ECE 3.1 APPLIED MATHEMATICS III

MODULE I

Matrices: Types of matrices, Determinant, adjoint, inverse of matrix, elementary transformation, (2Hrs)

Elementary matrices, Rank of matrix, Reduction to normal form, canonical form. (3Hrs)

Rank using elementary transformation, Linear independence end dependence. (2Hrs)

System of the form AX=0 and AX=B, their solutions. (3Hrs)

MODULE II

Eigen values, Eigen vectors with properties. (2Hrs)

Cayley Hamilton theorem with Applications. Minimal polynomial, Diagonalisation. (3Hrs)

Fourier Series: Fourier Series, Fourier series of Periodic functions, Trigonometric Series, Euler's formulas, Dirichlets condition, Even and Odd functions, Half range series, Parseval's Identity. (5Hrs)

MODULE III

Laplace Transforms: Definition, Existence condition, Properties (3Hrs)

Inverse Laplace Transform. Laplace Transform of periodic functions, Convolution theorem, Laplace Transform of Dirac-Delta function. (5Hrs)

Applications of Laplace Transform in solving linear differential equations with initial conditions and system of linear simultaneous differential equations. (2Hrs)

MODULE IV

Fourier Transforms: Properties, Inverse Fourier Transform, convolution, Applications. (5Hrs)

Z- Transforms: Properties, inverse, convolution and applications to deference equations. Wave equation- derivation and solution using separation of variable method. (5Hrs)

TEXT BOOKS:

1.Higher Engineering Mathematics by B.S.Grewal, Khanna Publications
2.Advanced Engineering Mathematics: Erusing Kreyszig, New International Ltd

REFERENCE BOOKS:

1.Theory and Problems of Matrices: Fraank Ayres, Schaum Outline Series
2.Signals and DSP: Xavier, S. Chand Publication
3.Matrix and Linear Algebra: Datta K.B., PHI
4.Engineering Mathematics Vol III: Kandasamy P, S. Chand & Co.
5.Advanced Engineering Mathematics: H. K. Dass, S. Chand

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ECE 3.2 DIGITAL SYSTEM DESIGN

MODULE I

Number Systems & Codes:
Decimal, Binary, Hexadecimal, Octal systems; Interconversions, Signed & Unsigned Binary numbers, Complements, Binary Arithmetic: Addition & Subtraction using 1's & 2's complements (2Hrs)

Binary Codes-Decimal codes (BCD, Excess-3, 8421, 2421), Error Detection codes (Parity generation & Detection), Reflected code, Alphanumeric codes (EBCDIC, ASCII), Study of Binary logic with logic gates. (2Hrs)

Boolean Algebra:
Postulates & Theorems, Boolean functions and their Algebraic manipulation, Canonical & Standard forms, Minterms & Maxterms. (3Hrs)

Simplification of Boolean functions: K-maps, POS & SOP simplification and their interconversions, NAND & NOR implementation, Plotting & Reading of K-map using VEM. (3Hrs)

MODULE II

Combinational Logic:
Design Procedure for Combinational logic circuits, Design & Analysis of Adder, Subtractor, Code Conversion, (2Hrs)

Binary Parallel Adder, Look-ahead Carry generator, Decimal Adder (BCD Adder), Magnitude Comparator, Decoders, (2Hrs)

Combinational logic implementation, Demultiplexers, Encoders, Multiplexers, Boolean function implementation with multiplexers. (2Hrs)

Flip-flops: Basic flip-flop circuit, Clocked RS flip-flop, D flip-flop, JK flip-flop, T flip-flop, Triggering of flip-flops, Master Slave flip-flop, Edge triggered flip-flops: their schematic symbols, truth table & Excitation table. (4Hrs)

MODULE III

Sequential Circuits: Design procedure for sequential circuits using state diagrams, (1Hr)

State table, state equations, state reduction and assignment, Circuit implementation, (2Hrs)

Moore & Mealy Machine. (1 Hr)

Design and analysis of counters, Modulo Counters, Synchronous, Ripple and ring counters (Switch tail, Johnson), Application of counters, Timing Sequences, Word time generation, timing signals. (3Hrs)

Registers: SISO, SIPO, PISO, PIPO, Register with parallel load, Shift registers, Bidirectional shift register with parallel load. (3Hrs)

MODULE IV

Digital Logic families:
Characteristics of Digital ICs, RTL, DTL, (2Hrs)

TTL-Operation of TTL NAND gate, Active pull-up, Open Collector output, Wired AND, three state (or tri- state) output, Schottky TTL, ECL, I^2L. (4Hrs)

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Characteristics of MOSFET's, CMOS Inverter, NAND and NOR, CMOS to TTL and TTL to CMOS interfacing. (1 Hr)

Noise Considerations: Types of Noise and Control methods, Shielding, Grounding and Decoupling, Crosstalk. (Refer Reference book:5) (1 Hr)

Memories:-Memory organization and operation: Write operation, read operation. Expanding memory size: Expanding Word size, Expanding Word Capacity, Basic concepts of RAM, ROM. (2Hrs)

TEXT BOOKS:

1. M. Morris Mano, Digital Logic and Computer Design.-PHI
2. Tocci, Digital Systems-Principles & Applications-PHI

REFERENCE BOOKS:

1. William Fletcher, An Engineering Approach to Digital Design-PHI
2. M. Morris Mano, Digital Design-PHI
3. Malvino & Leach, Digital Principles & Applications-Tata McGraw-Hill
4. Thomas Floyd, Digital Fundamentals-UBS Publishers & Distributors
5. Designing with TTL integrated circuits by Robert Morris & John Miller

