of D.C and A.C rotating electrical machine.
5. import the knowledge of protection and switch gear of electrical components.

UNIT-I: DC Circuits:
Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff's current and voltage laws, analysis of simple circuits with DC excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

UNIT –II: AC Circuits:
Representation of sinusoidal waveforms, peak and rms values, phasor representation, realpower, reactive power, apparent power, power factor. Analysis of single-phase AC circuits consisting of R, L, C, RL, RC and RLC series combinations, resonance in series RLC circuit. Three phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-III: Transformers:
Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

UNIT-IV: Rotating Electrical Machines:
D.C Motors - principle of operation, characteristics, speed control and application of series and shunt motor. Three-phase induction motor - construction, generation of rotating magnetic fields, principle of operation, torque-slip characteristics. Single-phase induction motor - construction, working, torque-speed characteristic.

UNIT –V: Electrical Installations:
Components of LT switchgear: Switch fuse unit (SFU), MCB, ELCB, MCCB, types of wires and cables, earthing. Types of batteries, important characteristics for batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

TEXT BOOKS :

1. D. P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 2010.
2. D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009.
3. L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.

REFERENCES:

1. E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
2. V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989.

Course Outcomes:

The student will be able to

1. illustrate and solve electrical circuits using network laws and theorem.
2. acquire knowledge about the single phase and three phase electrical circuits.
3. get exposure of magnetic circuits and transformers.
4. demonstrate the working principle of electrical machines.
5. acquire the knowledge on components of low voltage electrical installation.

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B.Tech. ECE	**L**	**T-P-D**	**C**
I Year - II Semester	**3**	**1-0-0**	**4**

(F120C) APPLIED PHYSICS
(COMMON TO EEE, ECE & ECM)

Course Objectives:

The student will

1. demonstrate skills in scientific inquiry, problem solving and laboratory techniques.
2. demonstrate competency and understanding of the concepts found in Quantum Mechanics, Semiconductor physics, Fiber optics and lasers and Electromagnetic theory and a broad base of knowledge in physics.
3. solve non-traditional problems that potentially draw on knowledge in multiple areas of physics.
4. study applications in engineering like memory devices, transformer core and electromagnetic machinery.
5. study semiconductor physics, Fiber optics and lasers and Electromagnetic theory and a broad base of knowledge in physics.

UNIT-I: Quantum Mechanics:

Introduction to quantum physics, Black body radiation, Planck's law, Photoelectric effect, Compton effect, de-Broglie's hypothesis, Wave-particle duality, Davisson and Germer experiment, Heisenberg's Uncertainty principle, Born's interpretation of the wave function, Schrodinger's time independent wave equation, Particle in one dimensional box.

UNIT-II: Electronic Materials:

Classical Free electron theory, Quantum free electron theory, Fermi energy level, Occupation probability, Density of States, Bloch Theorem, Kronig- Penny model, E-K Diagram, Effective mass of Electron, Band Theory of solids, Classification of materials.

UNIT-III: Semiconductor Physics:

Intrinsic and Extrinsic semiconductors, Carrier Concentration in intrinsic and extrinsic Semiconductors, Dependence of Fermi level on carrier-concentration and temperature, Carrier generation and recombination, Carrier transport: diffusion and drift, p-n junction diode, V-I Characteristic, Diode equation(qualitative treatment), Zener diode , Hall effect, LED, Photo diode and Solar cell.

UNIT-IV: Lasers and Fibre Optics :

Lasers: Introduction, absorption, spontaneous emission, Stimulated emission, calculation of Einstein co-efficient, Population inversion, Pumping, Lasing action, Types of Lasers: Ruby laser, He-Ne laser, Semiconductor laser, Applications of laser.

Fibre Optics: Introduction, Construction and working principle of Optical fibre,

Acceptance angle, Acceptance cone and Numerical aperture, Types of optical fibres, Applications of optical fibres.

UNIT-V: Electromagnetism:

Laws of electrostatics, Electric current and the continuity equation, Ampere's and Faraday's laws, Maxwell's equations, The wave equation: Plane Electromagnetic waves in vacuum, their Transverse nature, Polarisation, Permittivity and Dielectric constant, Internal fields in a solid, Clausius-Mossotti equation, Ferroelectrics and Piezoelectric.

TEXT BOOKS:

1. B.K. Pandey, S. ChaturvediEngineering Physics, CengageLearing.
2. Halliday and Resnick, Physics, Wiley.
3. Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar - Chand,A textbook of Engineering Physics, Chand

REFERENCES:

1. Richard Robinett, Quantum Mechanics.
2. SJ.Singh, emiconductor Optoelectronics: Physics and Technology, McGraw-Hill inc. (1995).
3. by Monica Katiyar and Deepak GupthaOnline Course: "Optoelectronic Materials and Devices" on NPTEL.
4. P.K.Palanisamy, "Engineering Physics", Scitech Publications, Fourth edition.

Course Outcomes:

The student will be able to

1. identify the behavior of a particles in quantum mechanics.
2. describe classification of materials based on band theory of solids.
3. analyze the properties of semiconducting materials and devices.
4. describe principles of fiber optics, different types of fiber optics, laser & its applications.
5. categorize various magnetic dielectric properties and apply them in engineering applications.

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B.Tech. ECE	**L**	**T-P-D**	**C**
I Year - II Semester	**0**	**0-2-0**	**1**

(F1201) ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB
(COMMON TO EEE, ME, ECE, CSE, IT & MIE)

Course Objectives:
The student will :

1. recognize sounds of English .
2. apply stress and intonation while speaking .
3. develop Listening skills.
4. develop introducing himself and others.
5. understand how to describe, debate and knows the types of presentations.

The following course content is prescribed for the English for the English Language and Communication Skills Lab based on Unit -6 of AICTE Model Curriculum 2018 for B.Tech First English. As the syllabus is very limited, it is required to prepare teaching/learning materials by the teachers collectively in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning and timesaving in the lab.

SYLABUS:

English Language and Communication Sills Lab (ELCS) will have two parts:

1. **Computer Assisted Language Learning (CALL) Lab.**
2. **Interactive Communication Skills (ICS) Lab.**

Exercise – I:

CALL Lab:

Understand:Listening Skill- Its importance – Purpose- Process- Types- Barriers of Listening.
***Practice*:** Introduction to Phonetics – Speech Sounds – Vowels and Consonants.
ab: *Understand:* Communication at Work Place- Spoken vs. Written language. *Practice:* Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

Exercise – II:

CALL Lab:

Understand:Structure of Syllables – Word Stress and Rhythm– Weak Forms and Strong Forms in Context.
Practice:Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms in Context.

ICS Lab:

Understand:Features of Good Conversation – Non-verbal Communication.
Practice:Situational Dialogues – Role-Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette.

Exercise – III:

CALL Lab:

Understand:Intonation-Errors in Pronunciation-the Influence of Mother Tongue (MTI).
Practice:Common Indian Variants in Pronunciation – Differences in British and American Pronunciation.
ICS Lab:

Understand:How to make Formal Presentations.
Practice:Formal Presentations.

Exercise – IV:

CALL Lab:

Understand:Listening for General Details.
Practice:Listening Comprehension Tests.
ICS Lab:
Understand:Public Speaking – Exposure to Structured Talks.
Practice:Making a Short Speech – Extempore.

Exercise – V:

CALL Lab:

Understand:Listening for Specific Details.
Practice:Listening Comprehension Tests.
ICS Lab:
Understand:Interview Skills.
Practice:Mock Interviews.
Computer Assisted Language Learning (CALL) Lab:
The Computer Assisted Language Learning Lab has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self- study by students. **System Requirement (Hardware component):** *Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:*

i) Computers with Suitable Configuration
ii) High Fidelity Headphones

Interactive Communication Skills (ICS) Lab:

The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public-Address System, a LCD and a projector etc.

Course Outcomes

The student will be able to:

1. develop correct pronunciation.
2. use stress and intonation properly while speaking and writing.
3. develop listening skills.
4. describe himself and others in day to day life situations.
5. acquire debating and oral presentation skills.

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B.Tech. ECE	**L**	**T-P-D**	**C**
I Year - II Semester	**0**	**0-2-0**	**1**

(F1204) BASIC ELECTRICAL ENGINEERING LAB
(COMMON TO EEE, ECE & ECM)

Course Objectives:

The student will

1. analyze a given network by applying various electrical laws and network theorems.
2. know the response of electrical circuits for different excitations.
3. calculate, measure and know the relation between basic electrical parameters.
4. analyze the performance of single phase and three phase Transformers.
5. analyze the performance characteristics of DC and AC electrical machines.

Choice of 10-12 experiments from the following

List of Experiments

1. Verification of Ohms Law.
2. Verification of KVL and KCL.
3. Transient response of series RL and RC circuits using DC excitation.
4. Transient response of RLC series circuit using DC excitation.
5. Resonance in series RLC circuit.
6. Calculations and verification of impedance and current of RL, RC and RLC series circuits.
7. B-H loop for single phase transformers.
8. Measurement of voltage, current and real power in primary and secondary circuits of a single phase transformer.
9. Load test on single phase transformer (Calculate Efficiency and Regulation).
10. Three phase transformer: Verification of relationship between voltages and currents (Star-Delta, Delta-Delta, Delta-star, Star-Star).
11. Measurement of active and reactive power in a balanced three-phase circuit.
12. Performance Characteristics ofa DC Shunt Motor.
13. Torque-Speed Characteristics of a DC Shunt Motor.
14. Performance Characteristics of a Three-phase Induction Motor.
15. Torque-speed Characteristics of a Three-phase Induction Motor.

Course Outcomes:

The student will be able to

1. demonstrate electrical circuits with basic electrical laws.
2. make use of different types of electrical circuits to different excitations.
3. understand the measurement, calculation and relation between the basic electrical parameters.
4. illustrate the basic characteristics of transformers .
5. test the performance of various electrical machines.

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B.Tech. ECE	**L**	**T-P-D**	**C**
I Year - II Semester	**0**	**0-3-0**	**1.5**

(F1202) APPLIED PHYSICS LAB
(COMMON TO EEE, ECE & ECM)

Course Objectives: The student will

1. demonstrate skills in scientific inquiry, problem solving and laboratory techniques.
2. demonstrate competency and understanding of the concepts found in LED, Electric and Electronic materials a broad base of knowledge in physics.
3. solve Experimental problems that potentially draw an experimental knowledge in multiple areas of physics.
4. study applications in engineering like Hall effect, and magnetic properties.
5. study applications in engineering like Optical fiber, LASER, Photodiode and Solar cell.

List of Experiments

1. Energy gap of P-N junction diode: To determine the energy gap of a semiconductor diode.
2. Solar Cell: To study the V-I Characteristics of solar cell.
3. Light emitting diode: Plot V-I and P-I characteristics of light emitting diode.
4. Optical fiber: Determination of Numerical Aperture.
5. Hall effect: To determine Hall co-efficient of a given semiconductor.
6. Photoelectric effect: To determine work function of a given material.
7. LASER: To study the Wave length of LASER Source.
8. Dielectric constant: To determine the Dielectric constant of the given material.
9. LCR Circuit: To determine the Quality factor of LCR Circuit (Series& Parallel).
10. R-C Circuit: To determine the time constant of R-C circuit (Growth and Decay).

Text Books:

1. Dr. Narendra, L. Mathakari, "Experiments in Applied Physics" (Physics Lab Manual 4th edition).
2. "Engineering Physics Lab Manual" By Department of Physics, JBIET.

Course Outcomes:

The student will be able to:

1. learn the experimental concepts on in LED, Electric and Electronic materials.
2. get the knowledge of fundamentals of Semiconductor physics, Lasers and fibre optics enable the students to apply to various systems like communications, solar cell, photo cells and so on.
3. design, characterization and study of properties of material help the students to prepare new materials for various engineering applications.
4. exposed to the phenomena of electromagnetism and also to have exposure on magnetic materials and dielectric materials.
5. exposed to the phenomena of nano particle size in the materials science and engineering field.

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B.Tech. ECE	**L**	**T-P-D**	**C**
I Year - II Semester	**1**	**0-4-0**	**3**

(F1205) WORKSHOP AND MANUFACTURING PRACTICES
(COMMON TO CE, ME, ECE, ECM & MIE)

Course Objectives:

The Student will

1. learn fabricating small components using engineering tools and machines.
2. understand the working principles of maintaining dimensional accuracies and dimensional tolerances in different manufacturing processes.
3. understand assembly of various components.
4. understand the Tools used for different trades
5. learn machining practices.

(I) WORKSHOP AND MANUFACTURING PRACTICES – 10 Lecture hours

1. Brief introduction to Manufacturing processes : –
   a. machining on lathe, milling and drilling machines.
   b. basic process involved in the casting.
   c. brief process of forging , forming.
   d. metal joining , brief process of gas welding **(3 hours)**
2. Demo of working of CNC machine **(2 hours)**
3. Fitting operations & power tools **(1 hour)**
4. Electric house wiring **(1 hour)**
5. Carpentry **(1 hour)**
6. Metal casting **(1hour)**
   Welding (arc welding & gas welding), brazing **(1hour)**

(II) WORKSHOP PRACTICE: 60 hours

1. Machine shop **(12 hours) - on Lathe , Milling and drilling**
2. Fitting shop **(8 hours)**
3. Carpentry **(8 hours)**
4. Electrical house wiring **(8 hours)**
5. Welding shop **(8 hours (Arc welding 4 hrs + gas welding 4 hrs)**
6. Foundry practices – mould preparation **(8 hours)**
   Smithy – Black smithy and Tin smithy **(8 hours)**

TEXT BOOKS :

1. HajraChoudhury S.K., HajraChoudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
2. Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology", 4th edition, Pearson Education India Edition, 2002.
3. Gowri P. Hariharan and A. Suresh Babu,"Manufacturing Technology – I" Pearson Education, 2008.

REFERENCES:

1. Roy A. Lindberg, “Processes and Materials of Manufacture”, 4th edition, Prentice Hall India, 1998.
2. Rao P.N., “Manufacturing Technology”, Vol. I and Vol. II, Tata McGrawHill House, 2017.

Course Outcomes:

The student will be able to:

1. identify gauging skills.
2. apply skills of Black smithy.
3. apply skills of fabrication in design analysis.
4. produce wooden patterns for casting.
5. apply skills of fabrication in Welding.

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B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - I Semester	**3**	**0-0-0**	**3**

(F214A) ELECTRONIC DEVICES AND CIRCUITS
(COMMON TO ECE, ECM, EEE)

Course Objectives:
The student will

1. understand PN junction diode operation, characteristics and applications.
2. learn Transistor characteristics in various configurations.
3. gain knowledge on FET & MOSFET operations & Characteristics.
4. know biasing of BJT & FET and various models.
5. understand fabrication of integrated circuits.

UNIT – I: Applications of P-N Junction diode

V-I characteristics of P-N Junction as a diode, the PN- Junction as a Rectifier, Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Harmonic Components in a Rectifier circuit, Inductor Filters, Capacitor filters, L-section filters, π- Section filters, comparison of filters, DC-power supply circuit design.

Special Diodes: Zener Diode, Avalanche and Zener Breakdown, V-I characteristics of Zener Diode, voltage regulator using zener diode, Tunnel diode construction and working (using Energy Band diagram), Schottky diode, Photo diode, UJT, SCR, their construction and V-I Characteristics.

UNIT-II: Transistor (BJT) Characteristics

Introduction to Bi-Polar Junction Transistor, Different configurations, current components in a junction Transistor.

V-I characteristics in CE and CB configurations, Eber Molls model for a transistor, Small Signal Model for BJT.

UNIT-III: Field Effect Transistors (FET)

Comparison of BJT & FET, Construction & Operation of JFET, V-I Characteristics of JFET, Determination of FET Parameters from the V-I characteristics.

MOSFET Construction & Operation in Enhancement and Depletion modes, V-I Characteristics of MOSFET.

UNIT – IV: Biasing & Small Signal Models for Transistors (BJT &FET)

Need for Biasing of transistors, Determination of Quiescent point from the CE characteristics, stability factors S, Introduction to fixed bias, Self bias, and collector to base bias. Transistor circuits for quiescent point and stability factor S.

H-Parameter equivalent circuit for BJT Definition & Determination of h-Parameters from

CE, V-I Characteristics, Small Signal Models for FET Transistors, Biasing of FET, Self-Bias, Introduction to transistor amplifiers.

UNIT –V: Integrated circuit fabrication process

Basic Monolithic Integrated Circuits, Integrated Resistors, Capacitors & inductors Epitaxial growth Masking and Etching oxidation, diffusion, ion implantation, photolithography. Monolithic circuit layout, chemical vapor deposition, sputtering, twin-tub CMOS process.

TEXT BOOKS:

1. ELECTRONC DEVICES AND CIRCUITS, MILLMAN & HALKIAS, McGraw HILL.(Mandatory).
2. INTEGRATED ELECTRONICS,MILLMAN & HALKIAS, McGraw HILL.

REFERENCE BOOKS:

1. G. Streetman, and S. K. Banerjee, “Solid State Electronic Devices,” 7th edition, Pearson, 2014.
2. D. Neamen, D. Biswas "Semiconductor Physics and Devices," McGraw-Hill Education.
3. S. M. Sze and K. N. Kwok, “Physics of Semiconductor Devices,” 3rd edition, John Wiley & Sons, 2006.
4. C.T. Sah, “Fundamentals of solid state electronics,” World Scientific Publishing Co. Inc, 1991.
5. Y. Tsividis and M. Colin, “Operation and Modeling of the MOS Transistor,” Oxford Univ.Press, 2011.
6. Electronc Devices and Circuits, BOYLESTAD.

Course Outcomes:

The student will be able to

1. construct different circuits using PN-Junction diode.
2. analyze working of transistor in different configurations.
3. operate MOSFET in Enhancement and Depletion Mode.
4. apply BJT & MOSFET for biasing and small signal models.
5. analyze the fabrication process of Integrated circuits.

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B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - I Semester	**3**	**0-0-0**	**3**

(F214B) DIGITAL ELECTRONICS
(COMMON TO ECE, ECM)

Course Objectives:

The student will

1. understand Boolean Algebra and simplify Boolean functions using K-Maps.
2. emphasize on the concepts of designing combinational circuits.
3. learn how to use memory elements in FSM designs.
4. know about different logic families like CMOS, TTL and ECL.
5. gain knowledge of different PLDs and RAM organization.

Unit I: Logic Simplification

Introduction to number system, Review of Boolean Algebra and De Morgan's Theorem, SOP & POS forms, Canonical forms, Karnaugh maps up to 5 variables, Binary codes, Code Conversion.

Unit II: Combinational Logic Design

MSI devices like Comparators, Multiplexers, Encoder, Decoder, Driver & Multiplexed Display, Half and Full Adders, Subtractors, Serial and Parallel Adders, BCD Adder, Barrel shifter and ALU.

Unit III: Sequential Logic Design

Building blocks like S-R, D, T, JK and Master-Slave JK FF, Edge triggered FF, Ripple and Synchronous counters, Shift registers.

Finite state machines, Design of synchronous FSM, Algorithmic State Machines charts. Designing synchronous circuits.

Unit IV: Logic Families

TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, Tristate TTL, ECL.

CMOS families and their interfacing, TTL logic family(7400, 74S00, 74LS00), ECL Logic family, comparison of logic families.

Unit V: Programmable logic Devices & Memories

Digital system design using ROM, PLA & PAL, comparison of ROM, PLA & PAL, RAM Memory, read and write operation timing diagram.

Memory Decoding, memory Cell, Address Multiplexing, Bipolar RAM, SRAM, DRAM, Memory organization, Internal Structure, RAM Matrix at transistor level and Gate level.

Text Books:

1. R.P. Jain, "Modern digital Electronics", Tata McGraw Hill, 4th edition, 2009.
2. Douglas Perry, "VHDL", Tata McGraw Hill, 4th edition, 2002.

References Books:

1. W.H. Gothmann, “Digital Electronics- An introduction to theory and practice”, PHI, 2nd edition ,2006.
2. D.V. Hall, “Digital Circuits and Systems”, Tata McGraw Hill, 1989.
3. Charles Roth, “Digital System Design using VHDL”, Tata McGraw Hill 2nd edition 2012.

Course Outcomes:

The student will be able to

1. apply Boolean Algebra and K-Maps to minimize Boolean functions.
2. design different combinational circuits.
3. design different synchronous FSMs.
4. practice different logic families and their comparison.
5. design digital systems using different PLDs.

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B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - I Semester	**3**	**0-0-0**	**3**

(F214C) SIGNALS AND SYSTEMS

Course Objectives:
The student will

1. understand various continuous time signals and systems.
2. emphasize on the concept and methods those are necessary for analysis of continuous time signals and systems.
3. gain more familiarity with different types of transformation and their properties which include Fourier Transform, Laplace Transform and Z-Transform.
4. get Additional insight of sampling technique into various applications of signals and systems in different fields.
5. understand the convolution and correlation of signals.

Unit I: Signal Analysis
Energy and power signals, continuous and discrete time signals, continuous and discrete amplitude signals. System properties: linearity, additivity, homogeneity, shift-invariance, Causality, stability, reliability Linear shift-invariant (LSI) systems, Characterization of causality and stability of linear shift-invariant systems. Analogy between Vectors and Signals, Orthogonal Signal Space, Signal approximation using Orthogonal functions, Mean Square Error, Closed or complete set of Orthogonal functions, Orthogonality in Complex functions, Exponential and Sinusoidal signals, Concepts of Impulse function, Unit Step function, Signum function.
Fourier Analysis: Representation of Fourier series, Continuous time periodic signals, Properties of Fourier Series, Dirichlet's conditions, Trigonometric Fourier Series and Exponential Fourier Series, Complex Fourier spectrum.

Unit II: Fourier Transform
Deriving Fourier Transform from Fourier Series, Fourier Transform of arbitrary signal, standard signals, Periodic Signals, , Fourier Transforms involving Impulse function and Signum function, Properties of Fourier Transform, Introduction to Hilbert Transform.
Signal Transmission through Linear Systems
Transfer function of a LTI system, Filter characteristics of Linear Systems, Distortion less transmission through a system, Signal bandwidth, System bandwidth, Causality and Paley-Wiener criterion for physical realization.

Unit III: Convolution and Correlation of Signals
Concept of convolution in Time domain and Frequency domain, Graphical representation of Convolution, Convolution property of Fourier Transforms, Cross Correlation and Auto Correlation of functions, Properties of Correlation function, Energy density spectrum, Parseval's Theorem, Power density spectrum.
Relation between Auto Correlation function and Energy/Power spectral density function, Relation between Convolution and Correlation, Detection of periodic signals in the presence of Noise by Correlation, Extraction of signal from noise by filtering.

Unit IV: Sampling and Laplace Transforms

Sampling theorem – Graphical and analytical proof for Band Limited Signals, Impulse Sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, Effect of under sampling – Aliasing, Introduction to Band Pass sampling.

Review of Laplace Transforms (L.T), Concept of Region of Convergence (ROC), Constraints on ROC for various classes of signals, Inverse Laplace Transform, Partial fraction expansion method for inverse Laplace Transform. Properties of Laplace Transforms, Relation between Laplace Transform and Fourier Transform.

Unit V: Z Transforms

Discrete time signal representation using Complex exponential and Sinusoidal components, Periodicity of Discrete time signal using complex exponential signal, Concept of Z- Transform of a Discrete Sequence.

Distinction between Laplace, Fourier and Z Transforms, Region of Convergence in Z-Transform, Constraints on ROC for various classes of signals, Inverse Z-transform, Properties of Z-transforms.

Text Books:

1. Signals, Systems & Communications - B.P. Lathi, 2009, BSP.
2. Signals and Systems – A. Rama Krishna Rao – 2008, TMH.

References Books:

1. Fundamentals of Signals and Systems - Michel J. Robert, 2008, MGH International Edition.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, 2 ed., PHI.
3. Signals & Systems - Simon Haykin and Van Veen,Wiley, 2 ed.

Course Outcomes:

The student will be able to:

1. analyze the properties of Continuous and Discrete signals and systems with their frequency response.
2. develop input output relationship for linear shift invariant system and frequency response of both continuous-time and discrete-time systems using Fourier Transforms.
3. apply operations such as convolution, correlation for continuous and discrete time system.
4. outline the concept of sampling technique in different communication systems and the limitations of Fourier transform and need for Laplace transform to analyze the system in s- domain.
5. practice the concept of Z-Transform and frequency response of discrete time signal.

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B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - I Semester	**3**	**1-0-0**	**3**

(F214D) PROBABILITY THEORY AND STOCHASTIC PROCESSES

Course Objectives:

The student will

1. understand mathematical background and sufficient experience, so that the student can read, write, and prepare sentences in the language of probability theory, as well as solve probabilistic problems in signal processing and Communication Engineering.
2. be introduced to the basic methodology of "probabilistic thinking" and to apply it to problems.
3. understand basic concepts of probability theory and random variables, how to deal with multiple random variables, Conditional probability and conditional expectation, joint distribution and independence, mean square estimation.
4. analyze random process and application to the signal processing in the communication system.
5. learn how to apply sums and integrals to compute probabilities, means, and expectations.

Unit I: Probability and Random Variable

Probability: Set theory, Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Joint Probability, Conditional Probability, Total Probability, Bayes Theorem and Independent Events, Bernoulli's trials.

The Random Variable: Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete and Continuous, Mixed Random Variable.

Unit II: Distribution and density functions and Operations on One Random Variable

Distribution and density functions: Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Exponential Gaussian, Rayleigh and Conditional Distribution, Methods of defining Conditioning Event, Conditional Density function and its properties, problems.

Operation on One Random Variable: Expected value of a random variable, function of a random variable, moments about the origin, central moments, variance and skew, characteristic function, moment generating function, transformations of a random variable, monotonic transformations for a continuous random variable, non monotonic transformations of continuous random variable, transformations of discrete random variable.

Unit III: Multiple Random Variables and Operations on Multiple Random Variables

Multiple Random Variables: Vector Random Variables, Joint Distribution Function and Properties, Joint density Function and Properties, Marginal Distribution and density Functions, conditional Distribution and density Functions, Statistical Independence, Distribution and density functions of Sum of Two Random Variables and Sum of Several

Random Variables, Central Limit Theorem - Unequal Distribution, Equal Distributions, Markov, Chebyshev and Chernoff bounds.
Operations on Multiple Random Variables: Expected Value of a Function of Random Variables, Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions and Jointly Gaussian Random Variables: Two Random Variables case and N Random Variable case, Properties, Transformations of Multiple Random Variables.

Unit IV: Stochastic Processes-Temporal Characteristics

The Stochastic process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, Statistical Independence and concept of Stationarity: First-Order Stationary Processes, Second-Order and Wide-Sense Stationarity, Nth-Order and Strict-Sense.
Stationarity, Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function and Its Properties, Cross-Correlation Function and Its Properties, Covariance Functions and its properties, Gaussian Random Processes.
Linear system Response: Mean and Mean-squared value, Autocorrelation, Cross-Correlation Functions.

Unit V: Stochastic Processes-Spectral Characteristics

The Power Spectrum and its Properties, Relationship between Power Spectrum and Autocorrelation Function, the Cross-Power Density Spectrum and Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function.
Spectral characteristics of system response: power density spectrum of response, cross power spectral density of input and output of a linear system.

Text Books:

1. Probability, Random Variables & Random Signal Principles -Peyton Z. Peebles, TMH, 4th Edition, 2001.
2. Probability and Random Processes-Scott Miller, Donald Childers, 2ed., Elsevier,2012.

References:

1. Theory of probability and Stochastic Processes-Pradip Kumar Gosh, University Press
2. Probability and Random Processes with Application to Signal Processing - Henry Stark and John W. Woods, Pearson Education, 3rd Edition.
3. Probability Methods of Signal and System Analysis- George R. Cooper, Clave D. MC Gillem, Oxford, 3rd Edition, 1999.
4. Statistical Theory of Communication -S.P. Eugene Xavier, New Age Publications 2003.
5. Probability, Random Variables and Stochastic Processes Athanasios Papoulis and S.Unnikrishna Pillai, PHI, 4th Edition, 2002.

Course Outcomes:

The student will be able to:

1. define Simple probabilities using an appropriate sample space.
2. deduce probabilities and expectations from probability density functions (pdfs).
3. obtain Likelihood ratio tests from pdfs for statistical engineering problems.
4. build Least-square & maximum likelihood estimators for engineering problems.
5. analyze and simplify mean and covariance functions for simple random processes.

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B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - I Semester	**3**	**1-0-0**	**4**

(F210A) MATHEMATICS-III

(FOURIER SERIES AND COMPLEX ANALYSIS)

(COMMON TO EEE, ECE & ECM)

Course Objectives:
The student will

1. understand theimportance of Fourier series.
2. study basic properties of complex functions and analytic functions.
3. study taylor's series, Maclauren's and Laurent's series expansions of complex function.
4. do evaluation of integrals using residue theorem.
5. understand the mapping by general analytic functions W=f(z) .

UNIT – I: FOURIER SERIES
Determination of Fourier coefficients – Fourier series – even and odd functions, Fourier series in an arbitrary interval- even and odd periodic continuation – Half-range Fourier sine and cosine expansions.

UNIT-II: FUNCTIONS OF A COMPLEX VARIABLE
Continuity – Differentiability – Analyticity – Properties – Cauchy-Riemann conditions, Maxima – Minima principle, Harmonic and conjugate harmonic functions – Milne – Thompson method.

UNIT-III: COMPLEX INTEGRATION& POWER SERIES
Line integral – evaluation along a path and by indefinite integration – Cauchy's integral theorem – Cauchy's integral formula – Generalized integral formula. Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent series.

UNIT-IV: CONTOUR INTEGRATION
Singular point –Isolated singular point – pole of order m – essential singularity. (Distinction between the real analyticity and complex analyticity).
Residue – Evaluation of residue by formula and by Laurent series - Residue theorem, Evaluation of integrals of the type
(a) Improper real integrals $\int_{-\infty}^{\infty} f(x)dx$ (b) $\int_{c}^{c+2\pi} f(\cos\theta, \sin\theta)d\theta$

UNIT-V: CONFORMAL MAPPING
Transformation by e^z, Imz, z^2, z^n (n positive integer), Sin z, cos z, z + a/z. Translation, rotation, inversion and bilinear transformation – fixed point – cross ratio properties – invariance of circles and cross ratio – determination of bilinear transformation mapping 3 given points.

TEXT BOOKS:

1. Grewal B.S, "Higher Engineering Mathematics", Khanna publications, 42nd edition 2012.
2. Advanced Engineering Mathematics by Jain and S.R.K. Iyangar, Narosa Publications.
3. Engineering Mathematics by B.V.Ramana, Tata McGrawhill Publishing company Ltd New Delhi, 5th edition, 2011.

REFERENCES:

1. Engineering Mathematics-III by T.K.V. Iyengar & B.Krishna Gandhi & Others, S.Chand.
2. Engineering Mathematics-III by G.Shankar Rao, I.K.International Publications.
3. KREYSZIG. E, "Advanced Engineering Mathematics" JohnWiley & Sons Singapore, 10th edition, 2012.
4. Veerarajan.T " Engineering Mathematics-I", Tata McGrawhill Publishing Co.New Delhi, 5th edition, 2006.

Course Outcomes:

The student will be able to

1. find the series expansions of periodic functions.
2. construct the analytic function.
3. construct Laurent's series about the singular points.
4. use residue theorem to compute several kinds of real integrals.
5. construct conformal mappings between many kinds of domains.

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B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - I Semester	**3**	**0-0-0**	**3**

(F210E) PROFESSIONAL ETHICS

(Common to ECE, CSE, IT, ECM, EEE)

Course Objectives:

The student will

1. learn ethical values and attitudes.
2. understand the roles of a professional.
3. understand the current scenario and engineers responsibility towards the society.
4. know the types of professional ethical codes.
5. learn the need for ethical audit.

UNIT-I: Introduction to Ethics

Corporate Governance – importance of Corporate Governance, Ethics & CSR(Corporate Social Responsibility) Indian and western thoughts on ethics.

Value education, dimensions of ethics, goal setting importance of morality and ethics, basic ethical principles, moral developments theories, classification of ethical theories.

UNIT-II: Professional and professionalism

Introduction to profession, professional associations, professional's roles and professional risks. Professional accountability, successful professional, ethics and profession.

Engineering as social experimentation, engineering ethics, roles of engineers, professional responsibilities, professional rights. Professional etiquettes- Dress code, Telephone call, Email writing.

UNIT-III: Ethical codes and audits

Introduction, need for ethical codes, sample codes, corporate codes, limitations of the codes.

Need for Ethical Audit, Sustainability, Ethical standards, Ethical audit.

UNIT-IV: Human values and ethical living

Introduction, terminology, domains of learning, human values, attitudes, behavior values, attitudes and professionals.

Needs of life, harmony in life, what is ethical living, case studies.

UNIT-V: Global issues and safety

Introduction, current scenario, business ethics, environmental ethics, computer ethics, media ethics, war ethics, bio-ethics, research ethics, intellectual property right.

Safety and risk, assessment of risk, risk and cost, engineers responsibility for safety, risk benefit, analysis, risk cause and management, case studies, providing for safe exit, ethical issues of safety.

REFERENCES:

1. Professional ethics by R. Subramanian, Oxford press.
2. Text book on Professional ethics and human values by R.S.Nagarajan, New age international.
3. Professional ethics and human value by D.R.Kiran, Tata McGraw Hills education.
4. Ethics in engineering by Mike W. Martin and Roland Schinzinger, Tata McGraw Hills education.
5. Fundamental of Ethics by Edmund G Seebauer and Robert L.Barry, Oxford university press.

Course Outcomes:

The student will be able to

1. make use of ethical values and attitudes in their life.
2. implement once he/she becomes a professional.
3. solve the issues related with environment and technology.
4. apply the different types of professional ethical codes in their organization.
5. make use of the rules framed by the auditors.

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B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - I Semester	**0**	**0-2-0**	**1**

(F2141) ELECTRONIC DEVICES AND CIRCUITS LAB
(COMMON TO ECE,ECM,EEE)

Course Objectives: The student will

1. study the basic electronic components and applications.
2. observe the characteristics of different diodes..
3. study the operation and applications of rectifier.
4. study the applications of BJT as an amplifier.
5. demonstrate the characteristics of Field Effect Transistor and its applications.

NOTE: Minimum Twelve experiments to be conducted

1. Forward & Reverse Bias Characteristics of a PN Junction Diode.
2. Zener diode Characteristics and Zener diode as a voltage Regulator.
3. Half Wave Rectifier with & without filters.
4. Full Wave Rectifier with & without filters.
5. Bridge Rectifier with & without filters.
6. Input & Output Characteristics of Transistor in CB Configuration.
7. Input & Output Characteristics of Transistor in CE Configuration.
8. Measurement of h parameters of transistor in CE configuration.
9. FET characteristics.
10. Frequency response of CE amplifier.
11. Frequency response of CC amplifier.
12. SCR characteristics.
13. UJT Characteristics.

Equipments Required:

- RPS
- CRO
- Function Generators
- Multimeters
- Components

Course Outcomes: The student will be able to

1. obtain the characteristics of different electronic devices such as diodes.
2. analyze the waveforms of half wave and full wave rectifiers.
3. draw the characteristics of transistors.
4. demonstrate the operation as an amplifier.
5. analyze the characteristics of FET.

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B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - I Semester	**0**	**0-2-0**	**1**

(F2142) BASIC SIMULATION LAB

Course Objectives:

The student will

1. gain fundamentals of MATLAB tool for the analysis and processing of signals and to generate various continuous and discrete time signals.
2. determine the frequency domain analysis of signals and to convert a continuous time signal to the discrete time and reconstruction using the sampling theorem.
3. gain the knowledge about continuous time LTI/LTV systems using convolution.
4. use Laplace and Z-transforms for analyzing system function of different systems with pole zero plot (ROC).
5. analyze the different type of transformation techniques like bilinear, impulse invariant etc.

List of Programmes:

1. Basic Operations on Matrices.
2. Generation of Various Signals and Sequences (Periodic and Aperiodic), such as Unit Impulse, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc.
3. Operations on Signals and Sequences such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
4. Finding the Even and Odd parts of Signal/Sequence and Real and Imaginary parts of Signal.
5. Convolution between Signals and sequences.
6. Auto Correlation and Cross Correlation between Signals and Sequences.
7. Verification of Linearity and Time Invariance Properties of a given Continuous/Discrete System.
8. Computation of unit sample, unit step and sinusoidal responses of the given LTI system and verifying its physical realiazability and stability properties.
9. Gibbs Phenomenon.
10. Finding the Fourier Transform of a given signal and plotting its magnitude and phase spectrum.
11. Waveform Synthesis using Laplace Transform.
12. Generation of Gaussian noise (Real and Complex), Computation of its mean, M.S. Value and its Skew, Kurtosis, and PSD, Probability Distribution Function.
13. Sampling Theorem Verification.
14. Removal of noise by Autocorrelation / Cross correlation.
15. Extraction of Periodic Signal masked by noise using Correlation.
16. Verification of Weiner-Khinchine Relations.
17. Checking a Random Process for Stationarity in Wide sense.

SOFTWARE REQUIRED: MATLAB/OCTAVE

Course Outcomes:

The student will be able to

1. analyze the generation of various signals and sequences in MATLAB, including the operations on Signals and Sequences.
2. determine the Convolution and Correlation between Signals and sequences.
3. verify the Linearity, Time Invariance and Stability Properties of a given Continuous/Discrete System.
4. analyze the Waveform Synthesis using Fourier, Laplace and Z-Transform.
5. locate the Zeros and Poles and plotting the Pole-Zero maps in S-plane and Z-Plane for the given transfer function.

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B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - I Semester	**0**	**0-2-0**	**1**

(F2143) DIGITAL ELECTRONICS LAB
(COMMON TO ECE, ECM)

Course Objectives:

The student will

1. design different combinational circuits using ICs.
2. verify the functionality of various 74 series TTL ICs.
3. demonstrate working of combinational circuits using IC 74XX.
4. analyze sequential circuits behavior using various ICs.
5. simulate combinational circuits using VHDL/Verilog.

List of Experiments:

TO VERIFY THE FUNCTIONALITY of the following 74 series TTL ICs.

1. D Flip -Flop (74LS74) and JK Master-Slave Flip-Flop (74 LS73}.
2. Decade counter (74LS90) and UP-Down Counter (74 LS192).
3. Universal Shift registers- 74LS194/ 195.
4. 3-8 decoder-74LS138.
5. 4 bit comparator 74LS 85.
6. 8X1 Multiplexer-74151 and 2X4 demultiplexer-74155.
7. RAM (16X4) - 74189 (read and write operations).
8. Stack and queue implementation using RAM**,** 74189.

Simulate the internal structure of the following Digital IC's using VHDL / VERILOG and verify the operations of the Digital IC's (Hardware) in the Laboratory

1. Logic Gates- 74XX.
2. Half Adder, Full Adder.
3. 3-8 Decoders -74138.
4. 8 x 1 Multiplexer -74X151.
5. 2x4 Demultiplexer-74X155.
6. 4 bit Comparator-74X85.
7. D Flip-Flop 74X74.
8. Decade counter-74X90.

For Software Simulation

1. Computer Systems
2. LAN Connections (Optional)
3. Operating Systems
4. VHDL/ VERILOG

5. FPGAS/CPLDS (Download Tools)**.**

Course Outcomes:

The student will be able to:

1. design different combinational circuits using ICs.
2. apply the logic and analyze the truth table.
3. demonstrate working of combinational circuits using IC 74XX.
4. analyze sequential circuits behavior using ICs.
5. simulate combinational circuits using VHDL/Verilog.

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B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - I Semester	**2**	**0-0-0**	**0**

(F210C) GENDER SENSITIZATION

(Common to all branches)

Course Objectives:
The student will

1. develop students' sensibility with regard to issues of gender in contemporary India.
2. be provided a critical perspective on the socialization of men and women.
3. be introduced to information about some key biological aspects of genders.
4. be exposed to debates on the politics and economics of work.
5. help other students reflect critically on gender violence.

Unit-I: UNDERSTANDING GENDER

Gender: Why Should We Study It? (*Towards a World of Equals*: Unit -1)
Socialization: Making Women, Making Men (*Towards a World of Equals*: Unit -2)
Introduction. Preparing for Womanhood. Growing up Male. First lessons in Caste. Different Masculinities.

Unit-II: GENDER AND BIOLOGY

Missing Women: Sex Selection and Its Consequences (*Towards a World of Equals*: Unit -4)

Declining Sex Ratio. Demographic Consequences.

Gender Spectrum: Beyond the Binary (*Towards a World of Equals*: Unit -10)

Two or Many? Struggles with Discrimination.

Unit – III: GENDER AND LABOUR
Housework: the Invisible Labour (*Towards a World of Equals*: Unit -3)
"My Mother doesn't Work." "Share the Load."

Women's Work: Its Politics and Economics(*Towards a World of Equals*: Unit -7)

Fact and Fiction. Unrecognized and Unaccounted work. Additional Reading: Wages and Conditions of Work.

Unit – IV: ISSUES OF VIOLENCE-I
Sexual Harassment: Say No! (*Towards a World of Equals*: Unit -6)
Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "*Chupulu".*

Domestic Violence: Speaking Out (*Towards a World of Equals*: Unit -8)
Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Additional Reading:

New Forums for Justice.

Unit – V: ISSUES OF VIOLENCE-II

Thinking about Sexual Violence (*Towards a World of Equals*: Unit -11)

Blaming the Victim-"I Fought for my Life…." - Additional Reading: The Caste Face of Violence.

Text Books:

1. Essential Reading: All the Units in the Textbook**, "*Towards a World of Equals: A Bilingual Textbook on Gender*"** written by A.Suneetha, Uma Bhrugubanda, Duggirala Vasanta,Rama Melkote, Vasudha Nagaraj, Asma Rasheed,GoguShyamala,Deepa Sreenivas and Susie Tharu.

Course Outcomes:

The students will able to

1. develop a better understanding of important issues related to gender in contemporary India.
2. sensitize to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
3. acquire insight into the gendered division of labour and its relation to politics and economics.
4. understand that men and women students and professionals will be better equipped to work and live together as equals.
5. develop a sense of appreciation of women in all walks of life.

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B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - II Semester	**3**	**0-0-0**	**3**

(F224A) ANALOG COMMUNICATIONS

Course Objectives:

The student will

1. develop ability to analyze system requirements of analog communication systems.
2. understand the need for modulation.
3. understand the generation, detection of various analog modulation techniques. and also perform the mathematical analysis associated with these techniques.
4. acquire theoretical knowledge of each block in AM and FM receivers.
5. understand the pulse modulation techniques and study noise.

UNIT-I: Introduction to communication system, Need for modulation, Amplitude Modulation, Definition, Time domain and frequency domain description, power relations in AM waves, Generation of AM waves, square law Modulator, Switching modulator, Detection of AM Waves: Square law detector, Envelope detector.

DSB MODULATION: Double side band suppressed carrier modulators, time domain and frequency domain description, Generation of DSBSC Waves, Balanced Modulators, Ring Modulator, Coherent detection of DSB-SC Modulated waves, COSTAS Loop.

UNIT-II: **SSB MODULATION:** Frequency domain description, Frequency discrimination method for generation of AM SSB Modulated Wave, Time domain description, Phase discrimination method for generating AM SSB Modulated waves. Demodulation of SSB Waves.

Vestigial side band modulation: Frequency description, Generation of VSB Modulated wave, Time domain description, Envelope detection of a VSB Wave pulse Carrier, Comparison of AM Techniques, Applications of different AM Systems.

UNIT-III: ANGLE MODULATION: Basic concepts, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave - Comparison of FM & AM.

Generation of FM Waves: Direct Method: Parametric Variation Method, Varactor Diode, Reactance Modulator, Indirect Method: Armstrong Method, Detection of FM Waves: Balanced Frequency discriminator, Zero crossing detector, Phase locked loop, Foster Seeley Discriminator, Ratio detector.

UNIT-IV: TRANSMITTERS AND RECEIVERS: Radio Transmitters-Classification of Transmitters, AM transmitter block diagram and explanation of each block. FM transmitter block diagram and explanation of each block.

Radio Receiver - Receiver Types - Tuned radio frequency receiver, Superhetrodyne

receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, AGC, FM Receiver, Comparison with AM Receiver, Amplitude limiting.

UNIT-V: NOISE: Noise in Analog communication System, Noise in DSB& SSB System, Noise in AM System, Noise in Angle Modulation System, Threshold effect in Angle Modulation System, Pre-emphasis & de-emphasis.
PULSE MODULATION: Types of Pulse modulation, PAM (Single polarity, double polarity) PWM: Generation & demodulation of PWM, PPM, Generation and demodulation of PPM.

TEXTBOOKS:

1. Communication Systems - Simon Haykin, 2 Ed, Wiley Publications.
2. Communication Systems – B.P. Lathi, BS Publication, 2004.

REFERENCES BOOKS:

1. Electronic Communication Systems - Modulation and Transmission - Robert J. Schoenbeck, 2nd Edition, PHI.
2. Electronics & Communication System – George Kennedy and Bernard Davis, TMH 2004.
3. Principles of Communication Systems - H Taub & D. Schilling, Gautam Sahe, TMH, 2007, 3rd Edition.

Course Outcomes:

The student will be able to

1. analyze and design various modulation and demodulation of analog systems.
2. analyze the characteristics of noise present in analog systems.
3. determine Signal to Noise Ratio (SNR) performance of various Analog Communication Systems.
4. analyze and design the various Pulse Modulation Systems.
5. design low power AM and FM transmitters.

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B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - II Semester	**3**	**0-0-0**	**3**

(F224B) ANALOG CIRCUITS

Course Objectives:
The Student will
1. understand the concept of various electronic devices biasing techniques for different configurations, analysis of low frequency, high frequency single stage and multi stage amplifiers and power amplifiers.
2. learn the Different types of negative and positive feedback amplifier topologies and calculate the parameters of gain, bandwidth, input resistance and output resistance.
3. acquire the knowledge about internal structure of Linear Op-Amp Integrated Circuit.
4. understand the different real time applications of Op-Amp.
5. study the Analog to Digital and Digital to Analog converters.

UNIT – I: Transistor Circuits
Biasing schemes for BJT and FET amplifiers, bias stability, various configurations (such as CE/CS, CB/CG, CC/CD) and their features, small signal analysis, low frequency transistor models, estimation of voltage gain, input resistance, output resistance etc., design procedure for particular specifications, low frequency analysis of multistage amplifiers. High frequency transistor models, frequency response of single stage and multistage amplifiers, cascode amplifier.
POWER AMPLIFIERS: Various classes of operation (Class A, B, AB, C etc.), their power efficiency and linearity issues, calculation with practical circuits.

UNIT-II: NEGATIVE FEEDBACK IN AMPLIFIERS
Feedback topologies: Voltage series, current series, voltage shunt, current shunt, effect of feedback on gain, bandwidth etc., Voltage amplifier, Current amplifier, Trans-conductance amplifier and trans-resistance amplifier.
Oscillators: Review of the basic concept, Barkhausen criterion, RC oscillators (phase shift, Wien bridge etc.), LC oscillators (Hartley, Colpitt, Clapp etc.), non-sinusoidal oscillators.

UNIT –III: INTRODUCTION TO OP-AMP:
Differential amplifier: Basic structure and principle of operation, calculation of differential gain, common mode gain CMRR and ICMR.
OP-AMP design: design of differential amplifier for a given specification, design of gain stages and output stages, compensation.

UNIT- IV: OP-AMP APPLICATIONS:
Review of inverting and non-inverting amplifiers, summing amplifier, integrator and differentiator, precision rectifier, Schmitt trigger and its applications.
Active filters: Low pass, high pass, band pass and band stop, design guidelines.

UNIT- V: CONVERTERS
Digital-to-analog converters (DAC): Weighted resistor, R-2R ladder, resistor string etc.

Analog to-digital converters (ADC): Single slope, dual slope, successive approximation, flash etc.
Switched capacitor circuits: Basic concept, practical configurations, application in amplifier, integrator, ADC etc.

TEXT BOOKS:

1. Electronic Devices and Circuits, David A. Bell – 5th Editions, Oxford.
2. P. Horowitz and W. Hill, The Art of Electronics, 2nd edition, Cambridge University Press, 1989.
3. A.S. Sedra and K.C. Smith, Microelectronic Circuits, Saunder's College11 5. Publishing, Edition IV.
4. Paul R. Gray and Robert G.Meyer, Analysis and Design of Analog Integrated Circuits, John Wiley, 3rd Edition.
5. Linear Integrated Circuits –D. Roy Chowdhury, New Age International (p) Ltd, 3rd Ed., 2008.

REFERENCES:

1. Integrated Electronics, Jacob Millman, Christos C Halkias, TMH.
2. Microelectronic Circuits – Sedra / Smith – 5th Edition – Oxford, 2009.
3. Electronic Circuit Analysis – K. Lal Kishore, BS Publications, 2004.
4. Electronic Devices and Circuits, Anil.K. Maini, Varsha Agrawal, 1st Edition, WILEY.
5. Electronic Devices and Circuits – 2nd Edition by Muhammad H.Rashid, Cengage Learning.

Course Outcomes:

The student will be able to

1. design the Low frequency, High frequency Single stage and Multi stage amplifiers and Power amplifiers.
2. determine the gain, input and output resistance of different negative feedback amplifiers and design different types Audio and Radio Oscillators.
3. design the differential Amp in Op-Amp to get desired specifications.
4. practice the different applications of Op-Amp.
5. analyze the operations of different ADC's and DAC's using OP-Amp.

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B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - II Semester	**3**	**0-0-0**	**3**

(F224C) MICROPROCESSORS AND MICROCONTROLLERS

Course Objectives:

The Student will

1. understand the basic 16-bit microprocessor architecture and its functionalities.
2. develop the microprocessor based programs for various applications.
3. make the interfacing in between microprocessor and various peripherals.
4. develop the microcontroller based programs for various applications.
5. understand basic feature of 8051 controller.

UNIT-I

8086 Architecture and Programming: 8086 Architecture, Register organization, memory segmentation, physical memory organization, signal description of 8086, Timing diagrams, instruction formats, instruction set, addressing modes, assembler directives, simple programs.

UNIT-II

Interfacing: 8255 PPI, Various modes of operation and interfacing to 8086, interfacing keyboard, Display, D/A and A/D converter,

Stepper motor using 8255, memory interfacing to 8086 , interrupt structure of 8086, vector interrupt table, interrupt service routine, 8251 USART.

Unit III

Introduction to Microcontrollers: overview of 8051 microcontroller architecture, memory organization, instruction set, addressing modes.

Programming: Simple programs, Timer interrupts, external hardware interrupts, serial communication interrupts.

Unit IV

Applications of 8051: Design and development of the applications in the area of communications (GSM module, GPS), keil IDE features and RTOS with 8051 in the area of automotive applications.

Unit V

Introduction to ARM controller: ARM processor families, architecture, registers, current program status register, pipeline, exception, interrupts and the vector table;

core extension, introduction to ARM instruction set.

TEXT BOOKS:

1. D.V.Hall, Microprocessors and interfacing, TMGH,2nd Edition 2006.
2. Advanced Microprocessors and peripherals-A.K.Ray and K.M Bhurchandani, TMH, 2nd Edition 2006.
3. Andrew N.Sloss, Domonic Symes, Chris Wright "ARM System Developers Guide Designing and optimizing system software" Elsevier 1st Edition 2004.

REFERENCE BOOKS:

1. Ayala, K.J., "The 8051 Microcontroller Architecture, Programming and Applications", Penram International, 2007.
2. Mazidi M.A, Mazidi JG, & Rolin D. Mckinlay, "The 8051 Microcontroller & Embedded Systems using Assembly and C ", 2/e, Pearson Education, 2007.
3. Steve Furber., "ARM System-on-Chip Architecture" 2nd Edition Addison-Wesley, 2000.

Course Outcomes:

The Student will be able to

1. analyze 8086 microprocessors architectures and its functionalities.
2. design 8086 Microprocessor based systems for real time applications using programming languages like Assembly Language and MASM.
3. interface and program external peripherals and I/O devices to 8086 microprocessor.
4. illustrate the basics of 8051 microcontroller's architecture and its functionalities.
5. design real time microcontroller based projects.

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B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - II Semester	**2**	**0-0-0**	**2**

(F220D) BIOLOGICAL SCIENCES

(Common to CSE,ECE,ECM,EEE & IT)

Course Objectives:

The student will

1. study the basis of biology.
2. know the process of inheritance & evolution.
3. gain knowledge of human systems.
4. understand the basic concept of nutrients.
5. know about different microorganisms.

UNIT - I:

Basic Biology : Introduction, Living organisms

Functions of cell organelles: Cell structure and Organelles, Organogenesis.

UNIT - II:

Human Anatomy: Systems of Life-Digestion, Respiration, Circulatory systems, Excretion, Reproduction, and Nervous systems.

UNIT - III:

Biochemistry: Diet and Nutrition- Macro (Carbohydrates, proteins, lipids) - and Micronutrients (vitamins).

Minerals: Essential minerals and their role; deficiency symptoms; and their role; deficiency symptoms.

UNIT - IV:

Microbiology: Micro organisms-Classification of Microorganisms.

Advantages and disadvantages of microorganisms: Beneficial and harmful effects of Bacteria, Fungi and Viruses.

UNIT - V:

Genetics: Basic principles of Mendel, molecular genetics, structure and function of genes and chromosomes.

Gene expressions: Transcription and Translation, gene expression and regulation.

TEXT BOOKS:

1.P K Gupta ,"Elements of Biotechnology", RASTOGI Publications
2.Dr RC Dubey ,"Advanced Biotechnology", S Chand Publications.

REFERENCE BOOKS:

1."Cell biology",Rastogi Publications.
2.Microbiology,PELCZAR.
3.Biotechnology,U.sathyanarayana.

Course Outcomes:

The student will be able to

1. acquire the Knowledge of basic biology.
2. obtain the Knowledge of Human Biological Systems.
3. apply the knowledge of Nutrients.
4. acquire Knowledge on Microorganisms.
5. employ the knowledge of genetics and gene expression.

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B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - II Semester	**3**	**1-0-0**	**4**

(F224D) ELECTRICAL CIRCUIT ANALYSIS

Course Objectives:

The student will

1. gain knowledge on solving circuit equations using network theorems.
2. find solution of first and second order networks.
3. study phasor diagrams and analysis of three phase circuits.
4. analyse electric circuits using Laplace Transform.
5. be educated on Two Port Network and Network Functions.

UNIT I: Network Theorems: Superposition theorem, Thevenin theorem, Norton theorem, Maximum power transfer theorem, Reciprocity theorem, Compensation theorem.

Analysis with dependent current and voltage sources, Node and Mesh Analysis, Concept of duality and dual networks.

UNIT II: Solution of First and second order networks: Solution of first and second order differential equations for Series and parallel R-L, R-C, RL-C circuits.

Initial and final conditions in network elements, forced and free response, time constants, steady state and transient state response.

UNIT III: Sinusoidal steady state analysis: Representation of sine function as rotating phasor, phasor diagrams, impedances and admittances, AC circuit analysis, effective or RMS values, average power and complex power.

Three-phase circuits, Mutual coupled circuits, Dot Convention in coupled circuits, Ideal Transformer.

UNIT IV: Electrical Circuit Analysis Using Laplace Transforms: Review of Laplace Transform, Analysis of electrical circuits using Laplace Transform for standard inputs, convolution integral, inverse Laplace transform, transformed network withinitial conditions.

Transfer function representation, Poles and Zeros, Frequency response (magnitude and phase plots), series and parallel resonances.

UNIT V: Two Port Network and Network Functions: Two Port Networks, terminal pairs, relationship of two port variables, impedance parameters, admittance parameters.

Transmission Parameters and hybrid parameters, interconnections of two port networks.

Text Books:

1. M. E. Van Valkenburg, “Network Analysis”, Prentice Hall, 2006.
2. D. Roy Choudhury, “Networks and Systems”, New Age International Publications, 1998.
3. W. H. Hayt and J. E. Kemmerly, “Engineering Circuit Analysis”, McGraw Hill Education, 2013.

References Books:

1. C. K. Alexander and M. N. O. Sadiku, “Electric Circuits”, McGraw Hill Education, 2004.
2. K. V. V. Murthy and M. S. Kamath, “Basic Circuit Analysis”, Jaico Publishers, 1999.

Course Outcomes:

The student will be able to

1. apply network theorems for solving DC electric circuit equations.
2. solve first and second order networks.
3. solve AC circuits using phasor diagrams.
4. analyse electric circuits using Laplace Transform.
5. demonstrate two port network and Network Functions.

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B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - II Semester	**3**	**0-0-0**	**3**

(F220B) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

(COMMON TO ECE,ME,ECM)

Course Objectives:

The student will

1. understand the importance of certain basic issues governing the business operation namely demand and supply.
2. get an idea about the production concepts and analysis of various types of costs.
3. apply the various pricing strategies and understanding of competitive markets.
4. acquire knowledge of application of fundamental concepts of financial accounting.
5. analyze and interpret financial ratios for more financial accuracy.

UNIT I

Introduction to Managerial Economics & Demand Analysis:

Definition, Nature and Scope of Managerial Economics, Demand Analysis: Demand Determinants, Law of Demand and its exceptions.

Elasticity of Demand: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting.

UNIT II

Production & Cost Analysis:

Production Function - Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale.

Cost Analysis: Cost concepts. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems) - Managerial Significance.

Unit III

Types of Markets & Economic Environment:

Types of competition and Markets, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly.

Pricing - Objectives and Policies of Pricing. Methods of Pricing.

Trends in economic Environment: Inflation, GDP, Introduction to GST, Interest rates.

UNIT IV

Introduction to Financial Accounting

Accounting concepts and Conventions - Introduction IFRS - Double - Entry Book Keeping, Journal, Ledger, Trial Balance.

Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

UNIT V

FINANCIAL ANALYSIS

Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability ratios.

Du Pont Chart analysis. Theoretical concept of Funds flow statements.

TEXT BOOKS:

1. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2014.
2. S.A. Siddiqui & A.S. Siddiqui, Managerial Economics and Financial Analysis, New Age international Publishers, Hyderabad 2014.
3. M. Kasi Reddy &Saraswathi, Managerial Economics and Financial Analysis, PHI New Delhi, 2014.

REFERENCES BOOKS:

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi, 2012.
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, Pearson, 2012.
3. Lipsey&Chrystel, Economics, Oxford University Press, 2012

Course Outcomes:

The student will be able to:

1. illustrate the scope of managerial economics.
2. apply managerial tools and techniques to attain optimal decisions.
3. analyze low production function is carried out to achieve maximum output.
4. analyze changing business environment in post liberalization scenario.
5. evaluate and interpret the financial statements to make informed decisions.

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B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - II Semester	**0**	**0-2-0**	**1**

(F2241) ANALOG CIRCUITS LAB

Course Objectives:

The student will

1. do practical study of configurations of different transistors.
2. do practical study of FET amplifier circuit, single and multistage amplifiers.
3. study practical implementation of feedback amplifiers and power amplifiers.
4. observe the different applications of Op-Amp circuits.
5. gain knowledge on A/D and D/A converters.

Minimum Twelve experiments to be conducted:

Design(any six) and Simulation (any six) using Multisim or Pspice or Equivalent Simulation Software:

List of the Experiments:

1. Common Emitter Amplifier.
2. Common Source amplifier.
3. Two Stage RC Coupled Amplifier.
4. Current Shunt and Voltage Series Feedback Amplifier.
5. Current Series and Voltage Shunt Feedback Amplifier.
6. Class B Complementary Symmetry Amplifier.
7. Class A Power Amplifier (Transformer less).
8. RC Phase Shift, Wien Bridge Oscillator using Transistors.
9. Hartley and Colpitt's Oscillator.
10. Inverting and Non Inverting Adder, Subtractor, using IC 741 Op-Amp.
11. Integrator and Differentiator using IC741 Op-Amp.
12. Active Low Pass & High Pass filters (second Order).
13. A/D and D/A converters.

Equipments required for Laboratories:

1. For Hardware design of Electronic Circuits
    - RPS
    - CRO
    - Function Generators
    - Multimeters
    - Components
2. For Software simulations of Electronic Circuits
    - Computer Systems with Latest Specifications.
    - Connected in Lan(Optional).

- Operating Systems Windows XP.
- Simulation Software(Multisim/Tinaroo) Package.

Course Outcomes:

The student will be able to:

1. measure the voltage gain and frequency of single stage and multistage amplifiers using CRO.
2. design the negative feedback and Oscillator circuits.
3. analyze the applications of different Op-Amp circuits such as integrator, differentiator, low pass and high pass filters.
4. demonstrate operations of A/D and D/A converters.
5. apply practical knowledge on amplifiers and transistors.

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B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - II Semester	**0**	**0-2-0**	**1**

(F2242) ANALOG COMMUNICATIONS LAB

Course Objectives:

The student will

1. understand all types of analog modulation / demodulation principles such as AM, DSB-SC, FM recognize the importance of pre-emphasis and de-emphasis.
2. understand the need for diode detector and AGC.
3. substantiate pulse modulation techniques.
4. design modulation and demodulation circuits such as AM,DSB-SC,FM, PAM,PWM & PPM circuits.
5. perform pre-emphasis and de-emphasis at the transmitter and receiver respectively.

List of the Experiments:

1. Amplitude modulation and demodulation.
2. DSB-SC Modulator & Detector.
3. SSB-SC Modulator & Detector (Phase Shift Method).
4. Frequency modulation and demodulation.
5. Study of spectrum analyzer and analysis of AM and FM Signals.
6. Pre-emphasis & de-emphasis.
7. Characteristics of Mixer.
8. Verification of Sampling Theorem.
9. Pulse Amplitude Modulation & Demodulation.
10. Pulse Width Modulation & Demodulation.
11. Pulse Position Modulation & Demodulation.
12. Frequency Synthesizer.
13. AGC Characteristics.
14. PLL as FM Demodulator.

Note: Minimum 12 experiments should be conducted:

Equipment required for Laboratories:

1.RPS	-	0– 30 V
2.CRO	-	0– 20 M Hz.
3. Function Generators	-	0– 1 M Hz
4. RF Generators	-	0– 1000 M Hz./0 – 100 M Hz.
5 Multimeters		
6 Components		
7 Spectrum Analyzer		1GHZ

Course Outcomes:

The Student will be able to

1. perform modulation and demodulation circuits such as AM, DSB-SC,FM.
2. apply pre-emphasis and de-emphasis at the transmitter and receiver respectively.
3. construct diode detector and AGC circuit that are necessary for good reception of the signal.
4. design the PAM,PWM and PPM circuits.
5. demonstrate various digital modulation and demodulation kits.

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B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - II Semester	**2**	**0-0-0**	**0**

(F220F) ENVIRONMENTAL SCIENCE
(Common to CSE,ECE,ECM,EEE&IT**)**

Course Objectives:
The student will

1. illustrate the concept of ecosystem and biodiversity.
2. know that the importance of Environment is a key to the future of mankind.
3. make students realize that Global warming, the depletion of ozone layer and loss of biodiversity have made everyone aware of environmental issues.
4. encourages students to explore the social, aesthetic, ethical, scientific, and technical aspects of environmental issues.
5. apply modeling to understand the behaviour, make predictions for future and plan management in view of changing environmental conditions.

UNIT - I

Ecosystems & Natural Resources, **Biodiversity:** Concept, Classification of Resources: Water resources, Land resources, land degradation, Forest resources, Mineral resources, Energy resources.

Concept of ecosystem: Classification of ecosystem, Functions of ecosystem. Biodiversity, Level, values, hotspots of biodiversity, Threats To Biodiversity, Conservation Of Biodiversity.

UNIT - II

Global Environmental Problems And Global Efforts: Deforestation ,Green house effect, Global Warming, Sea level rise, Ozone depletion. International conventions/protocols: green-belt-development, Concept of Green Building, Clean Development Mechanism (CDM).

Environmental Impact Assessment (EIA) And Environmental Management Plan: Definition of Impact, classification of impacts, methods of baseline data acquisition. Impacts on different components: such as human health resources, air, water, flora, fauna and society, impact assessment methodologies. Environmental management plan (EMP).

UNIT - III

Environmental Policy, Legislation, Rules And Regulations : Environmental Protection Act: Air (Prevention and control of pollution) Act-1981, Water (Prevention and control of pollution) Act-1974, Forest Conservation Act**.**

Towards Sustainable Future: Concept of Sustainable Development, Threats to Sustainability, Strategies for achieving Sustainable development, Environmental Ethics, Environmental Economics, Concept of Green Computing.

TEXT BOOKS:

1. TEXT BOOK OF ENVIRONMENTAL, Science and Technology by M.Anji Reddy 2007.
2. Principles of Environmental Science and Engineering by P.Venugopal Rao.
3. Introduction to Environmental Studies by K.Mukkanti.
4. Text book of Environmental studies by Kaushik and Anubha kaushik.

REFERENCE BOOKS:

1. Tata McgrawHill : Introduction to Environmental Studies by Benny Joseph.
2. Environmental Studies by Erach Bharucha 2005, University Grants Commission, University Press.

Course Outcomes:

The student will able to

1.learn the importance of natural resources and use them efficiently.

2.identify how to protect and conserve the biodiversity.

3.use environmental plan in developing any sort of environmental projects.

4.apply the environmental legislation in every walk of life.

5.explain importance of the natural resources for their future generations in a sustainable manner.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
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B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - I Semester	**3**	**1-0-0**	**4**

(F314A) ELECTROMAGNETIC WAVES AND TRANSMISSION LINES

Course Objectives:

The student will

1. study the electrostatics applicable to maxwells equation.
2. study the static magnetic fields applicable to maxwells equation.
3. understand the maxwells equation in various forms and boundary conditions.
4. illustrate the Electromagnetic wave propagation.
5. analyse characteristics and wave propagation on high frequency transmission lines.

UNIT I

ELECTROSTATICS : Coulomb's law, electric field intensity ,fields due to line and surface charge distributions, electric flux density, Gauss law and applications due to line charge , volume charge, electric potential, relations between E and V convection and conduction currents, Poisson's and Laplace 's equations, capacitance, parallel plate and spherical capacitors.

UNIT II

STATIC MAGNETIC FIELDS : Biot-savart's law ,magnetic field intensity due to line current, Ampere's circuital law and its applications, magnetic flux density, magnetic scalar and vector potentials, inductances.

UNIT III

MAXWELL'S EQUATIONS- Basic laws of electromagnetics, Maxwell's equations in point form, integral form and phasor form, Electrical and Magnetic boundary conditions at media interface.

UNIT IV

UNIFORM PLANE WAVES - Uniform plane wave, propagation of wave , wave propagation in partially conducting , good conductors , good dielectrics, velocity , wavelength, skin depth in good conductors , power flow and poynting vector, plane waves at a media interface-reflection and refraction at dielectric interface, total internal reflection, snell's law.

UNIT V

TRANSMISSION LINES- Equations of voltage and current on Transmission line, primary and secondary constants , Reflection coefficient and VSWR, impedance transformation on loss-less and low loss transmission line, Smith chart construction only , single and double stub matching.

TEXT BOOKS:

1 Elements of Electromagnetics – Matthew N.O. Sadiku, 4 ed., 2008, oxford univ. press.

2 Engineering Electromagnetics – William h. hayt jr. and John a. buck.

3 Networks, lines and fields – john d. ryder, 2 ed., 1999, phi.

4 Electromagnetics – Edminister - schauum series.

REFERENCE BOOKS:

1 E.C. Jordan & K.G. balmain, Electromagnetic Waves & Radiating Systems, Prentice hall, India.

Course Outcomes:

The student will be able to

1. apply electrostatics to derive expressions for maxwells equation.
2. illustrate the steady magnetic fields to maxwells equation.
3. express the maxwells equations in various forms and derive the boundary conditions.
4. describe properties and parameters of Electromagnetic propagation.
5. obtain the transmission lines characteristics and parameters of a Electromagnetic waves and Electrical lines.

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B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - I Semester	**3**	**0-0-0**	**3**

(F314B) COMPUTER ARCHITECTURE

Course Objectives:

The student will

1. learn how computers work.
2. know basic principles of computer's working.
3. analyze the performance of computers.
4. know how computers are designed and built.
5. understand issues affecting modern processors (caches, pipelines etc.).

Unit-I

Basic Structure of Computers, Functional units, software, performance issues in software, machine instructions and programs, Types of instructions, Instruction sets: Instruction formats, Assembly language, Stacks, Ques, Subroutines.

Unit-II

Processor organization, Information representation, number formats, Multiplication & division, ALU design, Floating Point arithmetic, IEEE 754 floating point formats.

Unit-III

Control Design, Instruction sequencing, Interpretation, Hard wired control - Design methods and CPU control unit. Microprogrammed Control - Basic concepts, minimizing microinstruction size, multiplier control unit. Microprogrammed computers - CPU control unit.

Unit-IV

Memory organization, device characteristics, RAM, ROM, Memory management, Concept of Cache & associative memories, Virtual memory.

Unit-V

System organization, Input - Output systems, Interrupt, DMA, Standard I/O interfaces, Concept of parallel processing, Pipelining, Forms of parallel processing, interconnect network.

TEXT BOOKS:

1. V.Carl Hammacher, "Computer Organisation", Fifth Edition.
2. A.S.Tanenbum, "Structured Computer Organisation", PHI, Third edition.

REFERENCE BOOKS:

1. Y.Chu, "Computer Organization and Microprogramming", II, Englewood Chiffs, N.J., Prentice Hall Edition.
2. M. Morris Mano, "Computer System Architecture", 3rd Edition.
3. C.W.Gear, "Computer Organization and Programming", McGraw Hill, N.V. Edition.
4. Hayes J.P, "Computer Architecture and Organization", PHI, Second edition.

Course Outcomes:

The student will be able to

1. examine basic structure of computers.
2. describe the basics of processor organization.
3. illustrate the functioning of control design.
4. demonstrate working of memory organization.
5. explain the system organization, interrupts and DMA.

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B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - I Semester	**3**	**0-0-0**	**3**

(F314C) CONTROL SYSTEMS

Course Objectives:

The Student will

1. learn the fundamental concepts of Control Systems and Mathematical modeling of the System.
2. learn the behavior of the Control Systems in Time and Frequency domain.
3. understand the Stability of Control Systems using Root Locus, Bode plots and Polar plots.
4. recognize different Compensators and Controllers in Time and Frequency domain.
5. understand the design of non-linear control systems for multiple inputs and outputs using State Space Analysis.

UNIT – I INTRODUCTION

Concepts of Control Systems- Open Loop and closed loop control systems and their differences-Different examples of control systems-Classification of control systems, Feed-Back Characteristics, Effects of feedback.

Mathematical models – Differential equations, Impulse Response and transfer functions - Translational and Rotational mechanical systems.

UNIT II: TRANSFER FUNCTION REPRESENTATION

Transfer Function of DC Servo motor - AC Servo motor- Synchro transmitter and Receiver, Block diagram representation of systems considering electrical systems as examples - Block diagram algebra – Representation by Signal flow graph - Reduction using Mason‘s gain formula.

TIME RESPONSE ANALYSIS

Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems.

UNIT III: STABILITY ANALYSIS IN S-DOMAIN

The concept of stability – Routh‘s stability criterion – Relative stability and conditional stability – limitations of Routh‘s stability.

Root Locus Technique:

The root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci.

UNIT-IV: FREQUENCY RESPONSE ANALYSIS AND STABILITY ANALYSIS IN FREQUENCY DOMAIN

Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots, Polar Plots.

UNIT-V: CLASSICAL CONTROL DESIGN TECHNIQUES AND STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Compensation techniques – Lag, Lead, Lead-Lag Controllers design in frequency Domain, PID Controllers.

Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability.

TEXT BOOKS:

1. Automatic Control Systems, 7th edition– by B. C. Kuo 2009– PHI/John wiley 8ed
2. Control Systems Engineering by I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 2nd edition.

REFERENCES BOOKS:

1. Modern Control Engineering – by Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 3rd edition, 1998.
2. Control Systems by A. Nagoor Kani, RBA Publications,. 2nd Edition.
3. Control Systems Engg. by NISE 5th Edition – John wiley.

Course Outcomes:

The Student will be able to

1. describe and simplify a Control Systems using block diagram and Signal flow graph technique.
2. analyze the transient and steady state performance of Control System.
3. evaluate the Stability of a system in Time and Frequency domain.
4. distinguish different Compensators and Controllers in Time and Frequency domain.
5. apply the concept of non-linear control system design for multiple inputs and outputs using state space analysis.

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B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - I Semester	**3**	**0-0-0**	**3**

(F314D) DIGITAL SIGNAL PROCESSING

Course Objectives:

The Student will

1. get fundamental concepts of discrete time signals, impulse response, sequence, zero-state solutions.
2. understand DFS, DTFT and DFT concepts and its applications.
3. analyze and designing of analog & digital IIR filter and application on DSP.
4. analyze and design analog & digital FIR filter and application on DSP.
5. learn the concept of finite word length and multi-rate signal processing.

UNIT -I : Introduction

Introduction to Digital Signal Processing: Discrete time signals & sequences, linear shift invariant systems, stability, and causality, linear constant coefficient difference equations, Frequency domain representation of discrete time signals and systems, Discrete Fourier series: DFS representation of Periodic Sequences, Properties of Discrete Fourier Series, Relation between DFT, DTFT and ZT.

UNIT-II: Discrete Fourier Transforms & Fast Fourier Transforms

Discrete Fourier Transforms: Properties of DFT, linear convolution of sequences using DFT, Computation of DFT: Over-lap Add method, Over-lap Save method. Fast Fourier Transforms: Fast Fourier transforms (FFT) - Radix-2 decimation-in-time and decimation-in-frequency FFT Algorithms, Inverse FFT.

UNIT-III: IIR Digital Filters

Analog filter approximations – Butterworth and Chebyshev, Design of IIR Digital filters from analog filters, Step and Impulse invariant techniques, Bilinear transformation method, Spectral transformations. Realization of IIR filters – Direct, Canonic, Cascade and Parallel forms.

UNIT – IV: FIR Digital Filters

Characteristics of FIR Digital Filters, Frequency response, Design of FIR Filters: Fourier Method, Digital Filters using Window Techniques, Frequency Sampling technique, Comparison of IIR & FIR filter.

Realization of FIR Filters: Direct form, cascade realization and Linear phase Realization.

UNIT -V: Multirate Digital Signal Processing

Introduction, down sampling, Decimation, Up sampling, interpolation, Sampling Rate Conversion, conversion of band pass signals, Concept of resampling, Applications of multi rate signal processing.

Finite Word Length Effects : Limit cycles, Overflow oscillations, Round-off noise in IIR digital filters, Computational output round off noise, Methods to prevent overflow, Tradeoff

between round off and overflow noise, Measurement of coefficient quantization effects through pole-zero movement, Dead band effects.

TEXT BOOKS:

1. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education / PHI, 2007.
2. Digital Signal Processing-R.Ramesh Babu, SCITECH 5TH Ed.

REFERENCE BOOKS:

1. Fundamentals of Digital Signal Processing using Matlab – Robert J. Schilling, Sandra L. Harris, Thomson, 2007.
2. Digital Signal Processing – Trun Kumar Rawat, Oxford Publications, 2015.
3. Discrete Time Signal Processing – A. V. Oppenheim and R.W. Schaffer, PHI, 2009.

Course Outcomes:

The student will be able to

1. define fundamental concepts of discrete time signals, impulse response, sequence and zero-state solutions.
2. distinguish the results using Fourier transforms, Laplace Transform, Z-transform and application of DFT and FFT in signal processing.
3. design IIR filters using Butterworth and Chebyshev technique.
4. construct FIR filters using window technique.
5. apply and access the finite word length and multi-rate signal processing in different communication systems.

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B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - I Semester	**3**	**0-0-0**	**3**

(F314E) DIGITAL COMMUNICATIONS

Course Objectives:
The student will

1. understand different digital modulation techniques such as PCM, DM and various shift keying techniques.
2. understand the concepts of different digital modulation codes like block codes, cyclic codes and convolution techniques.
3. study about different error detecting and error correcting codes.
4. study the advantages of spread spectrum techniques and performance of spread spectrum, PN codes in jamming, noise etc.
5. gain knowledge on the concepts of Information Theory.

UNIT -I
Elements of Digital Communication Systems: Advantages of Digital Communication Systems, Bandwidth-S/N Tradeoff, Hartley Shanon Law and Sampling Theorem. Pulse Code Modulation: PCM Generation and Reconstruction, Quantization Noise, Non Uniform Quantization DM and Adaptive DM, Noise in PCM and DM.

UNIT -II
Digital Modulation Techniques: Introduction, ASK,ASK Modulator, Coherent ASK Detector, Non-Coherent ASK Detector, FSK, Bandwidth and Frequency Spectrum FSK, Non Coherent FSK Detector, Coherent FSK Detector, FSK Detection using PLL, BPSK, Coherent PSK Detection, QPSK , Differential PSK.

UNIT -III
Baseband Transmission and optimal Reception of Digital Signal : Pulse Shaping for Optimum Transmissions, A Baseband Signal Receiver, Probability of Error, Optimum Receiver, Optimal of Coherent Reception, Signal Space Representation and Probability of Error and Eye Diagrams for ASK, PSK, FSK, Cross Talk.

UNIT-IV
Information Theory: Information and entropy, conditional entropy and redundancy, Shannon Fano coding, Mutual Information, Information loss due to noise, source coding — Huffman Code, variable length coding, Source coding to Increase average Information per bit, Lossy source coding.
Linear Block Codes: Matrix Description of Linear Block codes, Error Detection and Error Correction Capabilities of Linear block Codes.
Cyclic Codes: Algebraic Structure, Encoding, Syndrome Calculation, Decoding.
Convolution Codes: Encoding, Decoding using State, tree and trellis Diagrams, Decoding using Viterbi Algorithm. Comparison of error rated in Coded and Uncoded Transmission.

UNIT -V

Spread Spectrum Modulation: Use of Spread Spectrum, Direct Sequence Spread Spectrum (DSSS), Code Division Multiple Access, Frequency Hopping Spread Spectrum, PN – Sequences: Generation and Characteristics, Synchronization in Spread Spectrum systems.

TEXT BOOKS:

1. Principles of Communication Systems Herbert Taub, Donald I Schiling, Goutam Saha, 3rd Edition, Mcgraw- Hill, 2008.
2. Digital and Analog Communication Systems – Sam Shanmugani John Wiley, 2005.
3. Digital Communications – John G.Proakis , Masoud Salehi – 511 Edition, Mcgraw-Hill, 2008.

REFERENCE BOOKS:

1. Digital Communication – Simon Haykin, John Wiley, 2005.
2. Digital Communications – IanA.Glover, Peter M. Grant, 2nd Edition, Pearson Edu., 2008.
3. Communication Systems – B.P. Lathi, BS Publication, 2006.
4. A First course in Digital Communications -Nguyen, Shewedyll Cambride.
5. Digital Communication- Theory, Techniques , and Applications Mutagi, 2nd Ed. 2013.

Course Outcomes:

The student will be able to

1. identify basic components of digital communication systems.
2. design optimum receivers for digital modulation techniques.
3. analyse the error performance of digital modulation techniques.
4. discuss different error detecting and error correcting codes like block codes, cyclic codes and convolution codes.
5. outline advantages of spread spectrum techniques, mid performance of spread spectrum, PN codes in jamming, noise.

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B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - I Semester	**3**	**0-0-0**	**3**

(F310A) MANAGEMENT SCIENCE

Course Objectives:

The student will

1. understand and making decision related to planning and organisation structure in view of managers and leaders.
2. study HRM/PMIR by recruitment, selection, training and development.
3. study the PPC through PERT/CPM.
4. study management of marketing MIX physical distribution and PLC strategies.
5. understand the role of management in production through ppc, plant location and layout techniques, work study, quality control.

UNIT I

Introduction to Business & Management

Types of Business – Sole proprietorship, partnership, Joint stock company, public enterprises and their types, Changing Economic environment, LPG.

Nature and Importance of Management, Functions of Management, Taylor's Scientific Management Theory, Fayol's Principles of Management, Douglas McGregor's Theory X and Theory Y, Systems Approach to Management. 7's frame work, Contingency theory.

UNIT II

Planning & Organizational Structures

Types of planning, nature of planning, levels of planning, planning process, Vision, mission, Objectives of organization.

Departmentation, Decentralization, Centralization and Recentralization. Types of Organization structures - Line organization, Line and staff organization, functional organization, Committee organization, Matrix organization, Cellular Organization, Virtual Organization, Team structure, lean and flat organization structure and their merits, demerits and suitability.

UNIT III

Introduction to Operations & Project Management

Types of Plant Layout-Methods of production Job, batch and Mass Production), Work Study -Basic procedure involved in Method Study and Work Measurement-Statistical Quality Control: $\overline{X}$ chart, R chart, c chart, p chart, Quality, Deming principles, EOQ, ABC Analysis, VED Analysis. TQM, JIT, BPR, Six Sigma.

Project management (PERT/CPM): Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), identifying critical path.

UNIT IV

Human Resources Management

Concepts of HRM, Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Placement, Promotion, Performance Appraisal, Grievance Handling and Welfare Administration. Job Evaluation and Merit Rating, Bench

marking (Human Resource) Compensation.

Leadership & Motivation- Leadership styles, Motivation- Maslow's Theory, ERG theory, Herzberg's Two factor theory, Groups & Teams.

UNIT V

Marketing Management

Functions of Marketing, Marketing Mix, and Marketing Strategies based on Product Life Cycle, New product development, Services marketing, Characteristics of services, Services Mix.

Channels of distribution, Retailing and Basics of Rural Marketing, Digital Marketing, Virtual Marketing, Logistics & Supply chain management.

TEXT/REFERENCE BOOKS:

1. Principles of Management by James A.F. Stoner, Publisher: Pearson Education; Second edition (2010).
2. Kotler Philip & Keller Kevin Lane: Marketing Management, Publisher: Pearson; 15 edition (15 September 2015).
3. Production and Operations Management, Publisher: PHI; 3 edition (6 February 2012), R. Panneerselvam (Author).
4. L.S.Srinath: PERT/CPM,Affiliated East-West Press, 2009.
5. William J. Stevenson & Ceyhun Ozgur: Introduction to Management Science, TMH, 2007.
6. Rao, P. Subba. Essentials of Human Resource Management and Industrial Relations: Text, Cases and Games. Himalaya Publishing House, 2010.
7. Ramaswamy Namakumari: Marketing Management. Publisher: Mc Graw Hill India; 5th edition (2013).

Course Outcomes:

The student will be able to

1. evolve a strategy for a business or service organization.
2. planning and types of organizational structures for a given context.
3. carry out production operations through work study and SQC.
4. understand the human resource concepts in detail.
5. analyze markets, competition and pricing strategies, basics of rural marketing, virtual marketing, logistics and digital marketing.

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B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - I Semester	**0**	**0-2-0**	**1**

(F3141) MICROPROCESSORS AND MICROCONTROLLERS LAB

Course Objectives:

The student will

1. learn assembly language programming and embedded C.
2. familiarize with programming and interfacing microcontrollers to various devices.
3. design various applications using microcontrollers.
4. learn programming using arithmetic, logical and bit manipulation instructions of 8051.
5. gain knowledge on parallel and serial communication.

Note: - Minimum of 12 experiments to be conducted.

The following programs/experiments are to be written for assembler and to be executed the same with 8086 and 8051 kits.

List of Experiments:

1. Programs for 16 bit arithmetic operations 8086(using various addressing modes).
2. Programs for sorting an array for 8086.
3. Programs for searching for a number of characters in a string for 8086.
4. Programs for string manipulation for 8086.
5. Programs for digital clock design using 8086.
6. Interfacing ADC and DAC to 8086.
7. Parallel communication between two microprocessor kits using 8255.
8. Serial communication between two microprocessor kits using 8251.
9. Interfacing to 8086 and programming to control stepper motor.
10. Programming using arithmetic, logical and bit manipulation instructions of 8051.
11. Program and verify Timer/Counter in 8051.
12. Program and verify interrupt handling in 8051.
13. Communication between 8051 kit and PC.
14. Interfacing LCD to 8051.
15. Interfacing Matrix/Keyboard to 8051.

Course Outcomes:

The student will be able to:

1. write assembly language programming and embedded C.
2. interface microcontrollers to various devices.
3. analyze and develop various applications using microcontrollers.
4. program and verify interrupt handling in 8051.
5. demonstrate parallel and serial communication.

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B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - I Semester	**0**	**0-2-0**	**1**

(F3142) DIGITAL SIGNAL PROCESSING LAB

Course Objectives:

The student will

1. apply theoretical knowledge on a practical basis.
2. get the knowledge of MATLAB programming and functions.
3. analyze and design different signals and filters using MATLAB.
4. get basic knowledge of trainer kit TMS320C6713 DSP Processors.
5. implement low pass and high pass FIR filter for a given sequence and decimation and interpolation process.

The programs shall be implemented in software (Using MATLAB / Lab view / C programming/OCTAVE Equivalent) and hardware (Using TI / Analog devices / Motorola / Equivalent DSP processors).

1. Generation of Sinusoidal waveform/signal based on recursive difference equations.
2. To find DFT / IDFT of given DT signal.
3. To find frequency response of a given system given in (Transfer Function/Differential equation form).
4. Implementation of FFT of given sequence.
5. Determination of Power Spectrum of a given signal(s).
6. Implementation of LP FIR filter for a given sequence.
7. Implementation of HP FIR filter for a given sequence.
8. Implementation of LP IIR filter for a given sequence experiment.
9. Implementation of HP IIR filter for a given sequence.
10. Generation of Sinusoidal signal through filtering.
11. Generation of DTMF signals.
12. Implementation of Decimation Process.
13. Implementation of Interpolation Process.
14. Implementation of I/D sampling rate converters.
15. Audio application such as to plot a time and frequency display of microphone plus a cosine using DSP. Read a .wav file and match with their respective spectrograms.
16. Noise removal: Add noise above 3 KHz and then remove, interference suppression using 400 Hz tone.
17. Impulse response of first order and second order systems.

Note: - Minimum of 12 experiments has to be conducted.

Course Outcomes:

The student will be able to

1. practice MATLAB functions.
2. analyze and design different signals and filters.
3. demonstrate trainer kit TMS320C6713 DSP Processors.
4. design low pass and high pass FIR filter for a given sequence.
5. implement decimation and interpolation process.

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B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

(F324A) COMPUTER NETWORKS

Course Objectives:

The Student will

1. understand the concepts of networking thoroughly.
2. design a network for a particular application.
3. analyze the performance of the network.
4. analyze soundness or potential flaws in proposed protocols.
5. describe the current architecture of the Internet and the entities involved with the day to day running of the Internet and the process involved with development of policy and new protocols.

UNIT-I

Introduction to computer networks and the Internet: Application layer: Principles of network applications, The Web and Hyper Text Transfer Protocol, File transfer, Electronic Mail, Domain name system, Peer-to-Peer file sharing, Socket programming, Layering concepts.

UNIT-II

Switching in networks: Classification and requirements of switches, a generic switch, Circuit Switching, Time-division switching, Space-division switching, Crossbar switch and evaluation of blocking probability, 2-stage, 3-stage and n-stage networks, Packet switching, Blocking in packet switches, Three generations of packet switches, switch fabric, Buffering, Multicasting, Statistical Multiplexing.

UNIT-III

Transport layer: Connectionless transport - User Datagram Protocol, Connection-oriented transport – Transmission Control Protocol, Remote Procedure Call. Congestion Control and Resource Allocation: Issues in Resource Allocation, Queuing Disciplines, TCP congestion Control, Congestion Avoidance Mechanisms and Quality of Service.

UNIT-IV

Network layer: Virtual circuit and Datagram networks, Router, Internet Protocol, Routing algorithms, Broadcast and Multicast routing.

UNIT-V

Link layer: ALOHA, Multiple access protocols, IEEE 802 standards, Local Area Networks, addressing, Ethernet, Hubs, Switches.

TEXT BOOKS:

1. J.F. Kurose and K. W. Ross, “Computer Networking – A top down approach featuring the Internet”, Pearson Education, 5th Edition.
2. T. Viswanathan, “Telecommunication Switching System and Networks”, Prentice Hall.

REFERENCE BOOKS:

1. L. Peterson and B. Davie, “Computer Networks – A Systems Approach” Elsevier Morgan Kaufmann Publisher, 5th Edition.
2. S. Keshav, “An Engineering Approach to Computer Networking” , Pearson Education.
3. B. A. Forouzan, “Data Communications and Networking”, Tata McGraw Hill, 4th Edition.
4. Andrew Tanenbaum, “Computer networks”, Prentice Hall.
5. D. Comer, “Computer Networks and Internet/TCP-IP”, Prentice Hall.
6. William Stallings, “Data and computer communications”, Prentice Hall.

Course Outcomes:

The student will be able to

1. practice the concepts computer networks and the internet.
2. employ knowledge on switching in networks.
3. illustrate the concepts of transport layer.
4. describe the concepts of network layer.
5. assess knowledge on link layer and IEEE standards.

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B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

(F324B) VLSI DESIGN

Course Objectives:
The student will

1. get exposure to different steps involved in the fabrication of ICs using MOS transistor, CMOS/BICMOS transistors and passive components.
2. explain electrical properties of MOS and BiCMOS devices to analyze the behavior of inverters designed with various loads.
3. gain exposure to the design rules to be followed to draw the layout of any logic circuit.
4. understand the concept to design different types of logic gates using CMOS inverter and analyze their transfer characteristics.
5. study design concepts to design building blocks of data path of any system using gates and understanding of basic programmable logic devices and testing of CMOS circuits.

UNIT – I
Introduction: Introduction to IC Technology – MOS, PMOS, NMOS, CMOS & BiCMOS Basic Electrical Properties: Basic Electrical Properties of MOS and BiCMOS Circuits: Ids Vds relationships.
MOS transistor threshold Voltage, gm, gds, Figure of merit ωo; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

UNIT – II
VLSI Circuit Design Processes: VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, 2 μm CMOS Design rules for wires.
Contacts and Transistors Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits.

UNIT – III
Gate Level Design: Logic Gates and Other complex gates, Switch logic, Alternate gate circuits, Time delays.
Driving large capacitive loads, Wiring capacitance, Fan – in, Fan – out, Choice of layers.

UNIT – IV
Data Path Subsystems: Subsystem Design, Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Zero/One Detectors, Counters.
Array Subsystems: SRAM, DRAM, ROM, Serial Access Memories.

UNIT–V
Programmable Logic Devices: PLAs, FPGAs, CPLDs, Standard Cells, Programmable Array Logic, Design Approach, Parameters influencing low power design.

CMOS Testing: CMOS Testing, Need for testing, Test Principles, Design Strategies for test, Chip level Test Techniques.

TEXT BOOKS:

1. Essentials of VLSI circuits and systems – Kamran Eshraghian, Eshraghian Dougles and A. Pucknell, PHI, 2005 Edition.
2. CMOS VLSI Design – A Circuits and Systems Perspective, Neil H. E Weste, David Harris, Ayan Banerjee, 3rd Ed, Pearson, 2009.

REFERENCE BOOKS:

1. CMOS logic circuit Design – John .P. Uyemura, Springer, 2007.
2. Modern VLSI Design – Wayne Wolf, Pearson Education, 3rd Edition, 1997.

Course Outcomes:

The student should be able to

1. acquire qualitative knowledge about MOS transistors and their Electrical properties.
2. design VLSI circuits using stick diagrams and layout diagrams.
3. construct different types of logic gates using CMOS inverter and analyze their transfer characteristics.
4. design different Data Path sub systems and Array sub systems.
5. explain the concept of low power design, testing and testability of system.

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B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

(F324C) MICROWAVE ENGINEERING

Course Objectives:

The Student will

1. understand the basic concepts of microwave engineering.
2. get introduced with the advancement in the field of microwave engineering.
3. explain operation of microwave sources, wave guides, components and devices.
4. gain knowledge about methods of measuring various parameters in microwave devices.
5. understand different applications of microwave engineering.

UNIT-I

Introduction to Microwaves-History of Microwaves, Microwave Frequency bands; Applications of Microwaves: Civil and Military, Medical, EMI/ EMC.

Mathematical Model of Microwave Transmission-Concept of Mode, Features of TEM, TE and TM Modes, Losses associated with microwave transmission, Concept of Impedance in Microwave transmission.

Unit-II

Analysis of RF and Microwave Transmission Lines- Coaxial line, Rectangular waveguide, Circular waveguide, Strip line, Micro strip line, cut off wavelength, mode excitation.

Microwave Network Analysis- Equivalent voltages and currents for non-TEM lines, Network parameters for microwave circuits, Scattering Parameters.

Unit-III

Passive and Active Microwave Devices- Microwave passive components: Directional Coupler, Power Divider, Magic Tee, Attenuator, Microwave filter, Phase shifters and microwave attenuators.

Microwave active components: Diodes, Transistors, Oscillators, Mixers. Microwave Semiconductor Devices: Gunn Diodes, IMPATT diodes, Schottky Barrier diodes, PIN diodes. Microwave Tubes: Klystron, TWT, Magnetron.

Unit-IV

Microwave Measurements- Description of Microwave Bench–Different Blocks and their Features, Power, Frequency and impedance measurement at microwave frequency, Network Analyzer and measurement of scattering parameters, Spectrum Analyzer and measurement of spectrum of a microwave signal, Noise at microwave frequency and measurement of noise figure, Measurement of Microwave antenna parameters.

Unit-V

Microwave Systems- Radar, Terrestrial and Satellite Communication, Radio Aids to

Navigation, RFID, GPS. Modern Trends in Microwaves Engineering- Effect of Microwaves on human body, Medical and Civil applications of microwaves, Electromagnetic interference and Electromagnetic Compatibility (EMI & EMC), Monolithic Microwave ICs, RFMEMS for microwave components, Microwave Imaging.

TEXT/REFERENCE BOOKS:

1. R.E. Collins, Microwave Circuits, McGraw Hill.
2. K.C. Gupta and I.J. Bahl, Microwave Circuits, Artech house.
3. Liao, S.Y., "Microwave Devices and Circuits", Prentice-Hall of India. 1991.
4. Collin, R.E., "Foundations for Microwave Engineering", 2nd Ed., John Wiley & Sons, 2000.

Course Outcomes:

The student will be able to

1. demonstrate various microwave system components and their properties.
2. measure the various parameters in microwave engineering.
3. analyse microwave transmission lines and network.
4. distinguish various microwave waveguides.
5. illustrate the concept of microwave measurements.

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B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

(F324D) ANTENNA AND PROPAGATION

(Program Elective-I)

Course Objectives:
The Student will

1. get an introduction to different Antennas and their parameters.
2. obtain mathematical and physical background on radiation from antennas.
3. understand various physical structure and radiation patterns of antennas.
4. obtain ample knowledge in antenna arrays.
5. understand various wave propagation techniques.

Unit I

Antenna Basics: Introduction, Basic Antenna Parameters – Patterns, Beam Area, Radiation Intensity, Beam Efficiency, Directivity-Gain-Resolution, Antenna Apertures, Effective Height, Antenna Temperature, Front - to-back Ratio, Radiation Resistance , Illustrative Problems.

Thin Linear Wire Antennas – Radiation from Small Electric Dipole, Half Wave Dipole – Current Distributions, Field Components, Radiated Power, Radiation Resistance, Beam Width, Directivity, Far Fields and Patterns of Thin Linear Centre-fed Antennas of Different Lengths.

Unit II

Loop Antennas - Introduction, Small Loop, Comparison of Far Fields of Small Loop and Short Dipole, Radiation Resistances and Directivities of Small and Large Loops (Qualitative Treatment).

Antenna Arrays: Point Sources – Definition, Patterns**,** arrays of 2 Isotropic Sources **-** Different Cases, Principle of Pattern Multiplication, Uniform Linear Arrays – Broadside Arrays, Endfire Arrays, EFA with Increased Directivity, Broadside Arrays with Non-uniform Amplitude Distributions – General Considerations and Binomial Arrays.

Unit III

VHF, UHF and Microwave Antennas: Arrays with Parasitic Elements, Yagi-Uda Array, Folded Dipoles and their Characteristics, Helical Antennas – Helical Geometry, Helix Modes, Monofilar Helical Antenna in Axial and Normal Modes. Horn Antennas –Types, Fermat's Principle, Optimum Horns, Design Considerations of Pyramidal Horns,Microstrip Antennas – Introduction, Features, Advantages and Limitations, Rectangular Patch Antennas – Geometry and Parameters, Characteristics of Microstrip Antennas. Impact of Different Parameters on Characteristics.

Unit IV

Reflector Antennas – Introduction, Flar Sheet and Corner Reflectors, Paraboloidal Reflectors – Geometry, Pattern Characteristics, Feed Methods, Reflector Types – Related

Features.

Lens Antennas – Introduction, Geometry of Non-metallic Dielectric Lenses, Zoning, Tolerances, Applications.

Antenna Measurements: Introduction, Concepts - Reciprocity, Near and Far Fields, Coordinate System, Sources of Errors. Patterns to be Measured, Pattern Measurement, Arrangement, Directivity Measurement, Gain Measurements (by Comparison, Absolute and 3-Antenna Methods).

Unit V

Wave Propagation : Introduction, Definitions, Classifications Ground Wave Propagation Plane Earth Reflections, Space and Surface Waves, Wave Tilt, Curved Earth Reflections. Space Wave Propagation, Field Strength, Variation with Distance and Height, Effect of Earth's Curvature, Sky Wave Propagation Structure of Ionosphere, Refraction and Reflection of Sky Waves by Ionosphere, Ray Path, Critical Frequency, MUF, LUF, OF, Virtual Hight and Skip Distance, Relation between MUF and Skip Distance, Multi-hop Propagation, Energy Loss in Ionosphere.

TEXT BOOKS:

1. Antennas and Wave Propagation – J.D. Kraus, R.J. Marhefka and Ahmad S. Khan, TMH, New Delhi, 4th ed., 2010.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd ed., 2000.

REFERENCE BOOKS:

1. Antenna Theory - C.A. Balanis, John Wiley & Sons, 3rd ed., 2005.
2. Antennas and Wave Propagation – K.D. Prasad, Satya Prakashan, Tech India Publications, New Delhi, 2001.

Course Outcomes:

The Student will be able to

1. review various antenna parameters.
2. obtain mathematical and physical concepts of antennas.
3. discuss various techniques in antenna array formation.
4. examine directional behavior of arrays.
5. illustrate key factors in different wave propagation techniques.

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B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

(F324E) EMBEDDED SYSTEMS

(Program Elective-I)

Course Objectives:

The Student will

1. understand the characteristics of embedded systems and application areas.
2. explain the core of embedded system and gain the knowledge of ASICs, PLDs and communication interfaces.
3. understand Embedded firmware, RTC and design approaches.
4. analyze RTOs based Embedded System Design and multiprocessing.
5. understand Task communication and task synchronization.

UNIT-I

Introduction to Embedded Systems: Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification. Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

UNIT-II

Typical Embedded System: Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS).
Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces.

UNIT-III

Embedded Firmware: Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer. Embedded Firmware Design Approaches and Development Languages.

UNIT-IV

RTOS Based Embedded System Design: Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.

UNIT-V

Task Communication: Shared Memory, Message Passing, Remote Procedure Call and Sockets.
Task Synchronization: Task Communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, How to Choose an RTOS.

TEXT BOOKS:

1. Introduction to Embedded Systems- Shibu K.V, Mc Graw Hill.
2. Embedded Systems -Raj Kamal, TMH.

REFERENCE BOOKS:

1. Embedded System Design-Frank Vahid, Tony Givargis, John Wiley.
2. Embedded Systems –Lyla, Pearson, 2013.
3. An Embedded Software Primer-David E. Simon, Pearson Education.

Course Outcomes:

The student will be able to

1. define the characteristics of embedded systems, classification and application areas.
2. demonstrate core of embedded system, ASICs, PLDs and communication interfaces.
3. analyze embedded firmware, RTC and design approaches.
4. design RTOs based Embedded System Design.
5. illustrate the concepts of Task communication and task synchronization.

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B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

(F324F) DIGITAL IMAGE PROCESSING

(Program Elective-I**)**

Course Objectives:

The Student will

1. understand the fundamentals of digital image.
2. mathematically represent the various types of images and analyze them.
3. process these images for the enhancement of certain properties or for optimized use of the resources.
4. develop algorithms for image compression and coding.
5. process the color images.

UNIT-I

Digital Image Fundamentals: Elements of visual perception, image sensing and acquisition, image sampling and quantization, basic relationships between pixels – neighborhood, adjacency, connectivity, distance measures.

UNIT-II

Image Enhancements and Filtering: Gray level transformations, histogram equalization and specifications, pixel-domain smoothing filters – linear and order-statistics, pixel-domain sharpening filters – first and second derivative, two-dimensional DFT and its inverse, frequency domain filters – low pass and high pass.

UNIT-III

Image Segmentation-: Detection of discontinuities, edge linking and boundary detection, thresholding – global and adaptive, region-based segmentation.

UNIT-IV

Image Compression: Redundancy, inter pixel and psycho visual; Lossless compression – predictive, entropy; Lossy compression- predictive and transform coding; Discrete Cosine Transform; Still image compression standards – JPEG and JPEG-2000.

UNIT-V

Color Image Processing: Color models–RGB, YUV, HSI; Color transformations, formulation, color complements, color slicing, tone and color corrections; Color image smoothing and sharpening, Color Segmentation.

TEXT BOOKS:

1. R.C. Gonzalez and R.E. Woods, Digital Image Processing, Pearson Education, 3rd edition, 2008.

REFERENCE BOOKS:

1. Anil Kumar Jain, Fundamentals of Digital Image Processing, Prentice Hall of India.2nd Edition, 2004.

2. Gerard Blanchet, Maurice Charbit, Digital signal and Image Processing using MATLAB, ISTE.

Course Outcomes:

The student will be able to

1. explain the fundamentals of digital image.
2. Illustrate Image enhancements and filtering.
3. design the algorithm for different segmentation methods.
4. develop algorithms for image compression, coding and understand JPEG standards.
5. apply the basics of color image processing.

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B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

(F324G) INTRODUCTION TO MEMS

(Program Elective-II)

Course Objectives:

The student will

1. get Introduction to MEMS and micro fabrication.
2. study the essential material properties.
3. study various sensing and transduction technique.
4. illustrate various fabrication and machining process of MEMS.
5. know about the polymer and optical MEMS.

UNIT-I

INTRODUCTION TO MEMS AND MICROFABRICATION : History of MEMS Development, Characteristics of MEMS-miniaturization - microelectronics integration - Mass fabrication with precision. Micro fabrication - microelectronics fabrication process- silicon based MEMS processes- new material and fabrication processing- points of consideration for processing.

UNIT-II

ELECTRICAL AND MECHANICAL PROPERTIES OF MEMS MATERIALS : Conductivity of semiconductors, crystal plane and orientation, stress and stain – definition – relationship between tensile stress and stain- mechanical properties of silicon and thin films, Flexural beam bending analysis under single loading condition- Types of beam- deflection of beam-longitudinal stain under pure bending spring constant, torsional deflection, intrinsic stress, resonance and quality factor.

UNIT-III

SENSING AND ACTUATION : Electrostatic sensing and actuation-parallel plate capacitor – Application-Inertial, pressure and tactile sensorparallel plate actuator- comb drive.

Thermal sensing and Actuations-thermal sensors-Actuators- Applications- Inertial, Flow and Infrared sensors.

Piezoresistive sensors- piezoresistive sensor material- stress in flexural cantilever and membrane-Application-Inertial, pressure, flow and tactile sensor.

Piezoelectric sensing and actuation- piezoelectric material properties-quartz-PZT-PVDF – ZnOApplication-Inertial, Acoustic, tactile, flow-surface elastic waves.

Magnetic actuation- Micro magnetic actuation principle- deposition of magnetic materials-Design and fabrication of magnetic coil.

UNIT-IV

BULK AND SURFACE MICROMACHINING : Anisotropic wet etching, Dry etching of silicon, Deep reactive ion etching (DRIE), Isotropic wet etching, Basic surface micromachining process- structural and sacrificial material, stiction and antistiction methods, Foundry process.

UNIT-V

POLYMER AND OPTICAL MEMS : Polymers in MEMS- polymide-SU-8 liquid crystal, polymer(LCP)-PDMS-PMMA-Parylene- Flurocorbon, Application-Acceleration, pressure, flow and tactile sensors. Optical MEMS-passive MEMS. Optical components-lenses-mirrors-Actuation for active optical MEMS.

TEXT BOOKS:

1. Chang Liu, “Foundations of MEMS”, Pearson International Edition, 2006.

REFERENCE BOOKS:

1. Gaberiel M.Rebiz, “RF MEMS Theory,Design and Technology”, John Wiley & Sons,2003.
2. Charles P.Poole, Frank J.Owens, “Introduction to nanotechnology” John Wiley & sons, 2003.
3.Julian W.Gardner, Vijay K Varadhan, “Microsensors, MEMS and Smart devices”, John Wiley & Sons, 2001.

Course Outcomes:

The student will be able to

1. acquire knowledge about basics of MEMS and micro fabrication.
2. develop knowledge about essential material properties.
3. familiarize the important concepts applicable to MEMS and their fabrication.
4. practice the design, analysis and testing of MEMS.
5. apply MEMS for different applications.

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B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

(F324H) SPEECH AND AUDIO PROCESSING

(Program Elective-II)

Course Objectives:

The Student will:

1. obtain ample knowledge in the mathematical model of the speech signal.
2. understand various quantization process of speech.
3. gain the concept of linear prediction.
4. know the concept of the speech and audio signal enhancement.
5. get ample knowledge in Speech Coding Standards.

UNIT – I:

Introduction- Speech production and modeling - Human Auditory System; General structure of speech coders; Classification of speech coding techniques – parametric, waveform and hybrid ; Requirements of speech codecs –quality, coding delays, robustness. Speech Signal Processing- Pitch-period estimation, all-pole and all-zero filters, convolution; Power spectral density, periodogram, autoregressive model, autocorrelation estimation.

UNIT – II:

Speech Quantization- Scalar quantization–uniform quantizer, optimum quantizer, logarithmic quantizer, adaptive quantizer, differential quantizers; Vector quantization – distortion measures, code book design, codebook types.

UNIT –III:

Linear Prediction of Speech- Basic concepts of linear prediction; Linear Prediction Analysis of non-stationary signals –prediction gain, examples; Levinson-Durbin algorithm; Long term and short term linear prediction models; Moving average prediction.

UNIT- IV:

Linear Prediction Coding- LPC model of speech production; Structures of LPC encoders and decoders; Voicing detection; Limitations of the LPC model. Scalar Quantization of LPC-Spectral distortion measures, Quantization based on reflection coefficient and log area ratio, bit allocation; Line spectral frequency – LPC to LSF conversions. Introduction to speech recognition. Basics of MATLAB Speech and Audio Processing Toolbox.

UNIT – V:

Code Excited Linear Prediction-CELP speech production model; Analysis-by-synthesis; Generic CELP encoders and decoders; Excitation codebook search – state-save method, zero-input zero state method; CELP based on adaptive codebook, Adaptive Codebook search; Speech Coding Standards-An overview of ITU-T G.726, G.728 and G.729 standards.

TEXT BOOKS:

1. “Digital Speech” by A.M.Kondoz, Second Edition (Wiley Students Edition), 2004.
2. “Speech Coding Algorithms: Foundation and Evolution of Standardized Coders”, W.C. Chu, WileyInter science, 2003.
3. Introduction to Digital Speech Processing, Lawrence R. Rabiner and Ronald W. Schafer, now Publishers Inc., 2007.

REFERENCE BOOKS:

1. B.Gold and N.Morgan, “Speech and Audio Signal Processing”, Wiley and Sons, 2000.
2. L.R.Rabiner and R.W.Schaffer, "Digital Processing of Speech Signals", Prentice Hall,1978.
3. Mark Kahrs, Karlheinz Brandenburg, Applications of Digital Signal Processing to Audio and Acoustics, Kluwer Academic Publishers.
4. Udo Zölzer, "Digital Audio Signal Processing", Second Edition A John Wiley& sons Ltd.

Course Outcomes:

The Student will be able to

1. mathematically model the speech signal.
2. analyze the quality and properties of speech signal.
3. modify and enhance the speech and audio signals.
4. illustrate the concepts of linear prediction.
5. demonstrate Speech Coding Standards.

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B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

(F324I) CMOS DESIGN
(Program Elective-II)

Course Objectives:
The student will
1. get exposure to different types of CMOS modeling.
2. explain the concept of CMOS lay out along with their scalability.
3. elaborate the phenomena of different type of power consumption and their minimization.
4. analyze different type of delay models.
5. empower to design different type of combinational and sequential circuits.

UNIT – I: Review of MOS transistor model: Introduction, long channel I-V characteristics; C-V characteristics: simple MOS capacitance model, detailed MOS gate capacitance model, detailed MOS diffusion capacitance model; Non ideal I-V effects: Mobility degradation and velocity saturation, channel length modulation, threshold voltage effects, leakage, temperature dependence, geometry dependence; transistor as a switch, CMOS inverter characteristics.
UNIT – II: Integrated circuit layout: Lay out design rules, design rule back ground, scribe line and other structures, MOSIS scalable CMOS design rules, micron design rules; CMOS process enhancement: transistor interconnect, circuit elements; Delay: introduction, RC delay model, linear delay model, logical path effects.
UNIT – III: Power: Introduction, Introduction to low power device design, dynamic power, static power; Interconnect: introduction, interconnect modelling, interconnect impact, interconnect modelling.
UNIT– IV: Combinational circuit design: Introduction, circuit families: static CMOS, ratioed circuits, cascade voltage switch, dynamic circuits, pass transistor circuits; Sub threshold circuit design: sizing, gate selection.
UNIT – V: Sequential circuit design: Introduction, sequencing static circuits: sequencing methods, max delay constraints, min delay constraints, time borrowing, clock skew; Circuit design of latches and flip flops: Conventional CMOS latches, conventional CMOS flip flops, pulsed latches, Resettable latches and flip flops, dual edge triggered flip flops.

TEXT BOOKS:
1.CMOS VLSI Design – A Circuits and Systems Perspective, Neil H. E Weste, David Harris, Ayan Banerjee, 3rd Ed, Pearson, 2009.

REFERENCE BOOKS:
1. CMOS logic circuit Design – John .P. Uyemura, Springer, 2007.
2. Modern VLSI Design – Wayne Wolf, Pearson Education, 3rd Edition, 1997.
3. Essentials of VLSI circuits and systems – Kamran Eshraghian, Eshraghian Dougles and A. Pucknell, PHI, 2005 Edition.

Course Outcomes:

The student will be able to

1. acquire qualitative knowledge about different families of CMOS circuit design.
2. develop a CMOS circuit with less power and time delay.
3. miniature a CMOS circuit by scalability.
4. design different types combinational circuits.
5. construct different types of latches and flip flops.

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B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - II Semester	**0**	**0-2-0**	**1**

(F3241) DIGITAL COMMUNICATIONS AND MICROWAVE ENGINEERING LAB

Course Objectives:

The Student will

1. be provided with basic knowledge of Microwave components and equipments.
2. familiarize with the practical applications of Microwave kits.
3. understand various concepts and techniques of microwave components.
4. able to gain practical knowledge on digital communications experiments.
5. able to gain practical knowledge on microwave frequency and wavelength measurement.

PART-A: MICROWAVE ENGINEERING LAB (ANY 6 Experiments)

1. Reflex Klystron Characteristics.
2. Gunn Diode Characteristics.
3. Directional Coupler Characteristics.
4. VSWR Measurement.
5. Measurement of Waveguide Parameter.
6. Measurement of Impedance of a given Load.
7. Measurement of scattering parameter of a Magic Tee.
8. Measurement of scattering parameters of a Circulators.
9. Attenuation Measurement.
10. Microwave Frequency and Wavelength Measurement.

Part-B: DIGITAL COMMUNICATION LAB (Any 6 Experiments)

11. PCM Generation and Detection.
12. Differential Pulse Code Modulation.
13. Delta Modulation.
14. Time Division Multiplexing of 2 Band limited signals.
15. Frequency shift keying: Generation and Detection.
16. Phase shift Keying: Generation and Detection.
17. Amplitude shift Keying: Generation and Detection.
18. Study of the spectral characteristics of PAM, QAM.

19. DPSK: Generation and Detection.

20.QPSK: Generation and Detection.

Note: Minimum 12 Experiments to be conducted.

Course Outcomes:

The student will be able to

1. emphasize on learning of microwave measurements and gain knowledge on microwave components.
2. use advanced test and measurement equipment to make meaningful comparisons between measured and theoretical results.
3. demonstrate the microwave bench and analyze functionality of different components.
4. gain practical knowledge on digital communications experiments.
5. practice various digital shift key techniques.

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B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - II Semester	**0**	**0-2-0**	**1**

(F3242) VLSI LAB

Course Objectives:

The Student will

1. learn the logic design of digital circuits.
2. learn implementation of designs using Hardware description language and concept of timing simulation.
3. learn CAD tools for design and implementation using FPGA devices.
4. explore various design style of simple and complex Integrated Circuits.
5. able to understand about models and model parameters of MOSFET amplifier, CMOS Inverter etc. which are suited for IC Technology.

Note: Minimum of 10 programs from Part–I and Part-2 programs from Part -II are to be conducted.

Design and implementation of the following CMOS digital/analog circuits using Cadence / Mentor Graphics / Synopsys / Equivalent CAD tools. The design shall include Gate-level design, Transistor-level design, Hierarchical design, Verilog HDL/VHDL design, Logic synthesis, Simulation and verification.

Part –I: VLSI Front End Design programs:

Programming can be done using any complier, and obtain the simulation, synthesis, place and route and implement into FPGA/CPLD boards. The performance testing may be done using pattern generator (32 channels) and logic analyzer apart from verification by simulation with any of the front end tools.

1. HDL code to realize all the logic gates.
2. Design and Simulation of adder.
3. Design of encoders and decoders.
4. Design of multiplexer and de-multiplexer.
5. Design of code converters and comparators.
6. Design of flip flops: SR, D, JK, T.
7. Design of register using latches and flip flops.
8. Design of shift register of serial- in serial –out, serial in parallel out, parallel in serial out and parallel in parallel out.
9. Design of synchronous and asynchronous counter.
10. Design of Sequence Detector (Finite State Machine- Mealy and Moore Machines).

Part –II: VLSI Back End Design programs:

Design and implementation of the following CMOS digital/analog circuits using Cadence tools. Layout, physical verification (DRC, LVS) DC/transient analysis, for complex design of the following:

1. Basic logic gates.
2. CMOS inverter.
3. CMOS NOR/ NAND gates.
4. CMOS XOR and MUX gates.
5. Static / Dynamic logic circuit (register cell).
6. Latch.
7. Pass transistor.
8. Layout of any combinational circuit (complex CMOS logic gate).
9. Analog Circuit simulation (AC analysis) – CS & CD amplifier.

Course Outcomes:

The students will be able to

1. write HDL codes for all digital designs and implement using simulation tools.
2. synthesize combinational and sequential designs.
3. implement physical design in FPGA devices.
4. design combinational and sequential circuits.
5. analyze and layout design of CMOS circuits in micron and submicron level using any platform.

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B.Tech. ECE	**L**	**T-P-D**	**C**
IV Year - I Semester	**3**	**0-0-0**	**3**

(F414A) IMAGE AND COMPUTER VISION

(Program Elective-III)

Course Objectives:

The Student will

1. get an introduction to image analysis and computer vision.
2. obtain mathematical and physical background on image as a linear system.
3. understand various advanced segmentation techniques.
4. obtain ample knowledge in contour-based shape representation and description.
5. understand various techniques in object recognition.

UNIT – I:

Cameras: Pinhole Cameras**, Radiometry – Measuring Light:** Light in Space, Light Surfaces, **Sources, Shadows, and Shading:** Qualitative Radiometry, Sources and Their Effects, Local Shading Models, Application: Photometric Stereo, Inter reflections: Global Shading Models.

Color: The Physics of Color, Human Color Perception, Representing Color, A Model for Image Color, Surface Color from Image Color.

UNIT – II:

The image mathematical and physical background: Linearity, The Dirac distribution and convolution, Linear integral transforms, Images as linear systems.

Introduction to linear integral transforms: 2D Fourier transform, Sampling and the Shannon constraint, Discrete cosine transform, Wavelet transform, Eigen-analysis, Singular value decomposition, Principal component analysis, Other orthogonal image transforms, Images as stochastic processes.

UNIT –III:

Image pre-processing: Scale in image processing, Canny edge detection, Parametric edge models, Edges in multi-spectral images, Pre-processing in frequency domain, Line detection, Corner detection, Maximally stable extremal regions.

Image restoration: Degradations that are easy to restore, Inverse filtration, Wiener filtration.

Basics of video processing systems in Matlab, Computer vision toolbox.

UNIT- IV:

Advanced segmentation: Mean Shift Segmentation, Active contour models-snakes, Traditional snakes and balloons, Extensions, Gradient vector flow snakes, Geometric deformable models-level sets and geodesic active contours, Fuzzy Connectivity.

Contour-based shape representation and description: Chain codes, Simple geometric border representation, Fourier transforms of boundaries, Boundary description using segment sequences, B-spline representation, Shape invariants.

UNIT – V:

Knowledge representation: Statistical pattern recognition, Classification principles, Classifier setting, Classifier learning, Support Vector Machines, Cluster analysis.

Neural networks: Feed-forward networks, Unsupervised learning, Hopfield neural networks.

Optimization techniques in recognition: Genetic algorithms, Simulated annealing.

Fuzzy systems: Fuzzy sets and fuzzy membership functions, Fuzzy set operators, Fuzzy reasoning, Fuzzy system design and training.

TEXT BOOKS:

1. David A. Forsyth and Jean Ponce: Computer Vision – A Modern Approach, PHI Learning (Indian Edition), 2009.

2. Milan Sonka, Vaclav Hlavac , Roger Boyle“ Image Processing, Analysis, and Machine Vision”, Cengage Learning, 2014 or 3rd Edition, 2008ISBN:049508252X.

REFERENCE BOOKS:

1. E. R. Davies: Computer and Machine Vision – Theory, Algorithms and Practicalities, Elsevier (Academic Press), 4th edition, 2013.

2. Scott.E.Umbaugh,“Computer Vision and Image Processing”, PrenticeHall, 1997.

3. A. K.Jain,“ Fundamentals of Digital Image Processing”,Pearson, 2004.

4. S.Jayaraman, S . Esakkirajan, T. Veera kumar, “Digital Image Processing ”, Tata McGraw Hill, 2004.

5. Rafael C. Gonzalez Richard E. Woods and Steven L Eddins, “Digital Image Processing using MATLAB”, Second edition, Gatesmark Publishing, 2009.

Course Outcomes:

The Student will be able to

1. review image processing techniques for computer vision.
2. obtain mathematical and physical background on image.
3. demonstrate advanced techniques in image segmentation.
4. illustrate object recognition with emphasis on feature extraction.
5. practice some of computer vision algorithms.

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B.Tech. ECE	**L**	**T-P-D**	**C**
IV Year - I Semester	**3**	**0-0-0**	**3**

(F414B) ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

(Program Elective-III)

Course Objectives:

The Student will

1. get an understanding of various measurement systems functioning and metrices for performance analysis.
2. understand the principle of operation, working of different electronic instruments viz. Signal generators, signal analyzers, recorders and measuring equipments.
3. use various measurement techniques for measurement of different physical parameters using different classes of transducers.
4. gain knowledge on parameters and functions of CRO.
5. obtain knowledge on various transducers.

UNIT I

Performance Characteristics Of Instruments: Static characteristics, accuracy, resolution, precision, expected value, error and sensitivity.

Errors in measurement and dynamic characteristics: speed of response, fidelity, lag and dynamic error.

Voltmeters: Multirange, range extension.

Ammeters: Shunt and thermocouple type ammeter.

Ohmmeters: Series type and shunt type.

UNIT II

Signal Generators - standard and AF sine and square wave signal generators, function Generators, Wave Analyzers, Harmonic distortion analyzers.

UNIT III

Cathode Ray Oscilloscopes: CRT features, Block Diagram of CRO, Dual beam CRO, measurement of amplitude and frequency, Dual trace oscilloscope, Digital storage oscilloscope.

UNIT IV

AC Bridges: Measurement of inductance: Maxwell's bridge, Anderson bridge. Measurement of capacitance: Schearing bridge, Wheatstone bridge, Wien Bridge.

UNIT V

Transducers: Classification of Transducers**,** LVDT, Thermocouples, thermistors, Data acquisition systems.

TEXT BOOKS:

1. Electronic Measurements and Instrumentation –K. Lal Kishore, Pearson Education 2010.
2. Electronic Instrumentation: H.S.Kalsi – TMH, 2nd Edition 2004.

REFERENCE BOOKS:

1. Electronic Instrumentation and Measurements – David A. Bell, Oxford Univ. Press, 1997.
2. Modern Electronic Instrumentation and Measurement Techniques: A.D. Helbincs, W.D. Cooper: PHI 5th Edition 2003.
3. Electronic Measurements and Instrumentation: B.M. Oliver, J.M. Cage TMH Reprint 2009.
4. Industrial Instrumentation: T.R. Padmanabham Springer 2009.

Course Outcomes:

The student will be able to

1. identify the various electronic instruments based on their specifications for carrying out a particular task of measurement.
2. measure various physical parameters by appropriately selecting the transducers.
3. understand various types of signal generators, signal analyzers for generating and analyzing various real-time signals.
4. design the AC bridges for measurement of resistance, inductance and capacitance for frequency changes.
5. illustrate various types of transducers and their applications for measuring non-electrical parameters.

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B.Tech. ECE	**L**	**T-P-D**	**C**
IV Year - I Semester	**3**	**0-0-0**	**3**

(F414C) ADAPTIVE SIGNAL PROCESSING

(Program Elective-III)

Course Objectives:

The Student will

1. understand the basic concepts of Random process and adaptive filtering.
2. understand the non-linear control and need and significance of changing the control parameters w.r.t. real-time situation.
3. mathematically represent the 'adaptability requirement'.
4. understand the mathematical treatment for the modeling and design of the signal processing systems.
5. study the applications such as adaptive noise cancellation, interference canceling and system identification etc.

UNIT-I

General concept of adaptive filtering and estimation, applications and motivation, Review of probability, random variables and stationary random processes, Correlation structures, properties of correlation matrices.

UNIT-II

Optimal FIR (Wiener) filter, Method of steepest descent, extension to complex valued LMS algorithm (real, complex), convergence analysis, weight error correlation matrix, excess mean square error and mis-adjustment.

UNIT-III

Variants of the LMS algorithm: the sign LMS family, normalized LMS algorithm, block LMS and FFT based realization, frequency domain adaptive filters, Sub-band adaptive filtering. Signal space concepts - introduction to finite dimensional vector space theory, subspace, basis, dimension, linear operators, rank and nullity, inner product space, orthogonality, Gram- Schmidt orthogonalization, concepts of orthogonal projection, orthogonal decomposition of vector spaces.

UNIT-IV

Vector space of random variables, correlation as inner product, forward and backward projections, Stochastic lattice filters, recursive updating of forward and backward prediction errors, relationship with AR modeling, joint process estimator, gradient adaptive lattice.

UNIT-V

Introduction to recursive least squares (RLS), vector space formulation of RLS estimation, pseudo-inverse of a matrix, time updating of inner products, development of RLS lattice

filters, RLS transversal adaptive filters. Advanced topics: affine projection and subspace based adaptive filters, partial update algorithms, QR decomposition and systolic array.

TEXT BOOKS:

1. S. Haykin, Adaptive filter theory, Prentice Hall, 1986.Education 2010.

REFERENCE BOOKS:

1. C. Widrow and S.D. Stearns, Adaptive signal processing, Prentice Hall, 1984.

Course Outcomes:

The student will be able to

1. practice the basic concepts of Random process and adaptive filtering.
2. develop knowledge on optimal FIR filter.
3. establish knowledge on LMS algorithm.
4. employ the mathematical treatment for the modelling and design of the signal processing systems.
5. analyse working of Recursive Least Squares (RLS) method.

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B.Tech. ECE	**L**	**T-P-D**	**C**
IV Year - I Semester	**3**	**0-0-0**	**3**

(F414D) EMBEDDED REAL TIME OPERATING SYSTEMS

(Program Elective-IV)

Course Objectives:

The Student will

1. learn the architecture and programming of ARM processor.
2. be familiar with the embedded computing platform design and analysis.
3. be exposed to the basic concepts of real time Operating system.
4. learn the system design techniques and networks for embedded systems.
5. understand the case study based on Embedded Real Time Operating Systems applications.

UNIT I

INTRODUCTION TO EMBEDDED COMPUTING AND ARM PROCESSORS Complex systems and micro processors– Embedded system design process –Design example: Model train controller- Instruction sets preliminaries – ARM Processor – CPU: programming input and output- supervisor mode, exceptions and traps – Co-processors- Memory system mechanisms – CPU performance- CPU power consumption.

UNIT II

EMBEDDED COMPUTING PLATFORM DESIGN : The CPU Bus-Memory devices and systems– Designing with computing platforms – consumer electronics architecture – platform-level performance analysis – Components for embedded programs- Models of programs- Assembly, linking and loading – compilation techniques- Program level performance analysis – Software performance optimization – Program level energy and power analysis and optimization – Analysis and optimization of program size- Program validation and testing on Raspberry pie.

UNIT III

PROCESSES AND OPERATING SYSTEMS: Introduction – Multiple tasks and multiple processes – Multirate systems- Preemptive real-time operating systems- Priority based scheduling- Interprocess communication mechanisms – Evaluating operating system performance- power optimization strategies for processes – Example Real time operating systems-POSIX-Windows CE.

UNIT IV

SYSTEM DESIGN TECHNIQUES AND NETWORKS: Design methodologies- Design flows – Requirement Analysis – Specifications-System analysis and architecture design – Quality Assurance techniques- Distributed embedded systems – MPSoCs and shared memory multiprocessors.

UNIT V

CASE STUDY: Data compressor – Alarm Clock – Audio player – Software modem-Digital still camera – Telephone answering machine-Engine control unit – Video accelerator.

TEXT BOOK:

1. Marilyn Wolf, "Computers as Components – Principles of Embedded Computing System Design", Third Edition "Morgan Kaufmann Publisher (An imprint from Elsevier), 2012.

REFERENCE BOOKS:

1. Jonathan W.Valvano, "Embedded Microcomputer Systems Real Time Interfacing", Third Edition Cengage Learning, 2012.
2. David. E. Simon, "An Embedded Software Primer", 1st Edition, Fifth Impression, Addison-Wesley Professional, 2007.
3. Raymond J.A. Buhr, Donald L.Bailey, "An Introduction to Real-Time Systems- From Design to Networking with C/C++", Prentice Hall, 1999.
4. C.M. Krishna, Kang G. Shin, "Real-Time Systems", International Editions, Mc Graw Hill 1997.
5. K.V.K.K.Prasad, "Embedded Real-Time Systems: Concepts, Design & Programming", Dream Tech Press, 2005.
6. Sriram V Iyer, Pankaj Gupta, "Embedded Real Time Systems Programming", Tata Mc Graw Hill, 2004.

Course Outcomes:

The student will be able to

1. describe the architecture and programming of ARM processor.
2. outline the concepts of embedded systems.
3. explain the basic concepts of real time Operating system design.
4. analyse the system design techniques to develop software for embedded systems.
5. differentiate between the general purpose operating system and the real time operating system.

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B.Tech. ECE	**L**	**T-P-D**	**C**
IV Year - I Semester	**3**	**0-0-0**	**3**

(F414E) NANO ELECTRONICS
(Program Elective-IV)

Course Objectives:
The student will

1. understand the basic concepts of Nanotechnology and Nano machines.
2. understand the fundamental logic devices and the need of Quantum computing.
3. mathematically represent the 'Quantum tunneling'.
4. understand the mathematical treatment for the modeling and design of the carbon nanotubes.
5. study the applications such as MEMS, RAM, Mass Storage devices etc.

UNIT I
Background to nanotechnology: Types of nanotechnology and nano machines – periodic table – atomic structure – molecules and phases – energy – molecular and atomic size – surface and dimensional space – top down and bottom up; Molecular Nanotechnology: Electron microscope – scanning electron microscope – atomic force microscope –scanning tunneling microscope – nanomanipulator – nano tweezers – atom manipulation– nano dots – self assembly – dip pen nanolithography. Nanomaterials: preparation –plasma arcing – chemical vapor deposition – sol-gels – electrodeposition – ball milling –applications of nanomaterials.

UNIT II
Fundamentals of logic devices:- Requirements – dynamic properties – threshold gates; physical limits to computations; concepts of logic devices:- classifications – two terminal devices – field effect devices – coulomb blockade devices – spintronics – quantum cellular automata – quantum computing – DNA computer; performance of information processing systems;- basic binary operations, measure of performance processing capability of biological neurons – performance estimation for the human brain. Ultimate computation:- power dissipation limit – dissipation in reversible computation – the ultimate computer.

UNIT III
Silicon MOSFETS - Novel materials and alternate concepts:- fundamentals of MOSFET Devices- scaling rules – silicon-dioxide based gate dielectrics – metal gates – junctions & contacts – advanced MOSFET concepts. Quantum transport devices based on resonant tunneling:- Electron tunneling – resonant tunneling diodes – resonant tunneling devices; Single electron devices for logic applications:- Single electron devices – applications of single electron devices to logic circuits.

UNIT IV
Carbon Nanotube: Fullerenes - types of nanotubes – formation of nanotubes – assemblies – purification of carbon nanotubes – electronic properties – synthesis of

carbon nanotubes – carbon nanotube interconnects – carbon nanotube FETs – Nanotube for memory applications – prospects of an all carbon nanotube nanoelectronics.

UNIT V

Electrodes & contacts – functions – molecular electronic devices – first test systems – simulation and circuit design – fabrication; Future applications: MEMS – robots – random access memory – mass storage devices.

TEXT BOOKS/REFERENCE BOOKS:

1. 'Introduction to Nanoelectronics' by V. V. Mitin, V. Kochelap, Michel A Stroscio. Cambridge, 2007.
2. 'Fundamental of Nanoelectronics' by George W Hanson, Prentice Hall, 2008.

Course Outcomes:

The student will be able to

1. develop the basic concepts of Nanotechnology and Nano machines.
2. apply fundamentals of logic devices and the need of Quantum computing.
3. illustrate the operation of Silicon MOSFETS.
4. describe the mathematical treatment for the modeling and design of the carbon nanotubes.
5. understand the applications such as MEMS, RAM, Mass Storage devices and gain knowledge on Electrodes and Contacts.

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B.Tech. ECE	**L**	**T-P-D**	**C**
IV Year - I Semester	**3**	**0-0-0**	**3**

(F414F) FIBER OPTIC COMMUNICATIONS

(Program Elective-IV)

Course Objectives:

The student will

1. understand the functionality of each of the components that comprise a fiber- optic communication system.
2. study the properties of optical fiber and types of fiber materials with their losses occur in fibers, the principles of single and multi-mode optical fibers and their characteristics.
3. understand the Working of semiconductor lasers and differentiate between direct modulation and external electro-optic modulation.
4. analyze the operation of LEDs, laser diodes and PIN photo detectors (spectral properties, bandwidth, and circuits) and apply in optical systems.
5. analyze and design optical communication and fiber optic sensor systems and also the models of analog and digital receivers.

UNIT I: Overview of optical fiber communication Historical development, The general system, advantages of optical fiber communications. Optical fiber wave guides- Introduction, Ray theory transmission, Total Internal Reflection, Acceptance angle, Numerical Aperture, Skew rays. Cylindrical fibers- Modes, Number, Mode coupling, Step Index fibers, Graded Index fibers.

Single mode fibers- Cut off wavelength, Mode Field Diameter, Effective Refractive Index. Fiber materials — Glass, Halide, Active glass, Chalgenide glass, Plastic optical fibers. Signal distortion in optical fibers- Attenuation, Absorption, Scattering and Bending losses, Core and Cladding losses.

UNIT II: Information capacity determination, Group delay, Types of Dispersion: Material dispersion, Wave-guide dispersion, Polarization mode dispersion, Intermodal dispersion. Pulse broadening. Optical fiber Connectors- Connector types, Single mode fiber connectors, Connector return loss. Fiber Splicing- Splicing techniques, Splicing single mode fibers. Fiber alignment and joint loss- Multimode fiber joints, single mode fiber joints.

UNIT III: Optical sources LEDs, Structures, Materials, Quantum efficiency, Power, Modulation, Power bandwidth product. Injection Laser Diodes- Modes, Threshold conditions, External quantum efficiency,Laser diode rate equations, Resonant frequencies. Reliability of LED and ILD. Source to fiber power launching - Output patterns, Power coupling, Power launching, Equilibrium Numerical Aperture, Laser diode to fiber coupling.

UNIT IV: Optical detectors Physical principles of PIN and APD, Detector response time, Temperature effect on Avalanche gain, Comparison of Photodetectors.

Optical receiver operation- Fundamental receiver operation, Digital signal transmission, error sources, Receiver configuration, Digital receiver performance, Probability of error, Quantum limit, Analog receivers.

UNIT V: Optical system design Considerations, Component choice, multiplexing. Point-to-point links, System considerations, Link power budget with examples, Overall fiber dispersion in Multi-mode and Single mode fibers, Rise time budget with examples. Transmission distance, Line coding in Optical links, WDM, Necessity, Principles, Types of WDM, Measurement of Attenuation and Dispersion, Eye pattern.

TEXT BOOKS :

1. Optical Fiber Communications – Gerd Keiser, TMH, 4th Edition, 2008.
2. Optical Fiber Communications – John M. Senior, Pearson Education, 3rd Edition, 2009.

RERFERENCE BOOKS :

1. Fiber Optic Communications – D.K. Mynbaev , S.C. Gupta and Lowell L. Scheiner, Pearson Education, 2005.
2. Text Book on Optical Fibre Communication and its Applications – S.C.Gupta, PHI, 2005.
3. Fiber Optic Communication Systems – Govind P. Agarwal , John Wiley, 3rd Ediition, 2004.

Course Outcomes:

The student will be able to

1. Choose necessary components required in modern optical communications systems.
2. Design and build optical fiber experiments in the laboratory and learn how to calculate electromagnetic modes in waveguides, the amount of light lost going through an optical system, dispersion of optical fibers.
3. Apply different types of photo sources, photo detectors and optical test equipment to analyze optical fiber and light wave systems.
4. Choose the optical cables for better communication with minimum losses.
5. Illustrate the optical system design considerations.

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B.Tech. ECE	**L**	**T-P-D**	**C**
IV Year - II Semester	**3**	**0-0-0**	**3**

(F424A) MIXED SIGNAL DESIGN

(Program Elective-V)

Course Objectives:

The student will

1. understand the Switched capacitors Circuits and Operation.
2. analyze PLLS in detail.
3. study Data Converter Fundamentals.
4. illustrate Nyquist Rate A/D Converters.
5. motivate the graduate students to study and analyze the oversampling converters.

UNIT – I: Switched Capacitor Circuits: Introduction to Switched Capacitor circuits- basic building blocks, Operation and Analysis, Non-ideal effects in switched capacitor circuits, Switched capacitor integrators first order filters, Switch sharing, biquad filters.

UNIT – II: Phased Lock Loop (PLL): Basic PLL topology, Dynamics of simple PLL, Charge pump PLLs-Lock acquisition, Phase/Frequency detector and charge pump, Basic charge pump PLL, Non-ideal effects in PLLs-PFD/CP non- idealities, Jitter in PLLs, Delay locked loops, applications.

UNIT – III: Data Converter Fundamentals: DC and dynamic specifications, Quantization noise, Nyquist rate D/A converters- Decoder based converters, Binary-Scaled converters, Thermometer-code converters, Hybrid converters.

UNIT – IV: Nyquist Rate A/D Converters: Successive approximation converters, Flash converter, Two-step A/D converters, Interpolating A/D converters, Folding A/D converters, Pipelined A/D converters, Time-interleaved converters.

UNIT – V: Oversampling Converters: Noise shaping modulators, Decimating filters and interpolating filters, Higher order modulators, Delta sigma modulators with multi-bit quantizers, Delta sigma D/A.

TEXT BOOKS:

1. Design of Analog CMOS Integrated Circuits- Behzad Razavi, TMH Edition, 2002.
2. Analog Integrated Circuit Design- David A. Johns,Ken Martin, Wiley Student Edition, 2013.

REFERENCE BOOKS:

1. CMOS Mixed-Signal Circuit Design – R. Jacob Baker, Wiley Interscience, 2009.
2. CMOS Analog Circuit Design –Philip E. Allen and Douglas R. Holberg, Oxford University Press, International Second Edition/Indian Edition, 2010.
3. Introduction to Mixed-signal, Embedded design- Dr. Alex Doboli and Dr. Edward Currie, Springer, 2011.

Course Outcomes:

The student will be able to

1. illustrate the concepts of Switched Capacitor circuits.
2. design and analysis of Nyquist Rate A/D Converters.
3. extend the application of A/D converters for over sampling.
4. employ the Mixed Signal Design to Different Applications.
5. develop the concepts of Oversampling Converters.

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B.Tech. ECE	**L**	**T-P-D**	**C**
IV Year - II Semester	**3**	**0-0-0**	**3**

(F424B) SATELLITE COMMUNICATION

(Program Elective-V)

Course Objectives:

The Student will

1. understand the basic concepts of Satellite communication.
2. get introduced with the advancement in the field of satellite communication.
3. explain operation of orbital mechanics and satellite sub-systems.
4. gain knowledge about modulation and multiple access techniques.
5. understand different applications of satellite communication.

UNIT-I

Introduction to Satellite Communication: Principles and architecture of satellite Communication, Brief history of Satellite systems, advantages, disadvantages, applications and frequency bands used for satellite communication.

Orbital Mechanics: Orbital equations, Kepler's laws, Apogee and Perigee for an elliptical orbit, evaluation of velocity, orbital period, angular velocity of a satellite, concepts of Solar day and Sidereal day.

UNIT-II

Satellite sub-systems: Study of Architecture and Roles of various sub-systems of a satellite system such as Telemetry, Tracking, Command and Monitoring (TTC & M), Attitude and orbit control system (AOCS), Communication sub-system, power sub-systems.

UNIT-III

Typical Phenomena in Satellite Communication: Solar Eclipse on satellite, its effects, remedies for Eclipse, Sun Transit Outage phenomena, its effects and remedies.

Flux density and received signal power equations, Calculation of System noise temperature for satellite receiver, noise power calculation, Doppler frequency shift phenomena and expression for Doppler shift.

UNIT-IV

Modulation and Multiple Access Schemes: Various modulation schemes used in satellite communication, Meaning of Multiple Access, Multiple access schemes based on time and frequency, Code sharing namely TDMA, FDMA and CDMA, Satellite link budget.

UNIT-V

Earth Station Technology: Transmitters, Receivers, Tracking Systems, Terrestrial Interface, Power Test Methods, Lower Orbit Considerations.

Satellite Applications: VSAT, GPS, Direct Broadcast Satellite (DBS) Television, Orbital Spacing, Direct to Home Broadcast(DTH), Radarsat, Recent developments in Satellite

Communication.

TEXT /REFERENCE BOOKS:

1. Timothy Pratt Charles W. Bostian, Jeremy E. Allnutt: Satellite Communications: Wiley India, 2nd edition 2002.
2. Tri T. Ha: Digital Satellite Communications: Tata McGraw Hill, 2009.
3. Dennis Roddy: Satellite Communication: 4th Edition, McGraw Hill,2009.

Course Outcomes:

The student will be able to

1. visualize the architecture of satellite systems as a means of high speed, high range communication system.
2. illustrate the basic concepts of Orbital mechanics.
3. state aspects related to sub-systems in a satellite and satellite link budget.
4. acquire knowledge about modulation and multiple access schemes.
5. describe the typical phenomena in satellite communication and also its applications.

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B.Tech. ECE	**L**	**T-P-D**	**C**
IV Year - II Semester	**3**	**0-0-0**	**3**

(F424C) INFORMATION THEORY AND CODING

(Program Elective-V)

Course Objectives:

The student will

1. acquire knowledge about information and entropy.
2. learn Hamming weight, minimum distance decoding and different types of codes.
3. learn about syndrome calculation and design of an encoder and decoder.
4. study convolution coding, sequential search and Viterbi algorithm.
5. import image compression, graphics interchange format, JPEG and MPEG standards. and to study compression techniques, speech and audio coding.

UNIT I: INFORMATION THEORY

Information – Entropy, Information rate, classification of codes, Kraft McMillan inequality, Source coding theorem, Shannon-Fano coding, Huffman coding, Extended Huffman coding - Joint and conditional entropies, Mutual information - Discrete memoryless channels – BSC, BEC – Channel capacity, Shannon limit.

UNIT II: ERROR CONTROL CODING: BLOCK CODES

Definitions and Principles: Hamming weight, Hamming distance, Minimum distance decoding - Single parity codes, Hamming codes, Repetition codes - Linear block codes, Cyclic codes - Syndrome calculation, Encoder and decoder - CRC.

UNIT III: ERROR CONTROL CODING: CONVOLUTIONAL CODES

Convolutional codes – code tree, trellis, state diagram - Encoding – Decoding, Sequential search and Viterbi algorithm – Principle of Turbo coding.

UNIT IV: SOURCE CODING: TEXT, AUDIO AND SPEECH

Text: Adaptive Huffman Coding, Arithmetic Coding, LZW algorithm – Audio: Perceptual coding, Masking techniques, Psychoacoustic model, MEG Audio layers I,II,III, Dolby AC3 - Speech: Channel Vocoder, Linear Predictive Coding**.**

UNIT V: SOURCE CODING: IMAGE AND VIDEO

Image and Video Formats – GIF, TIFF, SIF, CIF, QCIF – Image compression: READ, JPEG – Video Compression: Principles-I,B,P frames, Motion estimation, Motion compensation, H.261, MPEG standard.

TEXT BOOKS:

1.R Bose, “Information Theory, Coding and Cryptography”, TMH 2007.

2.Fred Halsall, “Multidedia Communications: Applications, Networks, Protocols and Standards”, Perason Education Asia, 2002.

REFERENCE BOOKS:

1.K Sayood, “Introduction to Data Compression” 3/e, Elsevier 2006.

2.S Gravano, “Introduction to Error Control Codes”, Oxford University Press 2007.

3.Amitabha Bhattacharya, “Digital Communication”, TMH 2006.

Course Outcomes:

The student will be able to

1. analyze source coding methods and information.
2. practice and solve channel coding methods.
3. discriminate the block codes and cyclic codes.
4. apply audio and text coding in communications.
5. employ speech and image coding in communications.

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B.Tech. ECE	**L**	**T-P-D**	**C**
IV Year - II Semester	**3**	**0-0-0**	**3**

(F424D) WIRELESS SENSOR NETWORKS

(Program Elective-VI)

Course Objectives:

The student will

1. understand the basic WSN technology and supporting protocols, with emphasis placed on standardization basic sensor systems and provide a survey of sensor technology.
2. understand the medium access control protocols and address physical layer issues.
3. learn key routing protocols for sensor networks and main design issues.
4. gain knowledge on Sensor management, sensor network middleware, operating system.
5. illustrate the security and applications of Wireless Sensor Networks.

UNIT I

INTRODUCTION TO WSN: Components of a wireless sensor node, Motivation for a Network of Wireless Sensor Nodes, Classification of sensor networks, Characteristics of wireless sensor networks, Challenges of wireless sensor networks, Comparison between wireless sensor networks and wireless mesh networks, Limitations in wireless sensor networks, Design challenges.

HARDWARE ARCHITECTURE & APPLICATIONS : Structural Health Monitoring, Traffic Control, Health Care, Pipeline Monitoring, Precision Agriculture, Active Volcano, Underground Mining Node Architecture: The Sensing Subsystem, the Processor Subsystem, Communication Interfaces, Prototypes.

UNIT II

NETWORK LAYER: Routing Metrics, Flooding and Gossiping, Data-Centric Routing, Proactive Routing, On-Demand Routing, Hierarchical Routing, Location-Based Routing, QoS-Based Routing Protocols Node and Network Management: Power Management, Local Power Management aspects, Dynamic Power Management, Conceptual Architecture.

MAC Protocols for Wireless Sensor Networks: Issues in Designing a MAC protocol for Ad Hoc Wireless Networks, Design goals of a MAC Protocol for Ad Hoc Wireless Networks, Classifications of MAC Protocols, Contention – Based Protocols, Contention – Based Protocols with reservation Mechanisms, Contention – Based MAC Protocols with Scheduling Mechanisms, MAC Protocols that use Directional Antennas, Other MAC Protocols.

UNIT-III

ROUTING PROTOCOLS: Introduction, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classification of Routing Protocols, Table –Driven Routing Protocols, On – Demand Routing Protocols, Hybrid Routing Protocols, Routing Protocols with Efficient Flooding Mechanisms, Hierarchical Routing Protocols, Power – Aware Routing Protocols, Proactive Routing.

UNIT-IV

TIME SYNCHRONIZATION: Clocks and the Synchronization Problem, Time Synchronization in Wireless Sensor Networks, Basics of Time Synchronization, Time Synchronization Protocols Localization: Ranging Techniques, Range-Based Localization, Range-Free Localization, Event Driven Localization.

UNIT- V

SECURITY IN WSNs: Security in Ad Hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, Secure Routing in Ad Hoc Wireless Networks. SENSOR NETWORK PLATFORMS AND TOOLS: Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node- level software platforms, Node-level Simulators, State-centric programming. Protocols and Mechanisms for Security, IEEE 802.15.4 and Zig Bee Security.

APPLICATIONS of WSN: Ultra wide band radio communication, Wireless fidelity systems. Future directions, Home automation, smart metering Applications.

TEXT BOOKS

1.Wireless Ad- hoc and Sensor Networks: Protocols, Performance and Control – Jagannathan Sarangapani, CRC Press.

2.Waltenegus Dargie, Christian Poellabauer, “Fundamentals of Wireless Sensor Networks: Theory and Practice”, Wiley 2010.

3.Mohammad S. Obaidat, Sudip Misra, “Principles of Wireless Sensor Networks”, Cambridge, 2014.

REFERENCE BOOKS:

1. Ian F. Akyildiz, Mehmet Can Vuran , “Wireless Sensor Networks”, Wiley 2010.
2. C S Raghavendra, K M Sivalingam, Taieb Znati, “Wireless Sensor Networks”, Springer, 2010.
3. C. Sivarm murthy & B.S. Manoj, “Adhoc Wireless Networks”, PHI-2004.
4. FEI HU., XIAOJUN CAO, “Wireless Sensor Networks”, CRC Press, 2013.
5. Feng ZHAO, Leonidas GUIBAS, “ Wireless Sensor Networks”, ELSEVIER , 2004.

Course Outcomes:

The student will be able to

1. illustrate the Concepts, Network Architecture and Applications of Ad-hoc and Wireless Sensor Networks.
2. analyze the protocol design issues of wireless sensor Networks.
3. apply the design of routing protocols for ad-hoc and wireless networks.
4. examine the Concepts, Architecture of ad-hoc and sensor networks and MAC layer protocols.
5. evaluate the QOS related performance measurements of wireless sensor networks.

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IV Year - II Semester	**3**	**0-0-0**	**3**

(F424E) CONSUMER ELECTRONICS

(Program Elective-VI)

Course Objectives:

The student will

1. gain knowledge about Audio fundamentals.
2. study the working of different audio systems.
3. study the applications of various consumer electronics appliances.
4. gain knowledge on television systems.
5. be familiar with day to day consumer electronics appliances and the technology behind that.

UNIT-I

Audio Fundamentals and Devices: Basic characteristics of sound signal: level and loudness, pitch, frequency response, fidelity and linearity, Reverberation. Audio level metering, decibel level in acoustic measurement. Microphone: working principle, sensitivity, nature of response, directional characteristics .Types: carbon, condenser, crystal, electrets, tie- clip, wireless . Loud speaker: working principle, characteristic impedance, watt capacity . Types: electrostatic, dynamic, permanent magnet , woofers and tweeters . Sound recording: Optical recording, stereophony and multichannel sound, MP3 standard.

UNIT-II

Audio systems: CD player, home theatre sound system, surround sound . Digital console: block diagram, working principle, applications . FM tuner: concepts of digital tuning, ICs used in FM tuner TDA 7021T . PA address system: planning, speaker impedance matching, Characteristics, power amplifier, Specification.

UNIT-III

Television Systems: Monochrome TV standards, scanning process, aspect ratio, persistence of vision and flicker, interlace scanning, picture resolution . Composite video signal: horizontal and vertical sync details, scanning sequence . Colour TV standards, colour theory, hue, brightness, saturation, luminance and chrominance . Different types of TV camera . Transmission standards: PAL system, channel bandwidth.

UNIT-IV

Television Receivers and Video Systems : PAL-D colour TV receiver, block diagram, Precision IN Line colour picture tube. Digital TVs:- LCD, LED , PLASMA, HDTV, 3-D TV, projection TV, DTH receiver. Video interface: Composite, Component, Separate Video,

Digital Video, SDI, HDMI Multimedia Interface) , Digital Video Interface.CD and DVD player: working principles, Interfaces.

UNIT-V

Home / Office Appliances : FAX and Photocopier . Microwave Oven: types, single chip controllers, wiring and safety instructions, technical specifications. Washing Machine: wiring diagram, electronic controller for washing machine, technical specifications, types of washing machine, fuzzy logic . Air conditioner and Refrigerators: Components features, applications, and technical specification . Digital camera and cam coder: - pick up devices - picture processing - picture storage.

TEXT BOOKS

1. Consumer Electronics, Bali S.P., Pearson Education India,2010.
2. Audio video systems : principle practices & troubleshooting, Bali R and Bali S.P., Khanna Book Publishing Co. (P) Ltd., 2010Delhi , India.

REFERENCE BOOKS

1. Modern Television practices, Gulati R.R., New Age International Publication (P) Ltd. New Delhi Year 2011.
2. Mastering Digital Television, Whitaker Jerry & Benson Blair, McGraw-Hill Professional, 2010.

Course Outcomes:

The student will be able to

1. describe the Audio fundamentals.
2. illustrate the working of audio systems.
3. demonstrate the working of television systems
4. troubleshoot color TV receivers.
5. apply knowledge on applications of various consumer electronics appliances.

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B.Tech. ECE	**L**	**T-P-D**	**C**
IV Year - II Semester	**3**	**0-0-0**	**3**

(F424F) WAVELETS SIGNAL PROCESSING

(Program Elective-VI)

Course Objectives:

The Student will

1. understand the terminologies that are used in the wavelets literature.
2. understand the concepts and theory behind wavelets constructions from an interdisciplinary perspective that unifies harmonic analysis, filter banks and multi resolution analysis.
3. understand wavelets and multi resolution techniques to a problem at hand and justify why wavelets provide the right tool.
4. gain knowledge on multirate analysis and DWT.
5. study wavelet packet transform and other special topics based on Wavelets Signal Processing.

UNIT -I

Introduction: Vector Space – dot product, orthogonality and orthonormality-relation between vectors and signals, concept of convergence. Fourier Theory, FT, STFT, Transforms: Walsh, Hadamard, Haar and Slant Transforms, DCT, DST, KLT, – definition, properties and applications.

UNIT-II

Continuous Wavelet Transform (CWT): Short comings of STFT, Need for wavelets, Definition and Properties, Wavelet Basis Concept of Scale and its relation with frequency, Continuous time wavelet Transform Equation- Series Expansion using Wavelets- CWT-Tiling of time scale plane for CWT.

UNIT-III

Multi Rate Analysis and DWT: Need for scaling function – Multi Resolution Analysis, Two-Channel Filter Banks, Perfect Reconstruction Condition, Relationship between Filter Banks and Wavelet Basis, DWT, Structure of DWT Filter Banks.

UNIT-IV

Daubechies Wavelet Function, Mallat's Algorithm for DWT –Multiband Wavelet Transforms Lifting Scheme-Wavelet Transform Using Polyphase Matrix Factorization – Geometrical Foundations of Lifting Scheme –Lifting Scheme IN Z-Domain, Applications of DWT.

UNIT-V

Special Topics: Wavelet Packet Transform, Multidimensional Wavelets, Bi-orthogonal basis- BSplines, Lifting Scheme of Wavelet Generation, Multi Wavelets.

TEXT BOOKS:

1. Raghuveer M.Rao and Ajit S. Bopardikar, “Wavelet Transforms-Introduction theory and applications” Pearson Edu, Asia, New Delhi, 2003.
2. Soman. K. P, Ramachandran. K.I, “Insight into Wavelets from Theory to Practice” Printice Hall India, 1st Edition, 2004.

REFERENCE BOOKS:

1. Jaideva C Goswami, Andrew K Chan, “Fundamentals of Wavelets- Theory, Algorithms and Applications” John Wiley & Sons, Inc, Singapore, 1999.
2. Vetterli M. Kovacevic, “Wavelets and Sub-band Coding”, PJI, 1995.
3. C. Sydney Burrus, “Introduction to Wavelets and Wavelet Transforms”, PHI, 1st Edition, 1997.
4. Stephen G. Mallat,v, ”A Wavelet Tour of Signal Processing” , Academic Press, 2nd Edition
5. S.Jayaraman, S.Esakkirajan, T.Veera Kumar, “Digital Image Processing” , TMH, 2009.

Course Outcomes:

The student will be able to

1. define the concept of different transform techniques and application areas.
2. analyze continuous wavelet transforms and its importance in different communication areas.
3. design different filter banks using multirate analysis techniques.
4. derive the concept of different wavelet transform techniques.
5. acquire knowledge about Multi Wavelets.

Open Elective – I

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B.Tech.	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

ENERGY AUDIT AND GREEN BUILDING
(Open Elective-I)

COURSE OBJECTIVES:

The Student Will:

1. Create awareness about the principles of green building technology and to have insight about the criteria for rating systems along with the established Indian codes and guidelines.
2. Establish a clear understanding of various renewable and non-renewable sources of energy along with their carbon footprints and enumerates the process of performance testing including building modeling and energy analysis.
3. Discuss about the energy efficient green building materials and to have understanding on the cost-effective Building Technologies, Strategies for Green Building Systems and Energy Conservation Measures.
4. Give details on the principles of sustainable development in green building design.
5. Describe the best green building practices adopted along with cost/benefit and life-cycle analysis of green buildings.

UNIT-1

Sources of Energy:

Renewable and Non-renewable sources of energy - Coal, Petroleum, Nuclear, Wind, Solar, Hydro, Geothermal sources, potential of these sources, hazards, pollution with reference to Global scenario, demand and supply in India, Global efforts to reduce carbon emissions, Performance testing. Building modeling- Energy analysis, Metering, Monitoring.

Carbon emission: Forecasting, Control of carbon emission, Air quality and its monitoring carbon footprint, Environmental issues, Minimizing carbon emission, Energy retrofits and Green Remodels.

UNIT-II

Green Building Materials: Sustainable Materials, Depletion of natural resources for preparation of building materials, renewable and recyclable resources, energy efficient materials, Embodied Energy of Materials. Green cement, Biodegradable materials, Smart materials, Manufactured Materials, Volatile Organic Compounds (Voc's), Natural Non-Petroleum Based Materials, Recycled materials, Renewable and Indigenous Building Materials, Engineering evaluation of these materials.

Green Building Planning and Specifications: Environment friendly and cost effective Building Technologies, Integrated Life cycle design of Materials and Structures, Green Strategies for Building Systems, Alternative Construction Methods, Energy Conservation Measures in Buildings, Waste and Water management and Recycling by Sustainable Facilities, Heating, Ventilation and Air Conditioning, Passive Solar and Daylight, Plumbing and its Effect on Energy Consumption

UNIT -III

Concept of Green Buildings: Green building - Definition, Features, Necessity, Initiatives, Green buildings in India, Green building Assessment – Green Building Rating Systems

(BREEAM, USGBC, LEED, IGBC,TERI-GRIHA, GREEN STAR),Criteria for rating, Energy efficient criteria ,environmental benefits economic benefits, health and social benefits, Major energy efficiency areas for building, Contribution of buildings towards Global Warming. Life cycle cost of buildings, Codes and Certification Programs.

UNIT-IV

Design of Green Buildings; Sustainable sites, Impact of construction on environment, Life cycle assessment, Principles of sustainable development in Building Design, Design on Bioclimatic and solar passive architecture, Considerations of energy consumption, water use, and system reliability, indoor air quality, noise level, comfort, cost efficiency in building design, Advanced Green building technologies and innovations

UNIT-V

Construction of Green Buildings: Energy efficient construction, Practices for thermal efficiency and natural lighting. Ecofriendly water proofing; Energy conservation building codes building rating, Maintenance of green buildings, Cost and Performance Comparisons and Benchmarking, Green Project Management Methods and Best Practices, Cost/benefit analysis of green buildings, Life-cycle analysis of green buildings, Case studies of rated buildings (new and existing)

TEXT BOOKS:

1. Alternative Building Materials and Technologies – By K S Jagadeesh, B V Venkata Rama Reddy & K S Nanjunda Rao – New Age International Publishers
2. Integrated Life Cycle Design of Structures – By AskoSarja – SPONPress
3. Non-conventional Energy Resources – By D S Chauhan and S K Sreevasthava – New Age International Publishers
4. Green Buildings (McGraw hill publication): by Gevorkian

REFERENCES:

1. Emerald Architecture: case studies in green buildings, The Magazine of Sustainable Design
2. Understanding Green Building Guidelines: For Students and Young Professionals, Traci Rose Rider, W. W. Norton & Company Publisher.
3. Understanding Green Building Materials, Traci Rose Rider, W. W. Norton & Company Publisher.

Course Outcomes:

The student will be able to:

1. Know the underlying principles, history, environmental and economic impacts of green building technology and to identify the criteria for rating systems along with the established Indian codes and guidelines.
2. Identify various Renewable and Non-renewable sources of energy along with their carbon footprints and comprehend the techniques and benefits of building performance testing such as building modeling and energy analysis, monitoring and metering.
3. Recognize the energy efficient green building materials and explain the cost effective Building Technologies, Strategies for Green Building Systems and Energy Conservation Measures.

4. Explain the application of design guidelines of Green Building considering the Energy Conservation Measures.
5. Summarize on the building codes, relevant legislation governing the consumption of resources and emission of environmental pollutants by buildings and be familiar with IGBC green building certification procedure.

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B.Tech.	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

ENVIRONMENTAL IMPACT ASSESSMENT
(Open Elective-I)

Course Objectives:

The Students will

1. To impart knowledge on Environmental management and environmental impact assessment.
2. To provide a basic understanding of the EIA process as it is used for research, planning, project or program evaluation, monitoring and regulatory enforcement.
3. To outline the impacts on soil, wetlands, flora, fauna, historical structures and the other socioeconomic environment.
4. To introduce students to the legal, economic, social, administrative and technical process preparing and evaluating environmental impact documents.
5. To assess the air and water quality parameters; predict the impacts and their mitigation measures.

UNIT - I:

Basics concepts of EIA: Initial environmental examination, elements of EIA, factors affecting EIA, impact evaluation and analysis, preparation of environmental base map, classification of environmental parameters.

EIA Methodologies: Introduction, Criteria for the selection of EIA methodology, EIA methods, Ad-hoc methods, matrix methods, network method, Environmental Media Quality Index Method (EMQI), Environmental media quality index method, overlay methods, cost/benefit analysis.

UNIT - II:

Impact of developmental activities and land use: Introduction and methodology for the assessment of soil and groundwater, delineation of study area, identification of of activities. Assessment of impact of developmental activities on vegetation and wildlife, environmental impact of deforestation- causes and effects of deforestation.

UNIT - III:

Procurement of relevant soil quality, impact prediction, assessment of impact significance, identification and incorporation of mitigation measures.

EIA of surface water, air and biological environment: Methodology for the assessment of impacts on surface water environment, air pollution sources, generalized approach for assessment of air pollution impact.

UNIT - IV:

Environmental audit and environmental legislation, objectives of environmental audit, types of environmental audit, audit protocel, stages of environmental audit onsite activities, evaluation of audit data and preparation of audit report, post audit activities.

UNIT - V:

Environmental protection Act, The water Act, The air Act (prevention and control of pollution Act), motor act, wild life act. Case studies of preparation of EIAs for various industries.

Text Books:

1. Environmental impact assessment methodologies, by Y.Anjaneyulu, B.S.Publication, Sultan bazaar Hyderabad.
2. Environmental impact assessment, by Alan Gilpin, Cambridge University Press
3. Environmental pollution Control by Dr. H S Bhatia – Galgotia Publications Pvt Ltd, Delhi.
4. Environmental Impact Assessment and Management Publisher, Daya Author: B Hoisetti, A Kumar

Course Outcomes:

The Students will be able to

1. Explain different methodologies for environmental impact prediction and assessment.
2. Understand the elements of environmental impact assessments and processes by which they apply.
3. Carry out scoping and screening of developmental projects for environmental and social assessments.
4. Evaluate EIA reports.
5. Plan EIAs and environmental management plans

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UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

ENERGY STORAGE SYSTEMS
(OPEN ELECTIVE - I)

Course Objectives:

The Students will

1. To enable the student to understand the need for energy storage, devices and technologies.
2. To understand the emerging needs for Electric Energy storage
3. To analyze the features of various Energy storage Systems
4. To integrate the Energy storage systems with batteries.
5. To understand the behavior of different configurations of Energy storage Systems

UNIT – I: Electrical Energy Storage Technologies
Characteristics of electricity - The roles of Electric Energy Storage - High generation cost during peak- demand periods - Need for continuous and flexible supply - Long distance between generation and consumption- Congestion in power grids - Transmission by cable

UNIT – II: Needs For Electrical Energy Storage
Emerging needs for Electric Energy Storage – Utilization of more renewable energy - less fossil fuel - Smart Grid uses - The roles of electrical energy storage technologies - The roles from the viewpoint of a utility, from the viewpoint of consumers, from the viewpoint of generators of renewable energy.

UNIT – III: Features of Energy Storage Systems
Classification of Electric Energy Storage systems - Mechanical storage systems - Pumped hydro storage (PHS) - Compressed air energy storage (CAES) - Flywheel energy storage (FES) - Electrochemical storage systems - Secondary batteries - Flow batteries - Chemical energy storage, -Hydrogen (H2) - Synthetic natural gas (SNG).

UNIT – IV: Types of Electrical Energy Storage Systems
Electrical storage systems - Double-layer capacitors (DLC) - Superconducting magnetic energy storage (SMES) - Thermal storage systems - Standards for Electric Energy Storage - Technical comparison of EES technologies.

UNIT – V: Applications
Present status of applications - Utility use (conventional power generation, grid operation & service) - Consumer use (uninterruptable power supply for large consumers) - New trends in applications - Renewable energy generation - Smart Grid - Smart Micro grid, Smart House - Electric vehicles - Management and control hierarchy of storage systems - Internal configuration of battery storage systems - External connection of EES systems - Aggregating EES systems and distributed generation (Virtual Power Plant) - Battery SCADA - Aggregation of many dispersed batteries.

TEXT BOOKS:

1. Energy Storage Benefits and Market Analysis' by James M. Eyer, Joseph J. Iannucci and Garth P. Corey.
2. The Electrical Energy Storage by IEC Market Strategy Board

REFERENCE BOOKS:

1. Jim Eyer, Garth Corey: Energy Storage for the Electricity Grid: Benefits and Market Potential Assessment Guide, Report, Jim Eyer, Garth Corey, Sandia National Laboratories, Feb 2010.

Course Outcomes:

The Students will be able to

1. Understand the concepts of energy storage devices
2. Analyze the characteristics of energy from various sources and need for storage
3. Classify various types of energy storage and various devices used for the purpose
4. Apply the same concepts to real time problems.
5. Differentiate the features of Energy Storage Systems.

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B.Tech.	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

ENERGY AUDITING, CONSERVATION AND MANAGEMENT
(OPEN ELECTIVE - I)

Course Objectives:
The Students will

1. To understand the need of Energy Audit and Energy Conservation Schemes.
2. To know the necessity of conservation of energy.
3. To generalize the methods of energy management.
4. To illustrate the factors to increase the efficiency of electrical equipment.
5. To detect the benefits of carrying out energy audits.

UNIT-I:Basic Principles of Energy Audit: Energy Audit-
Definitions, Concept, Types of audit, Energy index, Cost index, Pie charts, Sankeydiagrams, Load profiles, Energy conservation schemes- Energy audit of industries- Energy savingpotential, Building energy audit

UNIT-II:Energy Management
Principles of energy management, Organizing energy management program, Initiating, Planning,Controlling, Promoting, Monitoring, Reporting, Energy manger, Qualities and functions, Language,Questionnaire – Check list for top management.

UNIT-III:Energy Efficient Motors
Energy efficient motors, Factors affecting efficiency, Loss distribution, Constructional details, Characteristics - Variable speed, Variable duty cycle systems, RMS HP- Voltage variation-Voltage unbalance- Over motoring- Motor energy audit

UNIT-IV:Power Factor Improvement, Lighting and Energy Instruments
Power factor – Methods of improvement, Location of capacitors, Pf with non linear loads, Effect ofharmonics on power factor, Power factor motor controllers - Good lighting system design andpractice, Lighting control , Lighting energy audit - Energy instruments-Wattmeter, Data loggers,Thermocouples, Pyrometers,Lux meters, Tongue testers,Application of PLC's.

UNIT-V:Economic Aspects and Analysis
Economics analysis-Depreciation methods, Time value of money, Rate of return, Present worthmethod, Replacement analysis, Life cycle costing analysis- Energy efficient motors-Calculation ofsimple payback method, Net present worth method- Power factor correction, Lighting -Applications of life cycle costing analysis, Return on investment.

TEXT BOOKS:

1. W.R. Murphy & G. Mckay, “Energy Management”, Butter worth, Heinemann Publications, Second Edition, 2009.
2. Paul o’ Callaghan, “Energy Management”, Tata Mc-Graw Hill Book Company- First Edition, 1998.
3. W.C.Turner, “Energy Management Hand Book”, CRC Press, First Edition, 2004.

REFERENCES:

1. John .C. Andreas, “Energy Efficient Electric Motors”, CRC Press, Third Edition, 1992.
2. Great Britain, “Energy Management and Good Lighting Practice: Fuel Efficiency- Booklet Volume 12-EEO, 1989.

Course Outcomes

The Students will be able to

1. Analyze energy audit of industries.
2. Predict management of energy systems.
3. Sequence the methods of improving efficiency of electric motor.
4. Analyze the power factor and to design a good illumination system.
5. Determine pay back periods for energy saving equipment.

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B.Tech.	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

AUTOMOTIVE TECHNOLOGY

(OPEN ELECTIVE - I)

Course Objectives:
The Student will

1. Provide an overview on automobile engineering
2. Learn different fuels and advanced control systems
3. Study the concepts and drive train configurations of electric and hybrid electric vehicles
4. Understand use of intelligent vehicle technologies like navigation in automobiles
5. Provide awareness of safety security and regulations

UNIT-I

Structural systems of automobile– chassis and body, power unit, transmission system, Steering System, Suspension System, Braking System.

Other systems of automobile- Ignition systems, Fuel System, Cooling System, Electrical System.

UNIT –II

Fuels: Types of Fuels-Gasoline fuels, CNG, Biofuels, advantages and limitations.

Advanced Engine Controls: Concept of an electronic engine control system, electronic fuel injection - throttle body fuel injection, multi-point fuel injection, gasoline direct injection, common rail direct injection, electronic ignition control.

UNIT –III

Fuel Cell and Solar Vehicles: Fuel cell vehicle – Operating principle, types of fuel cells, fuel cell options for fuel cell vehicle and fuel cell hybrid vehicle. Solar vehicle - Solar photovoltaic cell, solar array, solar car electrical system and drive train.

Electric and Hybrid Vehicles: Electric vehicles - Layout of an electric vehicle, performance, energy consumption, advantage and limitations. Hybrid electric vehicles - Concepts, types of hybrid drive train architecture, merits and demerits.

UNIT-IV

Telematics Systems: Global positioning system, geographical information systems, navigation system.

Comfort Systems: Automotive vision system, adaptive cruise control system, active suspension system, power steering and power windows.

UNIT-V

Safety and Security Systems: Active and passive safety, airbags, seat belt tightening system, collision warning systems, anti-lock braking systems, traction control system, electronic immobilizers, remote keyless entry, smart card system, number plate coding.

Emission and noise control regulations- Pollution standards, National and international – Pollution Control – Techniques – Noise Pollution & control.

TEXT BOOKS:

1. William B Riddens, "Understanding Automotive Electronics", 5th edition, Butter worth Heinemann Woburn,1998.
2. Mehrdad Ehsani, Yimin Gao, Sebastien E. Gay and Ali Emadi, "Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design", CRC Press, 2005.
3. Kripal Singh, "Automobile Engineering", Standard Publishers Distributors, Vol. 1, & Vol. 2, 2007

REFERENCES:

1. Automotive Hand Book" Robert Bosch, SAE, 5th edition, 2000.
2. Ljubo Vlacic, Michel Parent and Fumio Harashima, "Intelligent Vehicle Technologies", Butterworth-Heinemann publications, Oxford, 2001.
3. Iqbal Husain, "Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003.
4. "Navigation and Intelligent Transportation Systems – Progress in Technology", Ronald K Jurgen, Automotive Electronics Series, SAE, USA, 1998.

Course outcomes:

The student will be able to:

1. Outline the overview of automobile engineering
2. Identify the different fuels and advanced control systems
3. Develop the concepts and drive train configurations of electric and hybrid electric vehicles
4. Apply the use of intelligent vehicle technologies like navigation in automobiles
5. Aware of safety security and regulations

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B.Tech.	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

MATLAB PROGRAMING LANGUAGE

(Open Elective I)

Course Objectives:

The Student will

1. understand the basic principles of programming and of implementing mathematical concepts in MATLAB.
2. write numerical algorithms with MATLAB Programming language.
3. evaluate the computational results using graphical representations.
4. gain knowledge about advanced MATLAB Programming methods.
5. gain knowledge on Simulink used in MATLAB.

Unit-I : **Introduction To MATLAB**

Historical Background, Applications, Scope of MATLAB, Importance of MATLAB for Engineers, Features, MATLAB Windows (Editor, Work Space, Command History, Command Window).

Operations with Variables, Naming and Checking Existence, Clearing Operations, Commands, Data types, Operators.

Unit-II: **Data Flow in MATLAB**

Vectors, Matrix Operations & Operators, Reshaping Matrices, Arrays, Colon Notations, Numbers, Strings, Functions, File Input-Output, Importing and Exporting of data.

Unit-III: MATLAB Programming

Conditional Statements, Loops, Writing Script Files, Error Correction, Saving Files, Worked out Examples.

Unit-IV: **MATLAB Advanced**

Plotting, Graphics, Creating Plot & Editing Plot, GUI (Graphical User Interface).

Matlab- Algebra, Calculus, Differential, Integration, Polynomials, solving a system of linear equations.

Unit-V: SIMULINK

Introduction, Importance, Model Based Design, Tools, Mathematical Modeling, Converting Mathematical Model into Simulink Model, Running Simulink Models, Importing Exporting Data, Solver Configuration, Masking Block/Model.

TEXT BOOKS:

1. Getting Started With Matlab: A Quick Introduction For Scientists And Engineers (English) by Rudra Pratap, OXFORD University Press.
2. MATLAB Programming by Y. Kirani Singh, B.B. Chaudhuri, PHI Publication.

REFERENCE BOOKS:

1. MATLAB® Programming For Engineers, Fourth edition by Stephen J. Chapman.
2. Applied Numerical Methods Using MATLAB 1st Edition by Won Y. Yang , Wenwu Cao, Tae-Sang Chung, John Morris.

Course Outcomes:

The student will be able to

1. translate mathematical methods to MATLAB code.
2. generalize results and represent data visually.
3. apply computer methods for solving a wide range of engineering problems.
4. utilize computer skills to enhance learning and performance in other engineering and science courses.
5. acquire knowledge of Advanced Matlab programming methods and Simulink.

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III Year - II Semester	**3**	**0-0-0**	**3**

PRINCIPLES OF COMMUNICATIONS

(Open Elective I)

Course Objectives:

The Students will

1. provide the basic concepts of communication systems.
2. gain knowledge about Amplitude modulation and Angle Modulation.
3. study sampling and pulse modulation methods.
4. study and compare different binary digital modulation techniques.
5. understand the basic concepts of information theory.

UNIT – I: Introduction

Block diagram of Electrical communication system, Radio communication: Types of communications, Analog, pulse and digital types of signals, Noise – Types of noise, sources of noise, calculation of noise in Linear systems and noise figure.

UNIT – II: Amplitude Modulation

Need for modulation, Types of Amplitude modulation, AM, DSB SC, SSB SC, Power and BW requirements, generation of AM, DSB SC, SSB SC, Demodulation of AM: Diode detector, Product demodulation for DSB SC & SSB SC. Angle Modulation: Frequency & Phase modulations, advantages of FM over AM, Bandwidth consideration, Narrow band and Wide band FM, Comparison of FM & PM.

UNIT – III: Pulse Modulations

Sampling, Nyquist rate of sampling, Sampling theorem for Band limited signals, PAM, regeneration of base band signal, PWM and PPM, Time Divison Multiplexing, Frequency Division Multiplexing, Asynchronous Multiplexing.

UNIT – IV: Digital Communication

Advantages, Block diagram of PCM, Quantization, effect of quantization, quantization error, Base band digital signal, DM, ADM, ADPCM and comparison. Digital Modulation: ASK, FSK, PSK, DPSK, QPSK demodulation, coherent and incoherent reception, Modems.

UNIT – V: Information Theory

Concept of information, rate of information and entropy, Source coding for optimum rate of information, Coding efficiency, Shanon-Fano and Huffman coding Error control coding: Introduction, Error detection and correction codes, block codes, convolution codes.

TEXT BOOKS:

1. Communication Systems Analog and Digital – R.P. Singh and SD Sapre, TMH, 20th reprint, 2004.
2. Principles of Communications – H. Taub and D. Schilling, TMH, 2003.

REFERENCE BOOKS:

1. Electronic Communication Systems – Kennedy and Davis, TMH, 4th edition, 2004.
2. Communication Systems Engineering – John. G. Proakis and Masoud Salehi, PHI, 2nd Ed. 2004.

Course Outcomes:

The Students will be able to

1. illustrate the main concepts of analogue and digital communication systems.
2. analyze and design an AM and FM modulator/demodulator.
3. explain, discuss, and compare different binary digital modulation techniques.
4. distinguish different types of noise and explain the effects of noise on communication system.
5. use the basic concepts of information theory.

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B.Tech.	**L**	**T-P-D**	**C**
III Year – II Semester	**3**	**0-0-0**	**3**

DATA BASE MANAGEMENT SYSTEMS

(Open Elective-I**)**

Course objectives:

The Students will:

1. Understanding of the architecture and functioning of database management systems as well as associated tools and techniques.
2. Understand and apply the principles of data modeling using entity relationship and develop a good database design.
3. Understand the use of structured query language (SQL) and its syntax.
4. Apply normalization techniques to normalize a database.
5. Understand the need of database processing and learn techniques for controlling the Consequences of concurrent data access.

UNIT - I:

Introduction to Data base management systems- Data base System Applications, data base System VS file System – View of Data – Data Abstraction –Instances and Schemas – data Models – the ER Model – Relational Model – Other Models – Database Languages – DDL – DML – database Access for applications Programs – data base Users and Administrator – Transaction Management – data base System Structure – Storage Manager – the Query Processor

ER diagrams - Beyond ER Design Entities, Attributes and Entity sets – Relationships and Relationship sets – Additional features of ER Model – Concept Design with the ER Model

UNIT - II:

Introduction to the Relational Model- Integrity Constraint Over relations – Enforcing Integrity constraints – Querying relational data – Logical data base Design – Introduction to Views – Destroying /altering Tables and Views.

Relational Algebra- Selection and projection set operations – renaming – Joins – Division – Examples of Algebra overviews – Relational calculus – Tuple relational Calculus – Domain relational calculus – Expressive Power of Algebra and calculus.

UNIT - III:

Form of Basic SQL Query- Examples of Basic SQL Queries – Introduction to Nested Queries – Correlated Nested Queries Set – Comparison Operators – Aggregative Operators – NULL values – Comparison using Null values – Logical connectivity‟s – AND, OR and NOT – Impact on SQL Constructs – Outer Joins – Disallowing NULL values – Complex Integrity Constraints in SQL Triggers and Active Data bases.

Schema refinement- Problems Caused by redundancy – Decompositions – Problem related to decomposition – reasoning about FDS – FIRST, SECOND, THIRD Normal forms – BCNF – Lossless join Decomposition – Dependency preserving Decomposition – Schema refinement in Data base Design – Multi valued Dependencies – FORTH Normal Form.

UNIT - IV:

Transaction Concept- Transaction State- Implementation of Atomicity and Durability – Concurrent – Executions – Serializability- Recoverability– Implementation of Isolation – Testing for serializability- Lock –Based Protocols – Timestamp Based Protocols- Validation- Based Protocols – Multiple Granularity.

Recovery and Atomicity- Log – Based Recovery – Recovery with Concurrent Transactions – Buffer Management – Failure with loss of nonvolatile storage-Advance Recovery systems- Remote Backup systems.

UNIT - V:

Data on External Storage- File Organization and Indexing – Cluster Indexes, Primary and Secondary Indexes – Index data Structures – Hash Based Indexing – Tree base Indexing – Comparison of File Organizations – Indexes and Performance Tuning- Intuitions for tree Indexes – Indexed Sequential Access Methods (ISAM) – B+ Trees: A Dynamic Index Structure.

Advanced Database Management System- Introduction to Distributed Database- Reference Architecture, fragmentation, Allocation, Joins

TEXT BOOKS:

1. Data Base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGrawHill 3rd Edition
2. Data base System Concepts, Silberschatz, Korth, McGraw hill, V edition.

REFERENCE BOOKS:

1. Data base Systems design**,** Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems**,** Elmasri Navrate Pearson Education
3. Introduction to Database Systems**,** C.J.Date Pearson Education

Course outcomes:

The Students will be able to:

1. Describe basic concepts of database system.
2. Design a data model and schemas in RDBMS.
3. Use RDBMS for developing industry applications.
4. Be competent in use of structured query language sql.
5. Analyze functional dependencies for designing a robust database

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III Year – II Semester	**3**	**0-0-0**	**3**

OPERATING SYSTEMS

(Open Elective-I)

Course objectives:
The Students will :

1. Know the purpose and different types of operating systems.
2. Describe process management and CPU scheduling algorithms.
3. Understand file and directory structures.
4. Understand deadlock prevention and avoidance
5. Explain various memory management and page replacement algorithms.

UNIT - I:

Operating System Overview- Overview of Computer Operating Systems, Operating System Functions, Protection and Security, Distributed Systems, Special Purpose Systems, Operating System Structures, Operating System Services and Systems Calls, Operating Systems Generation.

Process Management- Process Concepts, Threads, Scheduling-Criteria, Algorithms Evaluation, Thread Scheduling.

UNIT - II:

Concurrency- Process Synchronization, Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization examples, Atomic Transactions.

Memory Management- Swapping, Contiguous Memory Allocation, Paging, Page-Table Structure, Segmentation, Virtual Memory, Demand Paging, Page-Replacement Algorithms, Frames Allocation, Thrashing.

UNIT - III:

Principles of Deadlock- System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock.

Introduction to File System- File System Interface, File Concepts, Access Methods and Directory Structure, File System Mounting, File Sharing and Protection.

UNIT - IV:

File System Implementation- File System Structure, File System Implementation, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance. Case Studies: UNIX, Linux and Windows.

Mass Storage Overview- Mass-Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, Swap-Space Management, RAID Structure, Stable-Storage Implementation, Tertiary Storage Structure.

UNIT - V:

Protection and Security- Goals of Protection, Principles of Protection, Domain of Protection Access Matrix, Implementation of Access Matrix, Access Control, Revocation of Access Rights, Capability-Based Systems, Language-Based Protection. Security Problem, Program Threats, System and Network Threats Cryptography as a Security Tool, User Authentication, Computer-Security Classifications.

Advanced Operating Systems- Distributed Operating Systems, Multi-Processor Operating Systems, Real-Time Operating Systems and Mobile Operating Systems.

TEXT BOOKS:

1. Operating System Concepts-Abraham Silberchatz, Peter B. Galvin, Greg Gagne, 7th Edition, John Wiley.
2. Operating Systems- a Concept based Approach-D.M.Dhamdhere, 2nd Edition, TMH.

REFERENCE BOOKS:

1. Principles of Operating Systems-Naresh Chauhan, Oxford Higher Education.
2. Operating System A Design Approach-Crowley, TMH.
3. Modern Operating Systems-Andrew S Tanenbaum, 2nd Edition Pearson, PHI.

Course outcomes:

The Students will be able to:

1. Demonstrate the different operating systems.
2. Apply different CPU scheduling algorithms.
3. Analyze different directory structures.
4. Use deadlock prevention and avoidance algorithms
5. Illustrates the behavior of semaphores and monitors.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech :	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

INTRODUCTION TO DATA STRUCTURES
(Open Elective-I)

Course Objectives:
The Students will :

1. Describe the appropriate data structure like linked list to solve problems in real world.
2. Explain the implementation of linear and non linear data structure mechanisms.
3. Discuss the various techniques of tree data structure.
4. Describe graph data structure.
5. Explain several searching and sorting Techniques.

UNIT - I:
Data Structures-Introduction to Data Structures, abstract data types, Introduction to Linear and Non Linear data structures.Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list. Circular linked list implementation, Doubly linked list implementation, insertion, deletion and searching operations. Applications of linked lists.

UNIT - II:
Stacks-Operations, array and linked representations of stacks, stack applications-infix to postfix conversion, postfix expression evaluation. Queues-operations, array and linked representations. Circular Queue operations, Dequeue, applications of queue.

UNIT - III:
Trees – Definition, Binary tree representation, Binary search tree, binary Tree traversals.
AVL tree – operations, Red Black tree.

UNIT - IV:
Graphs-Terminology, sequential and linked representation.
Graph traversals: Depth First Search & Breadth First Search implementation. Spanning trees, Prims and Kruskals method.

UNIT - V:
Searching – Big O Notation, Linear Search and Binary Search.
Sorting-Bubble sort, Insertion Sort, Selection Sort, Merge Sort and Quick sort.

TEXT BOOKS:

1. Data Structures Using C, Reema Thareja, Oxford University Press, 2011 Learning.
2. Introduction to Algorithms, TH Cormen, PHI

REFERENCES BOOKS:

1. Data Structures & Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education.
2. Design methods and analysis of Algorithms, SK Basu, PHI.
3. Fundamentals of Computer Algorithms, 2nd Edition, Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, Universities Press.

Course Outcomes:

The Students will be able to:

1. Analyze and apply appropriate data structures for solving computing problems.
2. Use linear and non-linear data structures like stacks, queues, trees and graphs.
3. Implement different types of tree data structures.
4. Implement the concepts of graph data structures.
5. Apply the basic searching, sorting Techniques.

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B.Tech :	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

INTRODUCTION TO WEB DESIGN
(Open Elective-I)

Course Objectives

The Students will :

1. Know regarding internet related technologies.
2. Understanding of the current industry support for web technologies.
3. Explain the basic concepts of CSS.
4. Visualize the basic concepts of PHP.
5. Understanding PHP functions and Methods

UNIT-I

Basics in Web Design: Brief History of Internet, What is World Wide Web, Why create a web site, Web Standards, Audience requirement.

Web Design Principles: Basic principles involved in developing a web site, Planning process , Five Golden rules of web designing, Designing navigation bar ,Page design, Home Page Layout, Design Concept.

UNIT-II

Introduction to HTML: What is HTML, HTML Documents, Basic structure of an HTML document, Creating an HTML document, Mark up Tags, Heading-Paragraphs, Line Breaks, HTML Tags, HTML Tables, HTML Forms.

Elements of HTML: Introduction to elements of HTML, working with Text Working with Lists, Tables and Frames, working with Hyperlinks, Images and Multimedia, Working with Forms and controls.

UNIT-III

Introduction to Cascading Style Sheets: Concept of CSS, Creating Style Sheet and types of CSS, CSS Properties, CSS Styling (Background, Text Format, Controlling Fonts), Working with block elements and objects, Working with Lists and Tables, CSS Id and Class, Box Model(Introduction, Border properties, Padding Properties, Margin properties).

CSS Advanced (Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector), CSS Colors, Creating page Layout and Site Designs.

UNIT-IV

Introduction to PHP: Downloading, installing, configuring PHP, The anatomy of a PHP Page. Basic Security Guidelines, Variables, Data Types, Operators and Expressions, Constants, Flow Control Functions; Switching Flow, Loops.

Code Blocks and Browser Output, Objects, Strings Processing, Form processing, Connecting to database, using cookies, dynamic contents.

UNIT-V

Introduction to Web Publishing or Hosting : Creating the Web Site, Saving the site, Working on the web site. Creating web site structure, Creating Titles for web pages, Themes-Publishing web sites.

TEXT BOOKS:

1. Dietel and Dietel : —Internet and World Wide Web - How to Program‖, 5th Edition, PHI/Pearson Education, 2011
2. Web Technologies: HTML,CSS, XML,Php Black Book.

REFERENCE BOOKS:

1. Chris Bates, —Web Programming, building internet applications‖, 2ndEdition, WILEY,
   Dreamtech, 2008.
2. HTML 5 in simple steps Kogent Learning Solutions Inc, Dreamtech Press
3. Beginning CSS: Cascading Style Sheets for Web Design Ian Pouncey, ichard York Wiley India

Course Outcomes:

The Students will be able to:

1. Develop the application of the HTML for document structure.
2. Develop the skills in analyzing the usable of a website.
3. Create dynamic webpage, using PHP.
4. Using PHP to manipulate Files.
5. Develop the concept of web publishing

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UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

INTERNET OF THINGS
(Open Elective – I)

Course Objectives:
The Students will:

1. Understand the basic building blocks of IoT
2. Analyze the difference between M2M and IoT
3. Introduction of Basics of IoT System Management
4. Extend the knowledge in WSN an IoT enabling technology.
5. Acquire knowledge about challenges of IoT and Identify the specific application of IoT.

UNIT–I:
Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, Iot Communication APIs IoT enabaled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates.

UNIT–II:
Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle

IoT and M2M –Difference between IoT and M2M, SDN, NFV, Difference between SDN and NFV.

UNIT–III:
Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER.

UNIT–IV:
Network & Communication aspects
Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Data aggregation & dissemination

UNIT-V:
Challenges in IoT
Design challenges, Development challenges, Security challenges, other challenges

Domain specific applications of IoT
Home automation, Industry applications, Surveillance applications, Other IoT applications

Text Books:

1. Internet of Things – A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759

Course Outcomes:

The Students will be able to:

1. Analyze the physical and logical design of IoT.
2. Understand the characteristic and communication models of IoT and Compare and contrast M2M and IoT, SDN and NFV
3. Understand the Basics IoT management System
4. Understand the wireless medium issues, MAC protocols, routing protocols
5. Comprehend important challenges of IoT related to design, development and security and Learn about specific application of IoT.

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B. Tech.	**L**	**T-P-D**	**C**
III Year II sem	**3**	**0-0-0**	**3**

INTRODUCTION TO MINING TECHNOLOGY
(OPEN ELECTIVE - I)

COURSE OBJECTIVES:

The Student will:

1. introduce about distribution of mineral deposits in India
2. acquaint with different stages of mining process
3. get idea about Drilling and its machinery
4. get idea about Explosives and blasting in mines
5. know about shaft sinking methods, precaution & lining during shaft sinking

UNIT-I:

Introduction: Distribution of mineral deposits in India and other countries, mining contributions to civilization, mining terminology

UNIT –II:

Stages in the life of the mine - prospecting, exploration, development, exploitation, and reclamation. Access to mineral deposit- selection, location, size and shape (incline, shaft and Adit), brief overview of underground and surface mining methods.

UNIT-III:

Drilling: Types of drills, drilling methods, electric, pneumatic and hydraulic drills, drill steels and bits, drilling rigs, and jumbos.

UNIT-IV:

Explosives: Classification, composition, properties and tests, fuses, detonators, blasting devices and accessories, substitutes for explosives, handling and storage, transportation of explosives.; Rock blasting: Mechanism of rock blasting, blasting procedure, and pattern of shot holes.

UNIT –V:

Shaft sinking: Ordinary and special methods, problems, and precautions, shaft supports and lining.

TEXTBOOKS:

1. R. P. Pal, Rock blasting effect and operation, A. A. Balkema, 1st Ed, 2005.
2. D. J. Deshmukh, Elements of mining technology, Vol. 1, Central techno, 7th Ed, 2001.

REFERENCE BOOKS:

1. 1. C. P. Chugh, Drilling technology handbook, Oxford and IBH, 1st Ed, 1977.
2. 2. R. D. Singh, Principles and practices of modern coal mining, New age international, 1st Ed, 1997.

COURSE OUTCOMES:

The student will be able to:

1. Learn about distribution of mineral deposits in India
2. Learn about stages on mining process
3. Learn about drilling and its machinery
4. Understand about explosives, blasting and blasting mechanism
5. Understand about shaft sinking methods, precautions and lining of shafts

Open Elective - II

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UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
IV Year - I Semester	**3**	**0-0-0**	**3**

WASTE MANAGEMENT
(Open Elective-II)

Course Objectives:

The Students will:

1. provide in depth knowledge about handling of solid waste from cradle to grave.
2. It also provides the knowledge of designing and constructing the solid waste treatment system.
3. Provides the residue disposed of in an environmentally sound way.
4. Provides students depth knowledge in waste minimization.
5. provides knowledge in design and maintenance of different units

UNIT - I:

Introduction

Definition of solid waste, garbage, rubbish-Sources and Types of solid wastes Municipal waste, industrial waste, plastic waste, electronic waste, bio-medical waste and hazardous waste - Characteristics of Solid Wastes: Physical, chemical and biological characteristics-Problems due to improper disposal of solid waste.

UNIT II:

Functional Elements of Solid Waste Management

Waste generation and handling at source-onsite storage-Collection of solid wastes Collection methods and services-storage of solid waste- guidelines for collection route layout.

UNIT - III: Transfer and Transport of Wastes

Transfer station-types of vehicles used for transportation of solid waste-Processing and segregation of the solid waste- various methods of material segregation.

Processing and Transformation of Solid Wastes

Recycling and recovery principles of waste management- Composting: definition methods of composting-advantages of composting- Incineration: definition methods of incineration advantages and disadvantages of incineration.

UNIT - IV: Treatment and Disposal of Solid Waste

Volume reduction, Open dumping, land filling techniques, Landfills: classification Design and Operation of landfills, Land Farming, Deep well injection.

UNIT - V: Waste Minimization

Introduction to waste minimization, waste minimization techniques-5R (refuse, reduce, reuse, recover, recycle), municipal waste minimization, industrial waste minimization.

Text Books:

1. Solid and hazardous waste management by M.N.Rao and Razia sultana, BS publications
2. Environmental Engineering by Howard S.Peavy, Donald R.Rowe and George Tchobanognous

Reference Books:

1. Integrated Solid Waste Management by Tchobanognous.
2. Environmental engineering by Y.Anjaneyulu, B.S publication.
3. Environmental Pollution Control Engineering by C.S. Rao; Wiley Eastern Ltd., New Delhi.
4. Environmental engineering by Gerad Kiley, Tata Mc Graw Hill

Course Outcomes:

Students will be able to

1. Understand the components of solid waste management and the laws governing it
2. Acquires the knowledge of design, operation and maintenance of landfills, incinerators and composting units.
3. Reducing the amount and toxicity of material entering the waste flow (minimization)
4. Reusing as much material as practicable;
5. Recycling the waste that cannot be used and recovery of resources

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B.Tech.	**L**	**T-P-D**	**C**
IV Year - I Semester	**3**	**0-0-0**	**3**

ESTIMATION, QUANTITY SURVEY & VALUATION
(Open Elective-II)

Course Objective

The Students will:

1. Understand how to estimate the quantities of work, develop the bill of quantities and arrive at the Cost of civil engineering Project
2. Estimate the detailed quantities of various items of work and their rates in building projects.
3. Estimate the quantities of works and evaluate cost of project.
4. Understand and apply the concept of Valuation for Properties
5. Understand, Apply and Create the Tender and Contract document.

UNIT - I:

General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates – Approximate method of Estimating

UNIT II:

Detailed Estimates of Buildings - Reinforcement bar bending and bar requirement schedules

UNIT - III:

Earthwork for roads and canals.

UNIT - IV:

Rate Analysis – Working out data for various items of work over head and contigent charges.

UNIT - V:

Contracts – Types of contracts – Contract Documents – Conditions of contract, Valuation - Standard specifications for different items of building construction.

Text Books:

1. Estimating and Costing by B.N. Dutta, UBS publishers, 2000.
2. Estimating and Costing by G.S. Birdie.

Reference Books:

1. Standard Schedule of rates and standard data book by public works department.
2. I. S. 1200 (Parts I to XXV – 1974/ method of measurement of building and Civil Engineering works – B.I.S.)
3. Estimation, Costing and Specifications by M. Chakraborthi; Laxmi publications.

Course Outcomes:

The Students will be able to

1. Prepare detailed and abstract estimates for buildings, roads and canals
2. Prepare valuation of buildings.
3. Interpret Contract document of for civil engineering works
4. To study on Valuation of buildings, Standard specifications for different items building construction
5. Formulate construction scheduling and project Management methods.

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B.Tech.	**L**	**T-P-D**	**C**
IV Year - I Semester	**3**	**0-0-0**	**3**

ELECTRIC AND HYBRID VEHICLES
(OPEN ELECTIVE - II)

Course Objectives:
The Student will

1. understand working of different configurations of electric vehicles, and its components
2. understand hybrid vehicle configuration and performance analysis.
3. Introduce the transmission configuration and its analyze the characteristics
4. analyze the different speed control techniques
5. design and evaluate the sizing of components in hybrid vehicles.

UNIT-I : ELECTRIC VEHICLES
Introduction to Electric Vehicles – History of Electric and Hybrid Vehicles - Components - vehicle mechanics - Roadway fundamentals - vehicle kinetics - Dynamics of vehicle motion - Propulsion System Design.

UNIT-II : BATTERIES
Basics - Types - Parameters - Capacity - Discharge rate - State of charge - state of Discharge - Depth of Discharge - Technical characteristics - Battery pack Design - Properties of Batteries.
Fuel Cells - Types - Fuel Cell Electric Vehicle.

UNIT-III: DC & AC ELECTRICAL MACHINES
(Speed control Techniques)
Motor and Engine rating – Requirements – Speed control techniques of DC machines in Electric Vehicles – Speed control techniques of Three phase A/c machines -Induction machines- Permanent Magnet Machines, Switched Reluctance Machines.

UNIT-IV: ELECTRIC VEHICLE DRIVE TRAIN
Transmission configuration - Components - gears, differential, clutch, brakes regenerative braking- motor sizing- Gear Ratio – Torque speed characteristics - EV Motor Sizing Initial Acceleration - Rated Vehicle Velocity - Maximum Velocity - Maximum Gradability.

UNIT-V: HYBRID ELECTRIC VEHICLES
Types of Hybrid Vehicles - series and parallel Hybrid Electric Vehicles, series- parallel configuration - Internal Combustion Engines - Reciprocating Engines - Practical and Air-Standard Cycles - Air-Standard Otto Cycle - Air-Standard Diesel Cycle - Example IC Engines in HEVs - Design - Drive train - sizing of components.

TEXT BOOKS:

1. Iqbal Hussain, “Electric & Hybrid Vehicles - Design Fundamentals”, Second Edition, CRC Press, 2011
2. James Larminie, “Electric Vehicle Technology Explained”, John Wiley & Sons, 2003.

REFERENCES:

1. Mehrdad Ehsani, Yimin Gao, Ali Emadi, “Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals”, CRC Press, 2010.

2. Sandeep Dhameja, “Electric Vehicle Battery Systems”, Newnes, 2001

Course outcomes:

The student will be able to:

1. Understand the working of different configurations of electric vehicles, hybrid vehicles and its components.
2. Apply the basic concepts of batteries and Motors in the design of Electric and Hybrid Vehicles.
3. Differentiate the modes of operation of Hybrid Vehicles.
4. Analyze the performance of hybrid vehicles.
5. Design the basic parameters of Electric and Hybrid Electric Vehicles.

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B.Tech.	**L**	**T-P-D**	**C**
IV Year - I Semester	**3**	**0-0-0**	**3**

MATERIALS IN ELECTRICAL SYSTEMS
(OPEN ELECTIVE - II)

Course Objectives:
The Student will

1. understand the importance of various materials used in electrical engineering
2. obtain a qualitative analysis of their behavior and applications.
3. analyze the process used in manufacturing of integrated circuits
4. perform the calculations on cables on various aspects
5. evaluate the characteristics of HV and EHV cable.

UNIT-I : Materials
Conductors-free electron theory and electron scattering Di electrics Polarization, solid, liquid and gas dielectrics Insulators-Classification, Application in electric devices.

UNIT-II : Magnetic materials
Classification based on orientation of magnetic dipoles, Optoelectronic materials, Semiconductors-simple and compound, Refractory Materials. Solders and contacts, Super conductivity and super conducting materials.

UNIT-III: Components
Resistors and Capacitors. Display units:-LED, LCD and Monitors. Effect of environment on components.

UNIT-IV: Processes
Basic processes used in the manufacture of integrated circuits such as Epitaxy, masking, photolithography, diffusion, oxidation, Etching, metallization, Scribing, wire bonding and Encapsulation. Induction and Dielectric heating. Electron beam welding and cutting..

UNIT-V: Cables
Calculations of capacity of cables, charging current, stress, grading, heating of cables, Construction and characteristics of HV & EHV cable

TEXT BOOKS:

1. S.O. Kasap, Principles of Electrical Engineering Materials," MGH.
2. Mahajan, Principles of growth and processing of semiconductors," MGH.
3. Decker, Electrical Engineering Materials," PHI.

REFERENCES:

1. Dhir, Electronic components and Materials Principles manufacturing and Maintenance," TMH.
2. Allison, „Electronic Engineering Materials and Devices," TMH.
3. Ruska N Scot, Microelectronic processing – an introduction to the manufacture of integrated circuits," MGH.

Course outcomes:

The student will be able to:

1. Understand various types of materials and their properties in various conditions.
2. Evaluate magnetic materials and their behavior.
3. Evaluate semiconductor materials and technologies.
4. Acquire Knowledge on Materials used in electrical engineering and applications.
5. Design the components and observe the effect of these components on environment.

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B. Tech.	**L**	**T-P-D**	**C**
IV Year - I Semester	**3**	**0-0-0**	**3**

FUNDAMENTALS OF OPERATIONS RESEARCH

Open Elective - II

Course Objectives:
The Student will

1. Get the basic knowledge of formulation, Solve the LPP models using graphical and mathematical applications.
2. Identify the optimal way of developing various transport models, Choose the appropriate assignment of men and machinery to perform various tasks
3. Understand the optimal sequencing for a machine or for a job when there are m machines and n jobs; understand the concept of replacing machine at the appropriate
4. Understand the strategies in the business environment and decide the strategy to get maximum value of the game. Understand the inventory in an industry or business organization and its importance.
5. Define waiting time at any point to get the desired service for a single channel service and multi-channel service.

UNIT – I Introduction - Development – Definition– Characteristics and Phases – Types of models – Operations Research models – applications.

Allocation: Linear Programming Problem - Formulation – Graphical solution – Simplex method – Artificial variables techniques: Two–phase method, Big-M method; Duality Principle.

UNIT – II

Transportation problem – Formulation – Optimal solution, unbalanced transportation problem – Degeneracy.

Assignment problem – Formulation – Optimal solution - Variants of Assignment Problem; Traveling Salesman problem

UNIT – III

Sequencing – Introduction – Flow **–**Shop sequencing – n jobs through two machines – n jobs through three machines – Job shop sequencing – two jobs through 'm' machines

Replacement: Introduction – Replacement of items that deteriorate with time – when money value is not counted and counted – Replacement of items that fail completely-Group Replacement.

UNIT – IV

Theory of games: Introduction –Terminology– Solution of games with saddle points and without saddle points- 2 x 2 games –m x 2 & 2 x n games - graphical method – m x n games - dominance principle.

UNIT – V

Waiting lines: Introduction – Terminology-Single Channel – Poisson arrivals and Exponential Service times – with infinite population and finite population models– Multichannel – Poisson arrivals and exponential service times with infinite population.

Simulation: Definition – types of simulation models- applications, advantages and disadvantage. Brief introduction of simulation languages – inventory and queuing problems using random numbers

TEXT BOOKS:

1. Operation Research/J. K. Sharma /Mac Milan.
2. Introduction to O.R/Hillier & Libermann (TMH).

REFERENCES:

1. Operations Research: Methods and Problems / Maurice Saseini, Arhur Yaspanand Lawrence Friedman
2. Operations Research /A. M. Natarajan, P. Balasubramaniam, A. Tamilarasi / Pearson Education
3. Operations Research / Wagner/ PHI Publications.
4. Operations Research / ACS Kumar/Yesdee

Course outcomes:

The student will be able to:

1. Allocate and distribute material, machine, man hour, money and number of men in any service and manufacturing industry.
2. Allot optimum quantities to various destinations from different sources with minimum cost. Assign the required men and machines to perform the given tasks.
3. Determine the number of items to be produced and the product mix. Schedule and sequence production runs by proper allocation of machines and men to get maximum gain or profit.
4. Compute the economic order quantity in different scenario to minimize inventory cost. Determine the quantity to be ordered when there are quantity discounts on the price.
5. Determine the number of service channels required to keep minimum waiting time at optimum service cost. Determine the shortest path for a given route and to solve the inventory and capital management problems.

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B.Tech.	**L**	**T-P-D**	**C**
IV Year - I Semester	**3**	**0-0-0**	**3**

(F41OF) Digital Systems Using VHDL

(Open Elective -II)

COURSE OBJECTIVES

The Students will:

1. Learn how a Hardware Description Language (HDL) is used to describe and implement hardware.
2. Learn how to simulate and test that hardware and optimise their designs.
3. Learn in-depth study of combinatorial and sequential hardware systems and the use of finite state machines in the design of sequential systems.
4. To understand concept of Programmable Devices, PLA, PAL, CPLD and FPGA and implement digital system using VHDL.
5. To implement combinational and sequential circuits using VHDL.

UNIT I

Review of Logic Design Fundamentals: Combinational Logic, Boolean Algebra and Algebraic Simplification, Karnaugh maps, Designing with NAND and NOR Gates, Hazards in Combinational Networks, Flip-flops and latches, Mealy Sequential Network, Equivalent States and reduction of State Tables, Sequential Network Timing, Setup and Hold Times, Synchronous Design, Tristate Logic and Buses.

UNIT II

Introduction to VHDL: VHDL Description of Combinational Networks, Modeling Flip-flops using VHDL Process, VHDL Models for a Multiplexer, Compilation and Simulation of VHDL Code, Modeling a Sequential Machine, Variables, Signals and Constants, Arrays, operators, Functions, Procedures, Packages and Libraries, VHDL Model for a 74163 Counter.

UNIT III

Designing with Programmable Logic Devices: Read-Only Memories, Programmable Logic Arrays (PLAs), Programmable Array Logic (PALs) , Other Sequential Programmable Logic devices(PLDs),Design of a Keypad Scanner.

Design of Networks for Arithmetic Operations: Design of a Serial Adder with Accumulator, State Graphs for Control Networks, Design of a Binary Multiplier, Multiplication of Signed Binary Numbers, Design of a Binary Divider.

UNIT IV

Digital Design with SM Charts: State Machine Charts, Derivation of SM Charts, Realization of SM Charts, Implementation of the Dice Game, Alternative Realizations for SM Charts using Microprogramming, Linked State Machine.

Designing with Programmable gate Arrays and Complex Programmable Logic Devices: Xilinx 3000 Series FPGAs, Designing with FPGAs, Xilinx 4000 Series FPGAs, Using a One-Hot

State Assignment, Altera Complex Programmable Logic Devices(CPLDs),Altera FLEX 10K Series CPLDs.

UNIT V

Floating-Point Arithmetic: Representation of Floating-Point Numbers, Floating-point Multiplication, Other Floating-Point Operations.

Hardware Testing and Design for Testability: Testing Combinational Logic, Testing Sequential Logic, Scan Testing, Boundary Scan, Build-In Self-Test**.**

TEXTBOOKS:

1. Charles H,Roth ,“Digital system design using VHDL” , 2nd Edition, PWS publishing co.
2. Zainalabedin Navabi, “VHDL analysis and modeling of digital systems”,2nd Edition, MGH, 2004.

REFERENCE BOOKS:

1. Stphen Brown, "Fundamental of Digital logic with VHDL Design", Tata McGraw Hill, 2008.
2. J.Bhaskar ,“A VHDL primer”,3rd edition 2004, Prentice Hall of India Limited.
3. Michael D.Ciletti, “Advanced Digital design with Verilog HDL”, 2nd Edition, PHI Ltd, 2005.

COURSE OUTCOMES

The Students will be able to:

1. develop a digital logic and apply it to solve real life problems.
2. practice combinational and sequential digital circuits using different styles of modeling of VHDL.
3. analyze, design and implement sequential logic circuits.
4. employ digital system design using PLD.
5. simulate and implement combinational and sequential circuits using VHDL systems.

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B.Tech.	**L**	**T-P-D**	**C**
IV Year - I Semester	**3**	**0-0-0**	**3**

(F41OG) IC TECHNOLOGY

(Open Elective -II)

COURSE OBJECTIVES:

The Student will

1. understand the basic building blocks of linear and digital integrated circuits.
2. Familiarize with op-amp applications of active filters and oscillators.
3. gain the theory about applications of analog multipliers and PLL.
4. demonstrate the working of ADC and DAC.
5. understand few special functionalities of combinational and sequential integrated circuits.

UNIT I: INTEGRATED CIRCUITS

Classification, Chip Size and Circuit Complexity, Ideal and Practical Op-Amp, Op-amp characteristics-DC and AC Characteristics, 741 Op-Amp and its Features, Concept of Virtual Ground ,Modes of operation-inverting, non-inverting, differential.

UNIT II: OP-AMP APPLICATIONS

Basic Applications of Op-Amp, Instrumentation Amplifier, AC Amplifier, V to I and I to V Converters, Sample & Hold Circuits, Differentiators and Integrators, Comparators, Schmitt Trigger, Multivibrators.

UNIT III: ACTIVE FILTERS & OSCILLATORS

Introduction, First Order and Second Order Low Pass, High Pass and Band Pass Filters, Active Band Reject and All Pass Filters.

Principle of Operation and Types of Oscillators – RC, Wien Bridge and quadrature type. Waveform Generators – Triangular, Saw Tooth, Square Wave.

UNIT IV: TIMERS & PHASE LOCKED LOOPS

Introduction to 555 Timer, Functional Diagram, Monostable and Astable Operations and Applications, Schmitt Trigger, PLL - Introduction, Block Schematic, Principles and Description of Individual Blocks of 565, VCO. Introduction to Voltage Regulators, Features of 723 Regulator.

UNIT V: D-A AND A- D CONVERTERS

Introduction, Basic DAC Techniques - Weighted Resistor Type, R-2R Ladder Type, Inverted R-2R Type. Different types of ADCs – Parallel Comparator Type, Counter Type, Successive Approximation Register Type and Dual Slope Type. DAC and ADC Specifications.

TEXT BOOKS:

1. Linear Integrated Circuits –D. Roy Chowdhury, New Age International (p) Ltd, 3rd Ed., 2008.
2. Op-Amps & Linear ICs – Ramakanth A. Gayakwad, PHI, 1987.

REFERENCE BOOKS:

1. Modern Digital Electronics – RP Jain – 4/e – TMH, 2010.
2. Op-Amps and Linear Integrated Circuits – Concepts and Applications by James M.Fiore, Cengage/ Jaico, 2/e, 2009.
3. Operational Amplifiers and Liner Integrated Circuits by K.Lal Kishore – Pearson, 2008.

COURSE OUTCOMES:

The Student will be able to:

1. model operational amplifiers with linear and digital integrated circuits.
2. design op amp as active filters and oscillators.
3. reconstruct and relate circuits using operational amplifiers for various applications.
4. examine OP Amp to work as a converter.
5. design special function integrated circuits.

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B.Tech.	**L**	**T-P-D**	**C**
IV Year – I Semester	**3**	**0-0-0**	**3**

COMPUTER NETWORKS

(Open Elective-II)

Course objectives:
The Students will :

1. Recognize various layering approaches for networking and understand the functionalities of physical layer.
2. Identify the data link layer protocols, multi access protocols, Ethernet technologies and various internetworking devices.
3. Examine design issues of network layer, services provided to above layer and routing, and congestion control protocols.
4. Examine IP protocol, addressing, various protocols like CIDR, ICMP,ARP and RARP of internet Layer and examination of transport layer services.
5. Examine Transport layer protocols like TCP, UDP, RPC and various congestion controlling mechanisms, including application layer services, protocols like HTTP, FTP, E-Mail etc.

UNIT - I:
Overview of the Internet: Protocol, Layering Scenario, TCP/IP Protocol Suite: The OSI Model, Internet history standards and administration; Comparison of the OSI and TCP/IP reference model.
Physical Layer: Guided transmission media, wireless transmission media.

UNIT - II:
Data Link Layer: design issues, Framing, Error Detection and Error Correction, Block Coding, Hamming Distance, CRC, Flow control and error Control.
Protocols: Noiseless Channels, Noisy Channels, HDLC, Point to Point Protocols..
Connecting Devices: Repeaters, Hubs, Switches, Gateways and **Bridges -** Learning and Spanning tree bridges.
Multi Access protocols- Random access - . ALOHA, CSMA, CSMA/CD and CSMA/CA, Controlled access, Channelization. Ethernet IEEE 802.3, IEEE 802.5, IEEE 802.11

UNIT - III:
Network Layer: Network layer design issues, Store and forward packet switching, connection less and connection oriented network services.
Internetworking: Protocols-IPV4 and IPV6**,** Logical Addressing-IPV4, IPV6, Tunnelling and Packet Fragmentation.
Address Mapping: ARP, RARP, DHCP, ICMP and IGMP.

Routing Algorithms: Shortest Path Finding and Distance Vector Routing Algorithms.

UNIT - IV:
Transport Layer: Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), The TCP Connection Establishment, The TCP Connection Release, Crash recovery, The TCP sliding window, The TCP congestion control, Improving Quality of Service Techniques: Leaky Bucket Algorithm.

UNIT - V:

Application Layer: Introduction, services, Application layer paradigms.

Applications: DNS, WWW, HTTP, FTP, E-MAIL, TELNET, SNMP, SSH.

TEXT BOOKS:

1. Data Communications and Networking - Behrouz A. Forouzan, Fifth Edition TMH, 2013.
2. Computer Networks - Andrew S Tanenbaum, 4th Edition, Pearson Education.

REFERENCES BOOKS:

1. "Computer Networks", 5E, Peterson, Davie, Elsevier
2. "Introduction to Computer Networks and Cyber Security", Chawan - HwaWu, Irwin, CRC Publications.
3. "Computer Networks and Internets with Internet Applications", Comer .

Course outcomes:

The Students will be able to:

1. Demonstrate the networking concepts, various Layering approaches and their functionalities.
2. Understand the protocols of Data Link layer, how a medium can be shared among multiple devices, Ethernet technologies and internetworking devices used.
3. Work on fragmentation, assigning of logical address and judge on routing, congestion.
4. Demonstrate the working of IP Protocol, other protocols of internet layer and services of transport layer.
5. Explain the transport layer and application layer protocols, their working.

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PYTHON PROGRAMMING

(Open Elective-II)

Course objectives:

The Students will :

1. Learn how to design and program Python applications.
2. Learn how to use lists, tuples, and dictionaries in Python programs.
3. Learn how to identify Python object types, Components, decision statements, pass arguments in Python.
4. Learn how to build and package Python modules for reusability, design object oriented programs with Python classes, use class inheritance in Python for reusability.
5. Learn how to use exception handling in Python applications for error handling

UNIT - I:

Programming paradigms; Structured programming vs object oriented programming, OOPs fundamentals- class, object, abstraction, encapsulation, polymorphism, and inheritance; Introduction to Python Getting started to Python- an interpreted high level language, interactive mode and script mode. Variables, Expressions and Statements Values and types, Variables and keywords, statements, evaluating expressions, operators and operands, order of operations, composition. Functions function calls, type conversion, type coercion, pre-defined functions, composition, user define functions, flow of execution, passing parameters, function parameters and scope. Conditionals and recursion modulus operator, Boolean expression, logical operators, conditional execution, alternative execution, chained and nested conditionals, return statement; Recursion, infinite recursion.

UNIT - II:

Python data structures Strings Creating, initializing and accessing the elements; String operators, comparing strings using relational operators; String functions and methods. **Lists:** Concept of mutable lists, creating, initializing and accessing the elements, traversing, appending, updating and deleting elements; List operations; List functions and Methods, list parameters, nested lists, Matrices.

Dictionaries

Concept of key-value pair, creating, initializing and accessing the elements in a dictionary, dictionary operations traversing, appending, updating and deleting elements, Dictionary functions and methods.

Tuples

Mutability and tuples, Immutable concept, creating, initializing and accessing the elements in a tuple, Tuple functions.

UNIT - III:

Object oriented programming using Python: creating python classes, classes and objects: user defined compound types, attributes, instances as arguments, instances as return values, objects are mutable, copying; classes and functions: pure function, modifiers; Exceptions: raising exceptions, handling exceptions, exception hierarchy.

UNIT - IV:

Classes and methods: object oriented features, optional arguments, initialization method, operator overloading and polymorphism. Inheritance: Basic Inheritance: extending built-ins, overriding and super; Multiple inheritance: the diamond problem, different sets of arguments.

UNIT - V:

Files handling and Exceptions: Text files, writing variables, Directories, Pickling;
Database Programming in Python: Connection module, connect MySQL Data base, perform DDL, DML and DQL operations.

Text Books:

1. **Python 3 Object Oriented Programming,** Dusty Phillips, Packet Publishing, 2010.
2. **Programming in Python 3** - A complete Introduction to the Python Language-Second Edition, Mark Summerfiels, Addison-Wesley 2010.

Reference Books:

1. **Programming Python- 4th Edition**, Mark Lutz, O'Reilly, 2011.
2. **Object-Oriented Programming in Python**, Michael H, Goldwasser, David Letscher, Pearson Prentice Hall, 2008.

Course outcomes:

The Students will be able to:

1. Describe to design and program Python applications.
2. Analyse and conversion of to use lists, tuples, and dictionaries in Python programs.
3. Explain the concept to identify Python object types, Components ,decision statements, pass arguments in Python.
4. Apply decision for building and package Python modules for reusability, design object-oriented programs with Python classes, use class inheritance in Python for reusability.
5. Apply file handling and Exception handling Concepts in real world using python

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IV Year I- Semester	**3**	**0-0-0**	**3**

COMPUTER ORGANIZATION
(Open Elective-II)

COURSE OBJECTIVES:

The Students will :

1. understand the basic operations of the computer system.
2. know the functioning of CPU and the control unit
3. analyze various algorithms for arithmetic operations in the computer.
4. understand different hierarchical memory systems including cache memory and virtual memory.
5. Recognize different ways of communicating with input/output devices and standard I/O interfaces.

UNIT-I :

Basic structures of Computers: Computer Types, Functional unit, Basic operational concepts, Bus structures, software, Performance, multiprocessors and multi computers.
Data Representation: Fixed point representation, Floating point representation, Error detection codes.

UNIT-II:

Register Transfer and Micro operations: Register transfer language, Register transfer, Bus and memory transfers, Arithmetic micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit.
Basic computer organization and Design: Instruction codes, computer registers, computer instructions, Timing and control, instruction cycle.

UNIT-III:

Computer Arithmetic: Introduction, Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating-point arithmetic operations, Decimal arithmetic unit, Decimal arithmetic operations.

UNIT-IV:

The Memory System: Basic concepts, Semiconductor RAM memories, Read-Only memories, speed, Size and Cost, Cache memories, performance considerations, Virtual memories, Secondary storage.

UNIT-V:

Input/output Organization: Accessing I/O Devices Interrupts, Interrupt hardware, Enabling and disabling interrupts, Direct memory access, Buses, interface circuits, Standard I/O interfaces.

TEXT BOOKS:

1. ComputerOrganization-CarlHamacher,ZvonkoVranesic,SafwatZaky,VthEdition,McGraw Hill.
2. Computer System Architecture-M.Moris Mano, IIIrd Edition, Pearson/PHI

REFERENCE BOOKS:

1. Computer organization and architecture-William stallings, Sixth Edition, Pearson/PHI
2. Structures Computer Organization-Andrew S.Tanebaum,4th Edition PHI/Pearson.

COURSE OUTCOMES:

The Students will be able to:

1. Illustrate basic operations of the computer system.
2. Apply knowledge of CPU and the control unit.
3. Apply various algorithms for arithmetic operations in the computer.
4. To classify different memory systems.
5. Produce knowledge on input/output organization.

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HUMAN COMPUTER INTERACTION
(Open Elective-II)

Course Objectives:
The Students will :

1. Demonstrate an understanding of guidelines, principles, and theories influencing human computer interaction.
2. Recognize how a computer system may be modified to include human diversity.
3. Select an effective style for a specific application.
4. Design mock ups and carry out user and expert evaluation of interfaces.

UNIT I
Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design, The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

UNIT II
Design process – Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.

UNIT III
Screen Designing:- Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

UNIT IV
Windows – New and Navigation schemes selection of window, selection of devices based and screen based controls Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.

UNIT V
Software tools – Specification methods, interface – Building Tools. Interaction Devices – Keyboard and function keys – pointing devices – speech recognition digitization and generation – image and video displays – drivers.

TEXT BOOKS:

1. The essential guide to user interface design, Wilbert O Galitz, Wiley DreamTech.
2. Designing the user interface. 3rd Edition Ben Shneidermann , Pearson Education Asia

REFERENCE BOOKS:

1. Human – Computer Interaction. Alan Dix, Janet Fincay, Gre Goryd, Abowd, Russell Bealg, Pearson Education
2. Interaction Design Prece, Rogers, Sharps. Wiley Dreamtech.

Course Outcomes:

The Students will be able to:

1. Explain the human, Computer components functions regarding interaction with computer
2. Demonstrate Understanding of Interaction between the human and computer components.
3. Use Paradigms, HCI in the software process.
4. Implement Interaction design basics.

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IV Year - I Semester	3	0-0-0	3

INTRODUCTION TO EMBEDDED SYSTEMS

(OPEN ELECTIVE-II)

Course Objectives:

The Students will:

1. Understand the basic concepts of embedded systems and 8051 microcontrollers.
2. Compare and contrast the basics of assembly programming language.
3. Identify the unique characteristics of real-time systems
4. Analyze the general structure of a real-time system and define the unique design problems and challenges of real-time systems.
5. Acquaint the embedded software development tools and various advanced architectures.

UNIT–I:

Embedded Computing: Introduction, complex systems and microprocessor, the embedded system design process, formalisms for system design, design examples.

UNIT–II:

The 8051 Architecture: Introduction, 8051 micro controller hardware, input/outputports and circuits, external memory, counter and timers, serial data input/output, interrupts.

Basic Assembly Language Programming Concepts: The assemblylanguage programming process, programming tools and techniques, programming the 8051. Data transfer and logical instructions, arithmetic operations, decimal arithmetic, jump and call instructions.

UNIT–III:

Introduction to Real-Time Operating Systems: Tasks and task states, tasks and data, semaphores, and shared data; message queues, mailboxes and pipes, timer functions, events, memory management, interrupt routines in an RTOS environment.

Basic Design Using a Real-Time Operating System: Principles, semaphores and queues, hard real-time scheduling considerations, saving memory and power, an example RTOS like uC-OS (open source).

UNIT–IV:

Embedded Software Development Tools: Host and target machines, linker/locators for embedded software, getting embedded software into the target system

Debugging Techniques: Testing on host machine, using laboratory tools, an example system.

UNIT-V:

Introduction to advanced Architectures: ARM and SHARC, processor and memory organization and instruction level parallelism; networked embedded systems: bus protocols, I^2C bus and CAN bus; internet-enabled systems, design example-elevator controller.

Text Books:

1. Wayne Wolf (2008), Computers as Components-principles of embedded computer system design, Elseveir, New Delhi, India.
2. Kenneth J. Ayala (2008), The 8051 Microcontroller, 3rd edition, Cengage Learning, India.

References:

1. David E. Simon (1999), An Embedded Software Primer, Pearson Education, India.
2. Jean J. Labrosse (2000), Embedding System Building Blocks, 2nd edition, CMP publishers, USA.
3. Raj Kamal (2004), Embedded Systems, Tata McGraw hill, India.

Course Outcomes:

The Students will be able to:

1. Program an embedded system
2. Analyze Interfacing with keyboard, A/D & D/A conversions, serial data Communication, LCD and LED display.
3. Illustrate Tasks, Semaphores, Message queues, pipes, Timer functions.
4. Design embedded systems and real-time systems
5. Compare and contrast ARM, SHARC, internet enabled systems.

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IV Year I sem	**3**	**0-0-0**	**3**

INTRODUCTION TO SURFACE MINING

(OPEN ELCTIVE II)

COURSE OBJECTIVES:

1. To introduce surface mining terms and applicable conditions
2. To acquaint with different machinery used in surface mining
3. To get idea about Drilling and blasting of surface ore bodies.
4. To get idea about lighting, dust and slopes in surface mines.
5. To know about ore and waste transportation.

UNIT-I: Definition, Terminology, Applicability and limitations of surface mining, Classification, Advantages and dis-advantages of surface mining.

UNIT-II : Introduction to surface mining machinery: Equipment selection; Working with rippers, shovels, draglines, shovel-dragline combination; bucket wheel excavator. Disposal of OB/waste material

UNIT-III:

Drilling & blasting**:** Drilling mechanism, drilling patters, Drill bits Explosives, Blasting accessories, Bulk explosives, problems in blasting.

UNIT-IV: Basics of Mine lighting, Sources of dust in surface mining, dust control, and slope stabilization

UNIT-V: Methods of excavation & transportation – shovel-dumper combination, draglines, surface miner, bucket wheel excavator. Impacts on environment due to surface mining

TEXTBOOKS:

1. D.J. Deshmukh, Elements of Mining Technology, Vol 1, Central Techno, 7th Edition, 2001.
2. Principles & Practices of Coal Mining, R.D. Singh

REFERENCE BOOKS

1. Surface Mining Technology, by Prof S.K.Das, Lovely Prakashan, Dhanbad

COURSE OUTCOMES:

The student will be able to:

1. Understand about surface mining terms and conditions of applicability
2. Learn about different machinery used in surface mining
3. Learn drilling and blasting in surface mining
4. Understand mine lighting, dust and slopes in surface mining
5. Understand the transportation of ore and waste in surface mining.

Open Elective - III

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B.Tech.	L	T-P-D	C
IV Year - I Semester	3	0-0-0	3

ELEMENTS OF CIVIL ENGINEERING
(Open Elective-III)

Course Objectives:

The Students will

1. understand different methods of surveying for various applications.
2. familiarize with various types of building materials.
3. understand transportation and traffic management.
4. Gain knowledge of water sources, supply& its treatment.
5. Study about Highway development in India, Necessity for Highway planning, different road development plans.

UNIT - I:

Introduction, history of the civil engineering, sub – disciplines of civil engineering.

UNIT II:

Surveying

Introduction, divisions of surveying, classification of surveying, principles of surveying. Linear measurements and errors–introduction, methods of linear measurements, chaining instruments, types of error and correction. Compass surveying – introduction, angular measurement using compass, whole circle bearing and reduced bearing, fore bearing and back bearing. Traverse surveying –introduction, chain and compass traversing, closing error and adjustments. Levelling– introduction, types of levelling instruments, dumpy level, adjustment of level, levelling staff.

UNIT - III:

Building Materials and Construction

Materials: Introduction to construction materials like ferrous and nonferrous metals, alloys, Stones, Bricks, Lime, Cement, Timber, Sand, Aggregates, Mortar, Concrete and bitumen. Construction: Types of building, different loads considered in building design, types of foundation in building, other developments and constructions of buildings.

UNIT - IV:

Fire and Earthquake Protection in Building Introduction, fire protection in building, structural and architectural safety requirements of resistive structures, fire resistive properties of building materials, fire exit requirements, force and acceleration on building due to earthquake, building response characteristics, building drift.

UNIT - V:

Water Supply, Sanitary and Electrical Works in Building

Introduction, water supply system, water supply layout of a building, house drainage, traps, electrical works in building.

Highway Engineering:

Introduction, historical background of road or highway, classification of roads, pavements and roads, traffic control mechanism.

TEXT BOOKS:

1. Elements of Civil Engineering Author: Mimi Das Saikia, Bhargab Mohan Das and Madan Mohan Das Publisher: PHI Learning Private Limited New Delhi.
2. Elements of Civil Engineering Author: Dr. R.K. Jain and Dr. P.P. Lodha Publisher: McGraw Hill Education, India Pvt. Ltd.
3. Surveying Vol. I Author: Dr. B. C. Punmia, Ashokkumar Jain, Arunkumar Jain16th Edition Publisher: Laxmi Publication Delhi.
4. Building drawing Author: M.G.Shah, C.M.Kale and S.Y.Patki Publisher: Tata McGraw Hill.

Reference Books:

1. Surveying Theory and Practice (7th Edition) Author: James M Anderson and Edward M Mikhail Publisher: McGraw Hill Education, India Pvt. Ltd.
2. Surveying and Leveling Author: R. Subramanian Publisher: Oxford University.
3. Building drawing Author: M.G.Shah, C.M.Kale and S.Y.Patki Publisher: Tata McGraw Hill.
4. Civil Engg. Drawing Author: S. C. Rangwala Publisher: Charotar Pub. House Anand.

Course Outcomes:

Students will be able to

1. Carry out simple land survey and prepare maps showing the existing details.
2. Find out area of irregular shaped plane areas.
3. Understand building plan, elevation and section.
4. Get acquainted with construction materials and transportation systems.
5. Understand transportation and traffic problems.

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IV Year - I Semester	**3**	**0-0-0**	**3**

DISASTER MANAGEMENT
(Open Elective-III)

Course Objectives:

The Student will:

1. provide basic conceptual understanding the difference between the hazard and a disaster.
2. gain knowledge about the various disasters and their impacts.
3. provide basic understanding about the hazard and vulnerability profile of India.
4. have conceptual understanding about the disaster management phases.
5. gain approaches of Disaster Risk Reduction (DRR) and the relationship between vulnerability, Disasters, disaster prevention and risk reduction.

UNIT - I:

Concept of Disaster, Different approaches ,Concept of Risk, Levels of Disasters ,Disaster Phenomena and Events (Global, national and regional) ,Hazards and Vulnerability, Natural and man-made hazards, response time, frequency and forewarning levels of different hazards, Characteristics and damage potential or natural hazards, hazard assessment ,Dimensions of vulnerability factors, vulnerability assessment Vulnerability and disaster risk ,Vulnerabilities to flood and earthquake hazards.

UNIT II:

Disaster Management Mechanism, Concepts of risk management and crisis managements. Disaster Management Cycle, Response and Recovery Development, Prevention, Mitigation and Preparedness ,Planning for Relief.

UNIT - III:

Capacity Building: Concept, Structural and Non-structural Measures ,Capacity Assessment; Strengthening Capacity for Risk reduction ,Counter-Disaster Resources and their utility in Disaster Management ,Legislative Support at the state and national levels.

UNIT - IV:

Coping with Disaster ,Coping Strategies; alternative adjustment processes, Changing Concepts of disaster management ,Industrial Safety Plan; Safety norms and survival kits, Mass media and disaster management.

UNIT - V:

Planning for disaster management, Strategies for disaster management planning, Steps for formulating a disaster risk reduction plan, Disaster management Act and Policy in India. Organizational structure for disaster management in India, Preparation of state and district disaster management plans .

TEXT BOOKS:

1. Alexander, D. Natural Disasters, ULC press Ltd, London, 1993.
2. Carter, W.N. Disaster Management: A Disaster Management Handbook, Asian Development Bank, Bangkok, 1991.
3. Manual on Natural Disaster Management in India, NCDM, New Delhi, 2001.

REFERENCES:

1. Abarquez I. & Murshed Z. Community Based Disaster Risk Management: Field Practitioner's Handbook, ADPC, Bangkok, 2004.
2. Goudie, A. Geomorphological Techniques, Unwin Hyman, London 1990.
3. Goswami, S.C Remote Sensing Application in North East India, Purbanchal Prakesh, Guwahati, 1997.

Course Outcomes:

The Students will be able to

1. Acquired knowledge on various types of disasters and hazards.
2. Distinguish between the hazard and a disaster can be analysed.
3. Acquired knowledge on the various approaches of Disaster Risk Reduction (DRR)
4. Ability to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction.
5. Develop ability to respond to different disasters.

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IV Year - I Semester	**3**	**0-0-0**	**3**

ELECTRIC COSTING AND ESTIMATION
(OPEN ELECTIVE - III)

Course Objectives:
The Student will

1. emphasize the estimation and costing aspects of all electrical equipment,
2. design and estimation of wiring
3. design overhead and underground distribution lines,
4. classify types of substations and illumination
5. understand the Installation and costing of Electrical Equipment.

UNIT-I : Design Considerations of Electrical Installations
Electric Supply System, Three phase four wire distribution system, Protection of Electric Installation against over load, short circuit and Earth fault, Earthing, General requirements of electrical installations, testing of installations, Neutral and Earth wire, Types of loads, Systems of wiring, Service connections, Service Mains, Sub-Circuits, Location of Outlets, Location of Control Switches, Location of Main Board and Distribution board, Guide lines for Installation of Fittings, Load Assessment, Permissible voltage drops and sizes of wires, estimating and costing of Electric installations.

UNIT-II : Electrical Installation for Different Types of Buildings and Small Industries
Electrical installations for residential buildings – estimating and costing of material, Electrical
installations for commercial buildings, Electrical installations for small industries.

UNIT-III: Overhead and Underground Transmission and Distribution Lines
Introduction, Supports for transmission lines, Distribution lines – Materials used, Underground cables, Mechanical Design of overhead lines, Design of underground cables.

UNIT-IV: Substations
Introduction, Types of substations, Outdoor substation – Pole mounted type, Indoor substations – Floor mounted type.

UNIT-V: Design of Illumination Schemes
Introduction, Terminology in illumination, laws of illumination, various types of light sources, Practical lighting schemes LED, CFL and OCFL differences.

TEXT BOOKS:

1. "K. B. Raina, S. K. Bhattacharya", "Electrical Design Estimating and Costing", NewAge International Publisher, 2010.
2. "Er. V. K. Jain, Er. Amitabh Bajaj", "Design of Electrical Installations", UniversityScience Press.

REFERENCES:

1. Code of practice for Electrical wiring installations,(System voltage not exceeding 650volts), Indian Standard Institution, IS: 732-1983.
2. Guide for Electrical layout in residential buildings, Indian Standard Institution, IS:4648-1968.
3. Electrical Installation buildings Indian Standard Institution, IS: 2032.
4. Code of Practice for selection, Installation of Maintenance of fuse (voltage notexceeding 650 V), Indian Standard Institution, IS: 3106-1966.
5. Code of Practice for earthling, Indian Standard Institution, IS: 3043-1966.
6. Code of Practice for Installation and Maintenance of induction motors, IndianStandard Institution, IS: 900-1965.
7. Code of Practice for electrical wiring, Installations (system voltage not exceeding 650Volts), Indian Standard Institution, IS: 2274-1963.
8. "Gupta J. B., Katson, Ludhiana", "Electrical Installation, estimating and costing", S.K. Kataria and sons, 2013

Course outcomes:

The student will be able to:

1. Understand the design considerations of electrical installations.
2. Design electrical installation for buildings and small industries.
3. Analyze the feasibility of type of substation
4. Understand the performance of various materials used for transmission and distribution
5. Identify and design the various types of light sources for different applications.

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POWER PLANT ENGINEERING
(OPEN ELECTIVE - III)

Course Objectives:
The Student will

1. provide the knowledge on principles of solar radiation & solar energy collection & storage and applications.
2. prepare graduates to express the Knowledge on wind energy, geo-thermal energy, and ocean energy plants.
3. understand the behaviour of different power plants.
4. analyse different types of steam cycles and it's efficiencies in a steam power plant.
5. Expose on principle of safety and environmental issues.

UNIT-I : Thermal Power Plants
Basic thermodynamic cycles, various components of steam power plant- Layout- Pulverized coal burners- Fluidized bed combustion - Coal Handling systems - Ash handling systems - Forced draft and induced draft fans- Boilers- Feed pumps- Super heater- Regenerator - Condenser- Dearearators - Cooling tower

UNIT-II Hydro-electric Power Plants(Elementary Aspects)
Layout- Dams -Selection of water turbines – types - Pumped storage hydel plants

UNIT-III: Nuclear Power Plants(Elementary Aspects)
Principles of nuclear energy- Fission reactions - Nuclear reactor-Nuclear power plants

UNIT-IV: Gas and Diesel Power Plants(Elementary Aspects)
Types, Open and closed cycle gas turbine, Work output & thermal efficiency, Methods to improve performance-reheating, Inter-coolings, Regeneration-Advantage and disadvantages - Diesel engine power plant, Component and layout.

UNIT-V: Non-Conventional Power Generation:(Elementary Aspects)
Solar energy collectors, OTEC, Wind power plants, Tidal power plants and geothermal resources, Fuel cell, Thermoelectric power generation.

TEXT BOOKS:

1. Arora and Domkundwar, -"A Course in Power Plant Engineering", Dhanpat Rai and Co.Pvt. Ltd., New Delhi.
2. P.K. Nag,-"Power Plant Engineering", Tata McGraw Hill, Second Edition, Fourth reprint 2003.

REFERENCES:

1. Bernhardt G.A. Skrotzki and William A. Vopat, -"Power Station Engineering and Economy", Tata McGraw Hill Publishing Company Ltd., New Delhi, 20th reprint 2002.
2. G.D. Rai, -"An Introduction to Power Plant Technology", Khanna Publishers, Delhi-110 005.
3. M.M. El-Wakil, -"Power Plant Technology", Tata McGraw Hill, New Delhi, 1984.

Course outcomes:

The student will be able to:

1. Describe basic working principles of gas turbine and diesel engine power plants.
2. Define the performance characteristics and components of such power plants.
3. List the principal components and types of nuclear reactors.
4. List types, principles of operations, components and applications of steam turbines, steam generators, condensers, feed water and circulating water systems.
5. Estimate different efficiencies associated with power plant systems

J.B INSTITUTE OF ENGINEERING & TECHNOLOGY
AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
IV Year -I Semester	**3**	**0-0-0**	**3**

FUNDAMENTALS OF ROBOTICS

Open Elective - III

Course Objectives: The Student will

1. understand the theoretical aspects of Robotics
2. acquire practical experience in the field of Robotics through design projects and case studies.
3. understand the importance of robots in various fields of engineering.
4. understand trajectory planning and types of motion
5. expose to various robots and their operational details.

UNIT-I: Robotics-Introduction-classification with respect to geometrical configuration (Anatomy), Controlled system & chain type: Serial manipulator & Parallel Manipulator.

Components of Industrial robotics-precession of movement-resolution, accuracy & repeatability-Dynamic characteristics- speed of motion, load carrying capacity & speed of response-Sensors-Internal sensors: Position sensors & Velocity sensors, External sensors: Proximity sensors, Tactile Sensors, & Force or Torque sensors.

UNIT-II: Grippers - Mechanical Gripper-Grasping force-Engelberger-g-factors-mechanisms for actuation, Magnetic gripper, vaccume cup gripper-considerations in gripper selection & design. Industrial robots specifications. Selection based on the Application.

UNIT-III: Kinematics-Manipulators Kinematics, Rotation Matrix, Homogenous Transformation Matrix, D-H transformation matrix, D-H method of assignment of frames. Direct and Inverse Kinematics for industrial robots. Differential Kinematics for planar serial robots

UNIT-IV: Trajectory planning: Joint space scheme- Cubic polynomial fit-Obstacle avoidance in

operation space-cubic polynomial fit with via point, bleding scheme. Introduction Cartesian space scheme. Control- Interaction control, Rigid Body mechanics, Control architecture-position, path velocity, and force control systems, computed torque control, adaptive control, and Servo system for robot control.

UNIT-V: Programming of Robots and Vision System-Lead through programming methods-Teach pendent- overview of various textual programming languages like VAL etc.

Introduction to Mobile Robots: A brief history of mobile robotics, applications and market. Recent advances in the mobile robotics for RISE (Risky Intervention and Surveillance

Environment) applications.

TEXT BOOKS:

1. Industrial Robotics / Groover M P /Mc Graw Hill
2. Introduction to Robotics / John J. Craig/ Pearson

REFERENCES:

1. Theory of Applied Robotics /Jazar/Springer.H. Asada and J. J. E. Slotine, "*Robot Analysis and Intelligence*", Wiley Inter-Science. 1986
2. Robotics / Ghosal / Oxford

Course outcomes: The student will be able to

1. apply the basic components of robots.
2. differentiate types of robots and robot grippers.
3. model forward and inverse kinematics of robot manipulators.
4. analyze forces in links and joints of a robot.
5. programme a robot to perform tasks in differential applications.

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B.Tech.	**L**	**T-P-D**	**C**
IV Year - I Semester	**3**	**0-0-0**	**3**

DIGITAL SYSTEMS USING VERILOG

(Open Elective -III)

COURSE OBJECTIVES

The Students will

1. understand the constructs and conventions of the Verilog HDL programming.
2. Industrial-standard design software for coding, synthesis and simulation.
3. Learn in-depth study of combinational and sequential hardware systems and the use of finite state machines in the design of sequential systems.
4. understand concept of Programmable Devices, PLA, PAL, CPLD and FPGA and implement digital system using VHDL.
5. implement combinational and sequential circuits using VHDL.

UNIT I: Review of Logic Design Fundamentals

Combinational Logic, Boolean Algebra and Algebraic Simplification, Karnaugh maps, Designing with Nand and Nor Gates, Hazards in Combinational Networks, Flip-flops and latches,Mealy Sequential Network, Equivalent States and reduction of State Tables, Sequential Network Timing, Setup and Hold Times, Synchronous Design, Tristate Logic and Buses.

UNIT II: Introduction to Verilog

Computer-Aided Design, Hardware Description Languages, Verilog Description of Combinational Circuits, Verilog Modules, Assignments, Procedural Assignments, Modeling Flip-Flops Using Always Block, Always Blocks Using Event Control Statements, Delays in Verilog, Compilation, Simulation and Synthesis of Verilog Code, Data Types and Operators, Simple Synthesis Examples for Multiplexers, Modeling Registers and Counters Using Verilog Always Statements, Behavioral and Structural Verilog, Constants, Arrays, Loop in Verilog, Testing in Verilog Model.

UNIT III: Introduction to Programmable Logic Devices

Brief Overview of Programmable Logic Devices, Simple Programmable Logic Devices(SPLDs),Complex Programmable Logic Devices(CPLDs),Field-Programmable Gate Arrays(FPGAs), Problems.

Design Examples

BCD to 7-Segment Display Decoder, A BCD Adder, 32-Bit Adders, Traffic Light Controller, State Graphs for Control Circuits, Scoreboard and Controller, Array Multiplier.

UNIT IV: SM Charts and Microprogramming

State Machine Charts, Derivation of SM Charts, Realization of SM Charts, Implementation of the Dice Game, Microprogramming, Linked State Machine.

Designing with Field Programmable Gate Arrays

Implementing Functions in FPGAs, Implementing Functions Using Shannon's Decomposition, Carry Chains in FPGAs, Examples of Logic Block in Commercial FPGAs, Dedicated memory in FPGA, Dedicated Multipliers in FPGAs, Cost of Programmability.

UNIT V:Floating-Point Arithmetic

Representation of Floating-Point Numbers, Floating-point Multiplication, Floating-point Additions, Other Floating-Point Operations.

Hardware Testing and Design for Testability

Testing Combinational Logic, Testing Sequential Logic, Scan Testing, Boundary Scan, Build-In Self-Test.

TEXTBOOKS:

1. By Charles Roth, Lizy K. John, Byeong Kil Lee,"Digital System Design using Verilog".
2. Zainalabdien Navabi, Verilog Digital System Design, TMH, 2nd edition.

REFERENCE BOOKS:

1.T.R.Padmanabhan & Bala Tripura sundari, "Design through Verilog HDL", WSE2004 IEEE press.

2.Fundamentls of Digital Logic with Veilog design by Stephen Brown, Zvonkoc Vranesic, TMH, 2nd edition, 2010.

3. Digital Logic Design using Verilog , State machine & synthesis for FPGA, Sunggu Lee, Cengage Learning ,2009.

4. Verilog HDL - Samir Palnitkar, 2nd Edition, Pearson Education, 2009.

COURSE OUTCOMES

The Students will be able to:

1. describe, design, simulates and synthesize the computer hardware.
2. practice verilog hardware description language.
3. develop program codes for synthesis-friendly combinational and sequential logic incorporating the concept of sustainability of design and development.
4. analyze, design and implement sequential logic circuits.
5. construct digital system design using PLD.

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B.Tech.	**L**	**T-P-D**	**C**
IV Year - I Semester	**3**	**0-0-0**	**3**

ADVANCED COMPUTER ARCHITECTURE

(Open Elective -III)

COURSE OBJECTIVES:

The Student will

1. understand the fundamentals of computer design and technology trends.
2. familiarize with the Instruction level parallelism.
3. gain knowledge about memory design and virtual memory.
4. know about architectures of multiprocessors and storage systems.
5. analyze the Inter connection networks and design of clusters.

UNIT-I

Fundamentals of Computer design- Technology trends- cost- measuring and reporting performance quantitative principles of computer design. Instruction set principles and examples- classifying instruction set- memory addressing- type and size of operands- addressing modes for signal processing-operations in the instruction set- instructions for control flow- encoding an instruction set.-the role of compiler.

UNIT-II

Instruction level parallelism (ILP)- over coming data hazards- reducing branch costs –high performance instruction delivery- hardware based speculation- limitation of ILP. ILP software approach- compiler techniques- static branch protection - VLIW approach - Hardware support for more ILP at compile time- Hardware verses Software Solutions.

UNIT-III

Memory hierarchy design- cache performance- reducing cache misses penalty and miss rate – virtual memory- protection and examples of VM.

UNIT-IV

Multiprocessors and thread level parallelism- symmetric shared memory architectures- distributed shared memory- Synchronization- multi threading. Storage systems- Types – Buses - RAID- errors and failures- bench marking a storage device- designing a I/O system.

UNIT-V

Inter connection networks and clusters- interconnection network media – practical issues in interconnecting networks- examples – clusters- designing a cluster.

TEXT BOOKS:

1. Computer Architecture and Parallel Processing, Kai Hwang and A Briggs International edition Mcgraw-Hill.
2. Advanced Computer Architectures, Dezso Sima, Terence Fountain, Peter Kacsuk, Pearson.
3. Parallel Computer Architecture, A Hardware/Software Approach, david E Culler, Jaswinder Pal Singh, Anoop Gupta, Elseveir.

REFERENCE BOOKS:

1. Computer Architecture, A quantitative approach, 3rd edition, John L Hennessy and David A Patterson Morgan Kufmann (an imprint elsevier).

COURSE OUTCOMES:

The Students will be able to

1. understand the fundamentals of computer design and technology trends.
2. expertise with the Instruction level parallelism.
3. illustrate the concepts of memory design and virtual memory.
4. obtain knowledge on architectures of multiprocessors and storage systems.
5. design the Inter connection networks and design of clusters.

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B.Tech.	**L**	**T-P-D**	**C**
IV- I Semester	**3**	**0-0-0**	**3**

SOFTWARE ENGINEERING

(Open Elective-III)

Course objectives:

The Students will :

1. Analyze basic Software engineering methods.
2. Describe software engineering layered technology and Process frame work.
3. Design software architecture and UML modeling
4. Recognize testing approaches such as unit testing and integration testing.
5. Demonstrate software evolution and related issues such as version and risk management

UNIT - I:

Introduction to Software Engineering: The evolving role of Software, changing nature of Software, Software Myths.
A Generic view of process: Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and team process models.
Process models: The waterfall model, Incremental process models, Evolutionary process models, The Unified process.

UNIT - II:

Software Requirements: Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document**.**
Requirements Engineering Process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management.
System Analysis Models: Context models, behavioral models, data models, object models, structured methods

UNIT - III:

Design Engineering: Design process and Design quality, Design concepts, the design model.
Creating an architectural design: Software architecture, Data design, Introduction to UML, Importance of modeling, Principle of modeling, Concepts of modeling and architecture.
Object-Oriented Design: Objects and object classes, An Object-Oriented design process, Design evolution.
Performing User interface design: Golden rules, User interface analysis and design, interface analysis, interface design steps, Design evaluation.

UNIT - IV:

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging.

Product metrics: Software Quality, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance.
Metrics for Process and Products: Software Measurement, Metrics for software quality.
UNIT - V:

Risk management: Reactive vs. Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan.
Quality Management: Quality concepts, Software quality assurance, Software Reviews, Formal technical reviews, Statistical Software quality Assurance, Software reliability, The ISO 9000 quality standards.

TEXT BOOKS:

1. Software Engineering A Practitioner's Approach, Roger S Pressman, 6th edition. McGraw-Hill International Edition.
2. Software Engineering, Ian Sommerville, 7th edition, Pearson education.

REFERENCE BOOKS:

1. The Unified Modeling Language, User Guide by Grady Booch, James Rambaugh, Ivar Jaccobson.
2. Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India, 2010.
3. Software Engineering: A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008

Course outcomes:

The Students will be able to:

1. Apply software engineering principles and techniques
2. Evaluate requirements for a software system
3. Apply the process of analysis and design using the object-oriented approach
4. Write test cases for different requirement and implement testing.
5. Evaluate different version and risk management

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B.Tech :	**L**	**T-P-D**	**C**
IV Year I- Semester	**3**	**0-0-0**	**3**

JAVA PROGRAMMING
(Open Elective-III)

Course Objectives:
The students will :

1. Describe with constructors and string handling functions.
2. Explain Inheritance and Polymorphism.
3. Discuss Exception handling and Multithreading.
4. Review Applet Programming, Event Handling and scripting.
5. Discuss Collection frame work in java and Files.

UNIT – I

OOP concepts – Data abstraction, encapsulation, inheritance, benefits of inheritance, polymorphism, classes and objects, Procedural and object oriented programming paradigms

Java programming - History of Java, comments, data types, variables, constants, scope and life time of variables, operators, operator hierarchy, expressions, type conversion and casting, enumerated types, control flow - block scope, conditional statements, loops, break and continue statements, simple java stand alone programs, arrays, console input and output, formatting output, constructors, methods, parameter passing, static fields and methods, access control, this reference, overloading methods and constructors, recursion, garbage collection,

String handling: String, StringBuffer, StringTokenizer.

UNIT – II

Inheritance - Inheritance hierarchies, super and sub classes, Member access rules, super keyword, preventing inheritance: final classes and methods, the Object class and its methods

Polymorphism- dynamic binding, method overriding, abstract classes and methods.

Interfaces – Interfaces vs. Abstract classes, defining an interface, implementing interfaces, accessing implementations through interface references, extending interface.

Inner classes – Uses of inner classes, local inner classes, anonymous inner classes, static Inner classes, examples.

Packages-Defining, Creating and Accessing a Package, Understanding CLASSPATH, Importing packages.

UNIT – III

Exception handling – Dealing with errors, benefits of exception handling, the classification of exceptions- exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, re-throwing exceptions, exception specification, built in exceptions, creating own exception sub classes.

Multithreading - Differences between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, inter-thread communication, producer consumer pattern.

UNIT – IV

Event handling - Events, Event sources, Event classes, Event Listeners, Relationship between Event sources and Listeners, Delegation event model, Examples: handling a button click, handling mouse events, Adapter classes.

Applets – Inheritance hierarchy for applets, differences between applets and applications, life cycle of an applet, passing parameters to applets, applet security issues.

UNIT – V

Collection Framework in Java – Introduction to Java Collections, Overview of Java Collection frame work, Generics, Commonly used Collection classes– Array List, Vector, Hash table, Stack, Enumeration, Iterator, String Tokenizer, Random, Scanner, calendar and Properties

Files – streams- byte streams, character streams, text Input/output, binary input/output, random access file operations, File management using File class.

Connecting to Database - JDBC Type 1 to 4 drivers, connecting to a database, querying a database and processing the results, updating data with JDBC.

TEXT BOOKS:

1. Java Fundamentals – A comprehensive Introduction, Herbert Schildt and Dale Skrien, TMH.
2. Java The complete reference, 8th editon, Herbert Schildt, TMH.

REFERENCE BOOKS :

1. Java for Programmers, P.J.Deitel and H.M.Deitel, Pearson education (OR) Java: How to Program P.J.Deitel and H.M.Deitel, PHI.
2. Object Oriented Programming through Java, P.Radha Krishna, Universities Press.
3. Thinking in Java, Bruce Eckel, Pearson Education
4. Programming in Java, S.Malhotra and S.Choudhary, Oxford Univ. Press.

Course Outcomes:

The Students will be able to:

1. Apply constructors and string Handling.
2. Demonstrate Inheritance and Polymorphism.
3. Choose Exception handling and Multithreading.
4. Practice applet Programming Solve Event Handling.
5. Choose Collection frame work and files.

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B.Tech :	**L**	**T-P-D**	**C**
IV Year I- Semester	**3**	**0-0-0**	**3**

SOFTWARE PROJECT MANAGEMENT
(Open Elective-III)

COURSE OBJECTIVES:

The Students will:

1. Discuss the conventional and contemporary software project management principles.
2. Understand the ability to assess and plan project schedule and assign resources
3. Select an appropriate project development methodology among various alternating processes.
4. Identify project risks, understand the responsibilities, monitor and track project deadlines and the capability to work in a team environment.

UNIT-I

Conventional Software Management: The waterfall model, conventional software management performance.

Evolution of Software Economics: Software Economics.

Improving Software Economics: Reducing software product size, Improving software processes, Improving team effectiveness, Improving automation, Achieving required quality.

UNIT-II

The old way and the New way: The principles of conventional software engineering, Principles of modern software management.

Life Cycle Phases: Engineering and Production stages, Inception, Elaboration, Construction, Transition phases.

Artifacts of the Process: The artifact sets, Management artifacts, Engineering artifacts, Programmatic artifacts.

UNIT-III

Model Based Software Architectures: A Management perspective and Technical perspective.

Work Flows of the Process: Software process workflows, Iteration workflows.

Checkpoints of the Process: Major milestones, Minor milestones, Periodic status assessments.

Iterative Process Planning: Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process.

UNIT-IV

Project Organizations and Responsibilities: Line-of-business organizations, Project organizations.

Process Automation: Automation building blocks.

Project Control and Process Instrumentation: The seven core metrics, Management indicators, quality indicators, life cycle expectations, and pragmatic software metrics.

UNIT-V

Future Software Project Management: Modern project profiles, next generation software economics, modern process transitions.

Tailoring the Process: Process discriminants.
Case Study: The command centre processing and display system-replacement (CCPDS-R)

TEXT BOOKS:

1. Software Project Management, Walker Royce: Pearson Education, 2005
2. Software Project Management, Joel Henry: Pearson Education

REFERENCE BOOKS:

1. Software Project Management, Bob Hughes and Mike Cotterell: Tata McGraw-Hill Edition.
2. Software Project Management in practice, Pankaj Jalote, Pearson Education, 2005

COURSE OUTCOMES:

The Student is able to:

1. Describe the conventional s/w management and explain how to improve s/w economics
2. Understand and discuss the key phases of project management and the key skills associated with each.
3. Explain the concept of workflows and checkpoints of the processes.
4. Discuss the responsibilities in the project organization.
5. Distinguish between conventional project and modern project profiles.

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UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
IV Year - I Semester	**3**	**0-0-0**	**3**

INTRODUCTION TO INTELLIGENT SYSTEMS
Open Elective - III

Course Objectives:

At the end of the course, students will learn:

1. Understand In-depth of specialist bodies of knowledge within the engineering discipline.
2. Establish engineering methods to complex engineering problem solving.
3. Be Fluent application of engineering techniques, tools and resources

UNIT–I:

Introduction To Artificial Intelligence: Introduction to AI-Problem formulation, Problem Definition -Production systems, Control strategies, Search strategies. Problem, characteristics, Production system characteristics -Specialized production system

UNIT–II:

Representation Of Knowledge: Game playing - Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic Structured representation of knowledge.

UNIT–III:

Knowledge Inference: Knowledge representation -Production based system, Frame based system.

UNIT–IV:

Inference - Backward chaining, forward chaining, Rule value approach, Fuzzy reasoning - Certainty factors, Bayesian Theory-Bayesian Network-Dempster - Shafer theory.

UNIT-V:

Expert Systems: Expert systems - Architecture of expert systems, Roles of expert systems - Knowledge Acquisition –Meta knowledge, Heuristics.

Text Books:

1. Kevin Night, Elaine Rich, Nair B., “Artificial Intelligence (SIE)”, Tata McGraw-Hill Education Private Limited, 3rd edition, 2009, ISBN: 978-0070678163.
2. Dan W. Patterson, “Introduction to AI and ES”, Pearson Education, 2nd edition, 2007.ISBN, 0132097680.

References:

1. Peter Jackson, “Introduction to Expert Systems”, Pearson Education, 3rd edition, 2007. ISBN-13: 978-0201876864
2. Stuart Russel, Peter Norvig , “AI – A Modern Approach”, Pearson Education, 2nd edition, ISBN-13: 978-0137903955

Course Outcomes:

The Students will be able to:

1. Gain basic understanding of the underlying principles and philosophy of computational intelligence systems Technologies.
2. Be capable of constructing intelligent systems (in software) that perform useful engineering tasks

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B.Tech.	**L**	**T-P-D**	**C**
IV Year - I Sem	**3**	**0-0-0**	**3**

INTRODUCTION TO GEOLOGY

(OPEN ELECTIVE III)

COURSE OBJECTIVES:

The Student will:

1. introduce rock types and their physical properties
2. acquaint with different structures occurring in rocks
3. get idea about Ground water, and aquifers
4. get idea about coal formation and its stages.
5. know about minerals occurring in India.

UNIT-I:

Introduction, Definitions, Importance of geology in mining, Types of rocks, Physical properties of rocks.

UNIT-II:

Structural Geology: Definition, terminology, and Primary and secondary structures: Bedding, lineation, foliation, cleavage, Strike and dip. Definition of faults, folds and joints and their types, Unconformities and its kinds.

UNIT-III:

Ground Water: Introduction, Hydrological Cycle, origin and occurrence of groundwater, water table. Aquifers: Types of aquifers, confined and unconfined aquifers, perched aquifers.

UNIT-IV:

Coal: Stages of formation, composition, theories of formation of coal.

UNIT-V:

Occurrence and distribution of important metallic mineral deposits in India: Iron – Copper, - Lead and Zinc – Manganese – Aluminum – Chromium.

Occurrence and distribution of important non-metallic mineral deposits in India: Asbestos – kyanite – Sillimanite.

TEXTBOOKS:

1. Structural Geology – Billings, M.P. Prentice Hall.
2. Engineering geology –by Dr. Chennkeshavulu.

REFERENCE BOOKS:

1. A Textbook of Geology: Mukherjee P.K., The World Press Pvt. Limited Calcutta.

COURSE OUTCOMES:

The student will be able to:

1. Understand about rocks and their properties
2. Learn about different structures occurring in rocks
3. Understand about ground water, water table and aquifers
4. Learn about coal and its formation theories
5. Distinguish metallic and non-metallic minerals.

Open Elective - IV

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B.Tech.	**L**	**T-P-D**	**C**
IV Year - II Semester	**3**	**0-0-0**	**3**

INDUSTRIAL WASTE WATER TREATMENT
(Open Elective-IV)

COURSE OBJECTIVES:

The Students will:

1. Distinguish between the quality of domestic and industrial water requirements and Wastewater quantity generation
2. Understand the industrial process, water utilization and waste water generation
3. Impart knowledge on selection of treatment methods for industrial wastewater
4. Acquire the knowledge on operational problems of common effluent treatment plants.
5. Gain knowledge on different techniques and approaches for minimizing the generation and application of Physio chemical and biological treatment methods for recovery, reuse and disposal of industrial wastewater.

UNIT – I:

Sources of Pollution - Physical, Chemical, Organic & Biological properties of Industrial Wastes- Difference between industrial & municipal waste waters - Effects of industrial effluents on sewers and Natural water Bodies.

UNIT – II:

Pre & Primary Treatment - Equalization, Proportioning, Neutralization, Oil separation by Floating-Waste Reduction-Volume Reduction-Strength Reduction

UNIT-III:

Waste Treatment Methods - Nitrification and De-nitrification-Phosphorous removal -Heavy metal removal - Membrane Separation Process - Air Stripping and Absorption Processes - Special Treatment Methods - Disposal of Treated Waste Water.

UNIT-IV:

Characteristics and Composition of waste water and Manufacturing Processes of Industries like Sugar, Characteristics and Composition of Industries like Food processing Industries, Steel, and Petroleum Refineries

UNIT-V:

Characteristics and Composition of Industries like Textiles, Tanneries, Atomic Energy Plants and other Mineral Processing Industries – Joint Treatment of Raw Industries waste water and Domestic Sewage – Common Effluent Treatment Plants(CETP) – Location, Design, Operation and Maintenance Problems – Economical aspects

TEXT BOOKS:

1. Metcalf & Eddy, “Wastewater engineering Treatment disposal reuse”, Tata McGraw Hill.
2. Eckenfelder, W.W., “Industrial Water Pollution Control”, McGraw-Hill

REFERENCE BOOKS:

1. M.N. Rao and Dutta – Industrial Waste.
2. Mark J. Hammer, Mark J. Hammer, Jr., “Water & Wastewater Technology”, Prentice Hall of India.
3. N.L. Nemerrow –Theories and practices of Industrial Waste Engineering. C.G. Gurnham – Principles of Industrial Waste Engineering

COURSE OUTCOMES:

The Students will be able to

1. Learn a firm foundation and knowledge of mathematics, science and engineering principles and the ability to apply the knowledge.
2. Define and reason about fundamental concepts of waste water treatment
3. Design and conduct experiments and the ability
4. To analyze the data, interpret results and draw conclusions.
5. Design a component, system or process to meet desired needs and imposed constraints.

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B.Tech.	**L**	**T-P-D**	**C**
IV Year - II Semester	**3**	**0-0-0**	**3**

AIR POLLUTION AND CONTROL
(Open Elective-IV)

Course Objectives:

The Students will

1. introduce students to basic concepts of pollution.
2. gain the knowledge of causes of air pollution.
3. gain the knowledge of health related to air pollution.
4. develop skills relevant to control of air pollution.
5. Understand the quality of air.

UNIT–I: Air Pollution – Definitions, Scope, Significance and Episodes, Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary, point and Non-Point, Line and Areal Sources of air pollution- stationary and mobile sources

UNIT–II: Effects of Air pollutants on man, material and vegetation; Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holes etc.

UNIT–III: Thermodynamics and Kinetics of Air-pollution – Applications in the removal of gases like SO_x; NO_x; CO; HC etc., air-fuel ratio. Computation and Control of products of combustion. Meteorology and plume Dispersion; properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity; Influence of Meteorological phenomena on Air Quality-wind rose diagrams.

UNIT–IV: Lapse Rates, Pressure Systems, Winds and moisture plume behaviour and plume Rise Models; Gaussian Model for Plume Dispersion.
Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control.
Equipment's – Settling Chambers, Centrifugal separators, filters Dry and Wet scrubbers, Electrostatic precipitators.

UNIT-V: General Methods of Control of NO_x and SO_x emissions – In-plant Control Measures, process changes, dry and wet methods of removal and recycling.
Air Quality Management – Monitoring of SPM, SO_x; NO_x and CO Emission Standards.

Text Books:

1. Air pollution By M.N.Rao and H.V.N.Rao – Tata Mc.Graw Hill Company.
2. Air pollution by Wark and Warner.- Harper & Row, New York

References:

1. Air pollution and control By K.V.S.G. Murali Krishna, Kaushal Publishers. Kakinada.

Course Outcomes:

The Students will be able to

1. Acquired knowledge on the basic elements of causes and occurrence of the air pollution.
2. Have awareness on the different causes of the air pollution.
3. Have awareness about different health related problems caused due to air pollution.
4. develop concepts in controlling and prevention of air pollution.
5. Analyse the quality of air.

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B.Tech.	**L**	**T-P-D**	**C**
IV Year - II Semester	**3**	**0-0-0**	**3**

DISTRIBUTED GENERATION AND MICROGRID
(OPEN ELECTIVE - IV)

Course Objectives:
The Student will

1. illustrate the concept of distributed generation
2. analyze the impact of grid integration.
3. study concept of Micro grid and its configuration
4. understand the Economic and control aspect of DGs
5. find optimal size, placement and control aspects of DGs

UNIT-I : Need for Distributed Generation
Renewable sources in distributed generation - Current scenario in distributed generation - Planning of DGs – Siting and sizing of DGs – Optimal placement of DG sources in distribution systems.

UNIT-II : Grid Integration of DGs
Different types of interfaces - Inverter based DGs and rotating machine based interfaces - Aggregation of multiple DG units - Energy storage elements - Batteries, ultra capacitors, flywheels.

UNIT-III: Technical Impacts of DGs
Transmission systems, Distribution systems, De-regulation – Impact of DGs upon protective relaying – Impact of DGs upon transient and dynamic stability of existing distribution systems

UNIT-IV: Economic and Control Aspects of DGs
Market facts, issues and challenges - Limitations of DGs - Voltage control techniques, Reactive power control, Harmonics, Power quality issues - Reliability of DG based systems – Steady state and Dynamic analysis.

UNIT-V: Introduction to Micro-grids
Types of micro-grids – Autonomous and non-autonomous grids – Sizing of micro-grids - Modeling & analysis - Micro-grids with multiple DGs – Micro-grids with power electronic interfacing units - Transients in micro-grids - Protection of micro-grids – Case studies

TEXT BOOKS:

1. H. Lee Willis, Walter G. Scott , 'Distributed Power Generation – Planning and Evaluation', Marcel Decker Press, 2000.
2. M.Godoy Simoes, Felix A.Farret, 'Renewable Energy Systems – Design and Analysis with Induction Generators', CRC press.

REFERENCES:

1. Robert Lasseter, Paolo Piagi, ' Micro-grid: A Conceptual Solution', PESC 2004, June 2004.
2. F. Katiraei, M.R. Iravani, 'Transients of a Micro-Grid System with Multiple Distributed Energy Resources', International Conference on Power Systems Transients (IPST'05) in Montreal, Canada on June 19-23, 2005.
3. Z. Ye, R. Walling, N. Miller, P. Du, K. Nelson, 'Facility Microgrids', General Electric Global Research Center, Niskayuna, New York, Subcontract report, May 2005.

Course outcomes:

The student will be able to:

1. Find the size and optimal placement DG
2. Analyze the impact of grid integration and control aspects of DGs
3. Model and analyze a micro grid taking into consideration the planning and Operational issues of the DGs to be connected in the system
4. Describe the technical impacts of DGs in power systems.
5. Implement the micro grids and their control schemes

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UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
IV Year - II Semester	**3**	**0-0-0**	**3**

RENEWABLE ENERGY SOURCES
(OPEN ELECTIVE -IV)

Course Objectives:
The Student will

1. understand the various types of renewable energy sources.
2. analyze the principle and operation of direct energy conversion.
3. understand and analyze the hybrid energy systems.
4. apply the renewable energy sources to real world electrical and electronics problems.
5. apply the renewable energy sources to real world electrical and electronics applications.

UNIT-I : Principles of Solar Radiation
Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT-II : Solar Energy Collection
Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.
Solar Energy Storage and Applications: Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

UNIT-III: Wind Energy
Sources and potentials, Power from wind, Properties of air and wind, Types of wind turbines, Operating characteristics, Betz criteria.
Bio-Mass: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects.
UNIT-IV: Geothermal Energy
Resources, types of wells, methods of harnessing the energy, potential in India
Ocean Energy: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT-V: Direct Energy Conversion
Need for DEC, Carnot cycle, limitations, and principles of DEC
Environmental effects of energy conversion systems:
Pollution from coal and preventive measures, Steam stations and pollution, Pollution free energy systems

TEXT BOOKS:

1. Non-Conventional Energy Sources /G.D. Rai, khanna publications.
2. Renewable Energy Sources /Twidell&Weir CRC Press .

REFERENCES:

1. Renewable Energy resources /Tiwari and Ghosal/Narosa
2. Renewable Energy Technologies /Ramesh & Kumar /Narosa
3. Non-Conventional Energy Systems / K Mittal /Wheeler
4. Renewable Energy sources and emerging technologies by D.P. Kothari, K.C. Singhal, P.H.I
5. Systems" -Academic Press, 1st Edition 2009.

Course outcomes:

The student will be able to:

1. Understand the need of utilization of alternate energy resources.
2. Discuss the collection of solar energy, storage of solar energy and its applications.
3. Illustrate the potential of Wind and bio mass as a renewable source.
4. Understand the potential of geothermal energy and ocean energy as a renewable source.
5. Discuss the direct energy conversion systems.

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Open Elective - IV

DIGITAL MANUFACTURING

Course Objectives:
The Student will

1. Understand the need of digital fabrication
2. Understand about Two dimensional layer by layer techniques
3. Know about extrusion based systems, post processing and the software issues involved in digital fabrication
4. Know the applications of digital fabrication

UNIT-I :

INTRODUCTION TO ADDITIVE MANUFACTURING: Introduction to AM, AM evolution, Classification of Additive Manufacturing, Distinction between AM & CNC Machining, Advantages of AM

UNIT-II :

TWO- DIMENSIONAL LAYER- BY LAYER TECHNIQUES: Stereo-lithography (SL), Solid Foil Polymerization (SFP), Selective Laser Sintering (SLS), Selective Powder Building (SPB), Ballistic Particle Manufacturing (PM)

UNIT-III:

EXTRUSION BASED SYSTEMS: Introduction, basic principles, Fused Deposition Modeling, Materials, and Limitations of FDM

POST PROCESSING: Introduction, Support Material Removal, Surface Texture Improvements, Accuracy Improvements, Aesthetic Improvements

UNIT-IV:

SOFTWARE ISSUES FOR ADDITIVE MANUFACTURING: Introduction, Preparation of CAD Models: The STL file, Problems with STL files, STL file manipulation, Beyond the STL file, Additional software to assist AM

UNIT-V:

AM APPLICATIONS:

Applications in design, Applications in Engineering Analysis and Planning

Medical Applications: Customized Implants and Prosthesis, Aerospace applications and Automotive Applications

Other Applications: Jewelry Industry, Coin Industry, Tableware Industry.

TEXT BOOKS:

1. Ian Gibson, David W Rosen, Brent Stucker, “Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing”, Springer 2010.
2. Chuaa Chee Kai, Leong Kah Fai, “Rapid Prototyping: Principles & Applications”, World Scientific, 2010.

REFERENCES:

1. Ali K.Karmani, EmandAbouel Nasr, “Rapid Prototyping: Theory and Practice”, Springer 2006.
2. Andreas Gebhardt, Understanding Additive Manufacture: Rapid Prototyping, Rapid Tooling and Rapid Manufacture, Hanser Publishers, 2013.
3. Hopkinson, N.Haque, and Dickens Rapid Manufacturing: Advanced Research in Virtual and Rapid Prototyping, Taylor and Francis, 2007.

Course outcomes:

The student will be able to:

1. Understand the importance of digital fabrication
2. Identify different techniques involved in two dimensional layering
3. Analyze the software issues involved in digital fabrication and know about extrusion based systems and post processing
4. Apply the knowledge gained in the digital fabrication

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EMBEDDED SYSTEM DESIGN

(Open Elective-IV)

COURSE OBJECTIVES:

The Student will

1. understand the characteristics of embedded systems and application areas.
2. explain the core of embedded system and gain the knowledge of Embedded Software.
3. analyze ARM Cortex processor and its architecture.
4. gain knowledge on software aspects of embedded systems.
5. understand various communication protocols in Embedded Systems.

UNIT-I

The concept of embedded systems design, Embedded microcontroller cores, embedded memories. Examples of embedded systems, quality attributes- Design metrics - challenges. Embedded Hardware: Processor embedded into a system- Processor selection- embedded hardware units and devices.

UNIT-II

Embedded Software: An overview of programming languages- challenges and issues related to embedded software development.

Co-design-development process: Design cycle - Embedded software development tools- Target Machines - Linker/Locators - Embedded Software on Target system -Issues in co-design.

UNIT-III

ARM® Cortex™- M0+ processor: Overview - Architecture - Features- interfaces- configurable options-Modes of operation and Execution and Instruction Set- FRDM KL25Z Architecture - Interfacing of I/O devices with FRDM KL25Z.

UNIT-IV

Software aspects of embedded systems: real time programming languages and operating systems for embedded systems.

Technological aspects of embedded systems: Interfacing between analog and digital blocks, signal conditioning, digital signal processing.

UNIT-V

Communication protocols: Network Embedded Systems- Serial Bus Protocols- Parallel Bus Device Protocols, Parallel Communication Network Using ISA,PCI, PIC-X and Advanced Buses- Internet Enabled Systems, Network protocols- Wireless and Mobile System Protocols.

TEXT BOOKS:

1. Shibu K.V, “Introduction to Embedded Systems”, McGraw Hill.
2.J.W.Valvano, "Embedded Microcomputer System: Real Time Interfacing", Brooks/Cole, 2000.

REFERENCE BOOKS:

1. Raj Kamal, “Embedded Systems”, TMH.
2. Frank Vahid, Tony Givargis, “Embedded System Design”, John Wiley.
3. Lyla, “Embedded Systems”, Pearson, 2013.
4. David E. Simon, “An Embedded Software Primer”, Pearson Education.

COURSE OUTCOMES:

The student will be able to

1. define the characteristics of embedded systems, classification and application areas.
2. obtain knowledge on Embedded software and Co-design development.
3. familiarize the working of ARM Cortex processor.
4. develop knowledge on software aspects of embedded systems.
5. employ various communication protocols in Embedded Systems.

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SOFTWARE DEFINED RADIO

(Open Elective-IV)

COURSE OBJECTIVES:

The Students will:

1. study fundamentals and state of the art concepts in software defined radio.
2. Understand the concepts of Radio Resource Management.
3. Understand the reconfiguration of the network elements.
4. Remember the object oriented representation of radio and network resources.
5. Study of radio resource management in heterogeneous networks.

UNIT -I

Introduction: The Need for Software Radios, What is Software Radio, Characteristics and benefits of software radio- Design Principles of Software Radio, RF Implementation issues the Purpose of RF Front – End, Dynamic Range- The Principal Challenge of Receiver Design. RF Receiver Front- End Topologies- Enhanced Flexibility of the RF Chain with Software Radios- Importance of the Components to Overall Performance- Transmitter Architectures and Their Issues- Noise and Distortion in the RF Chain, ADC and DAC Distortion.

UNIT -II

Profile and Radio Resource Management : Communication Profiles- Introduction, Communication Profiles, Terminal Profile, Service Profile , Network Profile, User Profile, Communication Profile Architecture, Profile Data Structure, XML Structure, Distribution of Profile Data, Access to Profile Data, Management of Communication Profiles, Communication Classmarks, Dynamic Classmarks for Reconfigurable Terminals, Compression and Coding, Meta Profile Data.

UNIT -III

Radio Resource Management in Heterogeneous Networks : Introduction, Definition of Radio Resource Management, Radio Resource Units over RRM Phases, RRM Challenges and Approaches, RRM Modelling and Investigation Approaches, Investigations of JRRM in Heterogeneous Networks, Measuring Gain in the Upper Bound Due to JRRM, Circuit Switched System, Packet-Switched System, Functions and Principles of JRRM, General Architecture of JRRM, Detailed RRM Functions in Sub-Networks and Overall Systems.

UNIT -IV

Reconfiguration of the Network Elements : Introduction, Reconfiguration of Base Stations and Mobile Terminals, Abstract Modelling of Reconfigurable Devices, the Role of Local Intelligence in Reconfiguration, Performance Issues, Classification and Rating of Reconfigurable Hardware, Processing Elements, Connection Elements, Global Interconnect Networks, Hierarchical Interconnect Networks.

Installing a New Configuration, Applying Reconfiguration Strategies, Reconfiguration Based on Comparison, Resource Recycling, Flexible Workload Management at the Physical Layer,

Optimized Reconfiguration, Optimization Parameters and Algorithms, Optimization Algorithms, Specific Reconfiguration Requirements, Reconfiguring Base Stations, Reconfiguring Mobile Terminals.

UNIT -V

Object – Oriented Representation of Radios and Network Resources: Networks- Object Oriented Programming- Object Brokers- Mobile Application Environments- Joint Tactical Radio System.

Case Studies in Software Radio Design: Introduction and Historical Perspective, SPEAK easy-JTRS, Wireless Information Transfer System, SDR-3000 Digital Transceiver Subsystem, Spectrum Ware, CHARIOT.

TEXT BOOKS:

1. Software Defined Radio Architecture System and Functions- Markus Dillinger, Kambiz Madani, WILEY 2003.
2. Software Defined Radio: Enabling Technologies- Walter Tuttle Bee, 2002, Wiley Publications.

REFERENCE BOOKS:

1. Software Radio: A Modern Approach to Radio Engineering - Jeffrey H. Reed, 2002, PEA Publication.
2. Software Defined Radio for 3G - Paul Burns, 2002, Artech House.
3. Software Defined Radio: Architectures, Systems and Functions - Markus Dillinger,Kambiz. Madani, Nancy Alonistioti, 2003, Wiley.
4. Software Radio Architecture: Object Oriented Approaches to wireless System Engineering–Joseph Mitola, III, 2000, John Wiley & Sons.

COURSE OUTCOMES:

The students will be able to:

1. illustrate the design principles of software defined radio.
2. analyze the analog RF components as front end block in implementation of SDR.
3. visualize digital hardware architectures and development methods.
4. familiarize the radio recourse management in heterogeneous networks.
5. remember the object oriented representation of radio and network resources.

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IV Year - II Semester	**3**	**0-0-0**	**3**

E-COMMERCE

(Open Electives-IV**)**

Course objectives:

The Students will :

1. Gain knowledge about the main objective and at the same time need is transaction on your web store. Of, course if you are selling products online what you require are customers. If you are getting good reach ability then your business will definitely grow. Therefore one of the objectives is high reachability.
2. Solve conversions i.e., if people are coming on your web store and purchasing something then it will calculate as conversions and from the number of people who are buying stuff from your web store we can calculate the conversion rate.
3. Provide customer satisfaction i.e., customer is the main part of any e-commerce business so it's very important to make your customer happy and satisfied by providing quality and desirable products, on time delivery, 24*7 customer support, and timely sale & best deal offers you can make your customer happy. It is one of the main objectives of e-commerce.
4. Receive social popularity i.e., unless and until you are not famous and popular among people you cannot establish your brand. Social presence with omni channel and digital marketing is essential for any e-commerce business.
5. Understand the infrastructure for E-Commerce.

UNIT-I:

Introduction, Electronic Commerce Framework, The Anatomy of E-Commerce applications, E-Commerce Business Models.

E-Commerce Consumer applications, E-Commerce organization applications.

UNIT-II:

Consumer Oriented Applications, mercantile process models, mercantile models from the consumer's perspective, Mercantile from the merchant's perspective.

Types of Electronic Payment Systems, Digital Token-Based Electronic Payment Systems, Smart Cards & Electronic Payment Systems, Credit Card- Based Electronic Payment Systems, Risk & Electronic Payment Systems, Designing Electronic Payment Systems.

UNIT-III:

Electronic Data Interchange, EDI Applications in Business, EDI implementation, MIME, and value added networks.

Intra organizational E-Commerce, Macro forces and Internal Commerce, Work flow automation and Coordination, Customization and Internal Commerce, Supply Chain Management(SCM).

UNIT-IV:

Making a business case for a Document Library: Digital document types, Corporate Data warehouses.

Advertising and Marketing: The new age of Information Based Marketing, advertising on Internet, charting the Online marketing process, Market Research.

UNIT-V:

Consumer Search and Resource Discovery, information search and Retrieval, Electronic commerce catalogs or directories, Information Filtering.

Multimedia and Digital video, Key Multimedia concepts, Digital Video & Electronic Commerce, Desktop Video Processing, Desktop Video Conferencing.

Text Books

1. "Frontiers of electronic commerce" – Kalakota, Whinston, Pearson
2. "E-Commerce", S.Jaiswal – Galgotia

References

1. Ravi Kalakota, Andrew Winston, "Frontiers of Electronic Commerce", Addison-Wesley.
2. Goel, Ritendra "E-commerce", New Age International
3. Laudon, "E-Commerce: Business, Technology, Society", Pearson Education

Course outcomes:

The Students will be able to:

1. Demonstrate an understanding of the foundations and importance of e-commerce.
2. Demonstrate an understanding of retailing in e-commerce by:
    a. Analyzing branding and pricing strategies,
    b. Using and determining the effectiveness of market research.
    c. Assessing the effects of disintermediation.
3. Analyze the impact of e-commerce on business models and strategy.
4. Describe internet trading relationships including business-to-business, intra-organizational.
5. Describe the infrastructure for E-Commerce.

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IV Year – II Semester	**3**	**0-0-0**	**3**

BIG DATA ANALYTICS

(Open Elective-IV)

Course objectives:

The Students will :

1. Understand the basics of Big Data and Big data Platform
2. Attain the knowledge of Big Data analytics, Approaches and Tools
3. Describe MapReduce fundamentals and HDFC File system
4. Differentiate between Hadoop and RDBMS concepts
5. Apply analytics on Structured and Unstructured Data.

UNIT-I

Big Data Analytics : What is big data, History of Data Management ; Structuring Big Data ; Elements of Big Data ; Big Data Analytics; Distributed and Parallel Computing for Big Data;

Big Data Analytics:What is Big Data Analytics, What Big Data Analytics Isn't, Why this sudden Hype Around Big Data Analytics, Classification of Analytics, Greatest Challenges that Prevent Business from Capitalizing Big Data; Top Challenges Facing Big Data; Why Big Data Analytics Important; Data Science; Data Scientist; Terminologies used in Big Data Environments; Basically Available Soft State Eventual Consistency (BASE); Open source Analytics Tools

UNIT-II:

Understanding Analytics and Big Data: Comparing Reporting and Analysis, Types of Analytics; Points to Consider during Analysis; Developing an Analytic Team; Understanding Text Analytics;

Analytical Approach and Tools to Analyze Data: Analytical Approaches; History of Analytical Tools; Introducing Popular Analytical Tools; Comparing Various Analytical Tools.

UNIT-III:

Understanding MapReduce Fundamentals and HBase : The MapReduce Framework; Techniques to Optimize MapReduce Jobs; Uses of MapReduce; Role of HBase in Big Data Processing; Storing Data in Hadoop

Introduction of HDFS: Architecture, HDFC Files, File system types, commands, org.apache.hadoop.io package, HDF, HDFS High Availability; Introducing HBase, Architecture, Storing Big Data with HBase , Interacting with the Hadoop Ecosystem; HBase in Operations-Programming with HBase; Installation, Combining HBase and HDFS

UNIT-IV:

Big Data Technology Landscape and Hadoop : NoSQL, Hadoop; RDBMS versus Hadoop; Distributed Computing Challenges; History of Hadoop; Hadoop Overview; Use Case of Hadoop; Hadoop Distributors;

HDFC (Hadoop Distributed File System): HDFC Daemons, read,write, Replica Processing of Data with Hadoop; Managing Resources and Applications with Hadoop YARN

UNIT-V:

Social Media Analytics and Text Mining: Introducing Social Media; Key elements of Social Media; Text mining; Understanding Text Mining Process; Sentiment Analysis, Performing Social Media Analytics and Opinion Mining on Tweets;
Mobile Analytics: Introducing Mobile Analytics; Define Mobile Analytics; Mobile Analytics and Web Analytics; Types of Results from Mobile Analytics; Types of Applications for Mobile Analytics; Introducing Mobile Analytics Tools

TEXT BOOKS:

1. BIG DATA and ANALYTICS, Seema Acharya, Subhasinin Chellappan, Wiley publications.
2. BIG DATA, Black Book™ , DreamTech Press, 2015 Edition.
3. BUSINESS ANALYTICS 5e , BY Albright |Winston

REFERENCE BOOKS:

1. Rajiv Sabherwal, Irma Becerra- Fernandez," Business Intelligence –Practice, Technologies and Management", John Wiley 2011.
2. Lariss T. Moss,ShakuAtre, " Business Intelligence Roadmap", Addison-Wesley It Service.
3. Yuli Vasiliev, " Oracle Business Intelligence : The Condensed Guide to Analysis and Reporting", SPD Shroff, 2012

Course Outcomes:
The Students will be able to:

1. Know the basics of Big Data and its environment
2. Achieve the knowledge of Big Data analytics Tools and its Approaches
3. Define MapReduce fundamentals and HDFC Architecture
4. Distinguish between Hadoop and RDBMS concepts
5. Illustrate analytics on Structured and Unstructured Data.

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IV Year II- Semester	**3**	**0-0-0**	**3**

COMPUTER FORENSICS
(Open Elective-IV)

Course objectives:

The Students will :

1. Understand Computer forensics fundamentals.
2. Analyze various computer forensics technologies.
3. Know the principles of effective digital forensics investigation techniques.
4. Identify methods for data recovery.
5. Understand the methods for preservation of digital evidence.

UNIT I

Computer Forensics Fundamentals: What is Computer Forensics? Use of Computer Forensics in Law Enforcement, Computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources/Employment Proceedings, Computer Forensics Services, Benefits of professional Forensics Methodology, Steps taken by computer Forensics Specialists.

Types of Computer Forensics Technology: Types of Military Computer Forensics Technology, Types of Law Enforcement - Computer Forensic Technology - Types of Business Computer Forensics Technology. Computer Forensics Evidence and Capture: Data Recovery Defined- Data Back-up and Recovery- The Role of Back-up in Data Recovery- The Data Recovery Solution.

UNIT II

Evidence Collection and Data Seizure: Why Collection Evidence? Collection Options – Obstacles – Types of Evidence – The Rules of Evidence- Volatile Evidence- General Procedure – Collection and Archiving – Methods of Collection – Artifacts – Collection Steps – Controlling Contamination: The chain of Custody.

Duplication and preservation of Digital Evidence: Preserving the Digital Crime Scene – Computer Evidence Processing Steps – Legal Aspects of Collecting Preserving Computer Forensics Evidence. Computer Image Verification and Authentication: Special Needs of Evidential Authentication – Practical Consideration – Practical Implementation.

UNIT III

Computer Forensics analysis and validation: Determining what data to collect and analyze, validating forensic data, addressing data – hiding techniques, performing remote acquisitions.

Network Forensics: Network Forensics overview, performing live acquisitions, developing standard procedures for network forensics, using network tools, examining the honey net project.

UNIT IV

Processing crime and incident scenes: Identifying digital evidence, collecting evidence in private-sector incident scenes, processing law enforcement crime scenes, preparing for a

search, securing a computer incident or crime scene, seizing digital evidence at the scene, storing digital evidence, obtaining a digital hash, reviewing a case.
Current computer forensic tools: evaluating computer forensic tool needs, computer forensics software tools, computer forensics hardware tools, validating and testing forensics software.

UNIT V

E-Mail investigations: Exploring the role of E-mail in investigation, exploring the role of the client and server in E-mail, investigating e-mail crimes and violations, understanding e-mail servers, using specialized e-mail forensic tools.
Cell phone and mobile device forensics: Understanding mobile device forensics, understanding acquisition procedures for cell phones and mobile devices.
Working with windows and DOS Systems: Understanding file systems, exploring Microsoft File Structures, Examining NTFS Disks, Understanding whole disk encryption, windows registry, Microsoft startup tasks, MS-DOS Startup tasks, virtual machines.

TEXT BOOKS

1. Computer forensics, computer crime investigation by John R.Vacca, Firewall Media, New Delhi.
2. Computer forensics and investigations by Nelson, Phillips Enfinger Steuart, CENGAGE Learning.

REFERENCE BOOKS

1. Real Digital Forensics by Keith J.Jones, Rechard Bejtlich, Curtis W.Rose, Addison-Wesley Pearson Education.
2. Forensic compiling, A Tractitioneris Guide By Tony Sammes and Brain Jenkinson, Springer International Edition.
3. Computer Evidence Collection & Presentation by Christopher L.T.Brown, Firewall Media.

Course Outcomes:

The Students will be able to:

1. Utilize a systematic approach to computer investigations, various forensic tools, and collect digital evidence.
2. Perform digital forensics analysis upon Windows, MAC and LINUX operating systems, email investigations.
3. Analyze and carve image files both logical and physical
4. Explain guidelines for investigation reporting.
5. Apply the implications of anti-forensics to the digital forensics investigator

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IV Year - II Semester	**3**	**0-0-0**	**3**

E-DISASTER MANAGEMENT
(Open Elective-IV)

Course Objectives

The Students will :

1. Explain various disasters and their impacts.
2. Describe storage networking technologies such as FC-SAN, NAS, IP-SAN and data archival solution – CAS.
3. Identify different storage virtualization technologies and their benefits.
4. Understand and articulate business continuity solutions including, backup technologies, and local and remote replication.
5. Identify parameters of managing and monitoring storage infrastructure and describe common storage management activities and solutions.

UNIT - I:

Introduction to Disasters: Information Availability, Causes of Information Unavailability, Measuring Information Availability.

Consequences of Downtime; Failure Analysis, Single Point of Failure, Fault Tolerance, Multipathing Software.

UNIT II:

Backup and Recovery: Backup Purpose, Backup Considerations, Backup Granularity, Recovery Considerations.

Backup Methods, Backup Process, Backup and Restore Operations, Backup Topologies, Backup in NAS Environments, Backup Technologies.

UNIT - III:

Local Replication: Source and Target, Uses of Local Replica, Data Consistency, Local Replication Technologies, Restore and Restart Considerations Creating Multiple Replicas, Management Interface.

Remote Replication: Modes of Remote Replication, Remote Replication Technologies Network Infrastructure.

UNIT - IV:

Securing the Storage Infrastructure: Storage Security Framework, Risk Triad, Assets, Threats, Vulnerability. Storage Security Domains, Securing the Application Access Domain. Securing the Management Access Domain, Securing Backup, Recovery, and Archive (BURA) , Security Implementations in Storage Networking SAN , NAS, IP SAN.

UNIT - V:

Monitoring the Storage Infrastructure: Parameters Monitored, Components Monitored , Monitoring Examples , Alerts, Storage Management Activities , Availability management , Capacity management , Performance management ,Security Management.

Reporting, Storage Management Examples, Storage Infrastructure Management Challenges, Developing an Ideal Solution, Storage Management Initiative, Enterprise Management Platforms.

Text Books:

1. Information Storage and Management: Storing, Managing, and Protecting Digital Information, Ganesh Rajaratnam,EMC Education Services. Wiley Publications.
2. Executive Guide to Preventing Information Technology Disasters By Richard Ennals. Springer.

Reference Books:

1. Information Management & Computer Security, Port Elizabeth Technikon, Port Elizabeth, MCB UP Ltd.
2. Information Security Management Systems, Godesberger Allee, BSI.

Course Outcomes

The Students will be able to:

1. Apply important storage technologies and their features such as availability, replication, scalability and performance.
2. Show employs project teams to install, administer and upgrade popular storage solutions.
3. Illustrate virtual servers and storage between remote locations.
4. Use the knowledge of Disaster Management Phases.
5. Implement the parameters of managing and monitoring storage infrastructure and describe common storage management activities and solutions.

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INTRODUCTION TO NEURAL NETWORKS
Open Elective - IV

Course Objectives:
The Students will learn:

1. Understand the differences and similarities neural network, human brain and feedback systems
2. Learn the different learning techniques
3. Familiar with the concept of single layer perceptron and its algorithms.
4. Familiar with the concept of multilayer perceptron and its algorithms
5. Know the self-organisation mapping techniques.

UNIT–I:
Introduction: What is a neural network? Human Brain, Models of a Neuron, Neural networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks.

UNIT–II:
Learning Process: Error Correction learning, Memory based learning, Hebbian learning, Competitive, Boltzmann learning, Credit Assignment Problem, Memory, Adaption, Statistical nature of the learning process.

UNIT–III:
Single layer perceptron's: Adaptive filtering problem, Unconstrained Organization Techniques, Linear least square filters, least mean square algorithm, learning curves, Learning rate annealing techniques, perception-convergence theorem, Relation between perception and Bayes classifier foe a Gaussian Environment.

UNIT–IV:
Multilayer Perceptron's: Back propagation algorithm XOR problem, Heuristics, Output representation and decision rule, computer experiment, feature detection.

UNIT-V:
Self –Organization Maps: Two basic feature mapping models, Self-Organization maps, SOM algorithm.

Hopfield models: Hopfield models, computer experiment.

Text Books:

1. Neural networks A comprehensive foundation, Simon Hhaykin, PHI edition.
2. Artificial neural networks-B.Vegnanarayana Prentice Halll of India P Ltd 2005.

References:

1. Neural networks in Computer intelligence, Li Min Fu TMH 2003.
2. Neural networks James A Freeman David M S kapurapearson education 2004.

Course Outcomes:

The Students will be able to:

1. Know differences and similarities between neural network, human brain and feedback systems
2. Get the knowledge of different learning techniques
3. Describe the concept of single layer perceptron and its algorithms.
4. Describe the concept of multilayer perceptron and its algorithms.
5. Analyse the self-organisation mapping techniques.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY

UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
IV Year - II Semester	**3**	**0-0-0**	**3**

INTRODUCTION TO MINE ENVIRONMENT

(OPEN ELECTIVE IV)

COURSE OBJECTIVES:

The Students will:

1. introduce about atmospheric, mine air & their limitations
2. acquaint with spontaneous heating and explosions in coal mines
3. get idea about sources of dust, and its control in mines
4. get idea about miners' diseases & lighting in mines
5. know about reclamation of mines, impact of mining on environment & sustainable mining

UNIT-I:

Atmosphere and mine air composition. Origin of gases, properties, limitations of gases in underground mines

UNIT-II:

Spontaneous Combustion: Factors, control measures.

Explosions: Causes of firedamp explosion, preventive measures against firedamp explosion.

UNIT-III:

Dust: Sources in underground and opencast mines, standards and control measures.

UNIT-IV:

Miners diseases, Lighting standards in underground and opencast mines**.**

UNIT-V:

Reclamation, plantation of surface mines, Impact of mining on environment & sustainable mining.

TEXTBOOKS:

1. Elements of Mining Technology (VOL-2) – by D.J. Deshmukh.
2. Surface Mining – by S.K. Das.

REFERENCE BOOKS:

1. Mine Ventilation – by G.B. Mishra.

COURSE OUTCOMES:

The student will be able to:

1. Learn about atmospheric and mine air
2. Learn about spontaneous combustion and explosion in coal mines
3. Understand about dust sources and its control in mines
4. Learn about miners' diseases, mine lighting and its standards
5. Learn about reclamation of mines, impacts of mining on environment and sustainable mining