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ECE 3.3 NETWORK ANALYSIS AND SYNTHESIS

MODULE I

Network classification: Distributed and lumped, passive and active, time variable and time invariant, symmetrical and asymmetrical networks. Network analysis: Mesh and nodal analysis; super-node and super-mesh analysis (3Hrs)

T-Pi and Pi-T, conversions, Network theorems: Review of Thevenin's, Norton's, Superposition, Millman's Theorem (4Hrs)

Compensation,Reciprocity Tellgen's, Substitution, Superposition and Maximum power transfer Theorems. (3Hrs)

MODULE II

Graph theory: Basic definitions, matrices associated with networks graphs: Incidence, Cutset, Tieset Matrices and Duality. Applications to Mesh & Nodal Analysis. (4Hrs)

Time-Domain Analysis: Network equations in time-domain, first and second-order circuits, initial conditions, analysis of transient and steady state response to step, ramp, impulse and sinusoidal inputs. (3Hrs)

Application of Laplace Transform to analysis of networks for different inputs (impulse, step, ramp and sinusoidal) (3Hrs)

MODULE III

Resonance: Series resonance- Band Width, selectivity and Q-factor of resonance circuits. (3Hrs)

Parallel resonance- Band Width, selectivity and Q-factor of resonance circuits. (3Hrs)

Two port networks: Characterisation in terms of Z, Y, H and ABCD parameters, Equivalent circuits, inter- relationship between the two port parameters; Input, output, characteristic impedance and image impedances of two ports. (4Hrs)

MODULE IV

Attenuators and filters: Symmetrical and unsymmetrical, balanced and unbalanced attenuators; analysis and design of T, Pi, Lattice and Bridged-T attenuator. Types of filters-Low pass, high pass, band pass and band elimination filter. (4Hrs)

Basics of Butterworth, Chebyshev, Inverse Chebyshev and Elleptic approximations. (3Hrs)

Elements of network synthesis: Positive-real functions, Reactance functions, RL and RC functions (Foster method and Caver Method) (3Hrs)

TEXT BOOKS:

1. Franklin F. Chuo, Network Analysis And Synthesis, Wiley Eastern
2. Circuits and networks – Sudhakar & Shyamohan
3. Networks & Systems – Roy Choudhary

REFERENCE BOOKS:

1.N. Balabanian, T.A. Bichkart and Sundaran Seshu- Electric Network Theory, Wiley &sons
2.L. O. Chau, C.A. Desoer and E.S. Kuyh, Linear and Non-linear Circuits, McGraw Hill International,1987
3.M.E. Vanvalkenbarg, Network Analysis, Prentice (I) Ltd.
4.L.O Chau, C.A. Desoer, E.S Kuh, Linear and Nonlinear Circuits, McGraw Hill International edition,.1987

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ECE 3.4 ELECTRONIC DEVICES & CIRCUITS

MODULE I

Filters: Design of C, L and LC types. Zener Voltage Regulators: (2Hrs)

Modeling of BJT: h-parameter and re model for all biasing circuits, Miller's theorem. (3Hrs)

Multistage amplifiers-direct, RC-coupled and transformer coupled, Darlington pair, Cascade, Cascode. (3Hrs)

Large signal amplifiers: Class A,B,C,D (derivation for efficiency), complementary symmetry and push-pull amplifiers. (2Hrs)

MODULE II

Steady state response of RC differentiator & integrating circuits to square wave, BJT as a switch, Junction & Diffusion Capacitance of a BJT , Improving switching times, (3Hrs)

Analysis & Design of Basic BJT Monostable Multivibrator, (2Hrs)

BJT Bistable Multivibrator, (1 Hr)

BJT Astable Multivibrator, (1 Hr)

BJT Schmitt trigger. (1 Hr)

Sampling gates: UJT, JFET and MOSFET Sampling gate, Sample & Hold circuits. Transistor bootstrap ramp generator. (2Hrs)

MODULE III

Principle of negative feedback in electronic circuits, Voltage series, Voltage shunt, current series, current shunt types of negative feedback, (2Hrs)

Typical transistor circuits effects of negative feedback on input & output impedance, voltage & current gains, Bandwidth, Noise & Distortion. (3Hrs)

Principle of positive feedback, concept of stability in electronic circuits, Barkhausen criteria for oscillations, (1 Hr)

various types of oscillators-RC, Clapps, Wein Bridge, Colpitt, Hartley, Tuned LC, (3Hrs)

UJT Relaxation oscillator, Crystal Oscillators (Working and Derivation of frequency of oscillation) (1 Hr)

MODULE IV

Intrinsic & Extrinsic Semiconductors, types of doping & its effect on properties of Semiconductors, Diffusion, Mass-action law, Graded Semiconductors. (2Hrs)

Conduction mechanism in Semiconductors, Carrier density and conductivity of intrinsic Semiconductors, Drift & Diffusion currents, hall effect, Continuity equation, Qualitative treatment of pn junction diode. (3Hrs)

Superconductivity: Meissner effect, Single particle tunneling, Josephson Superconductor. (2Hrs)

Introduction to MEMS: Materials, Application ; Introduction to Nanotechnology: Materials, Application. (3Hrs)

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TEXT BOOKS :

1. Electronic Devices and circuits – Milliman and Halkias – McGraw Hill Publications
2. Solid State Electronic Devices – B.G. Streetman – PHI

REFERENCE BOOKS:

1.Physics of Semiconductor Devices by S.M.Sze - Wiley Publication
2.Electronic Devices & Linear circuits by Garud & Jain. (Tata McGraw Hill)
3.Electronic Devices and Circuit Theory – Robert Boylestead and Louis Nashelsky – PHI Publications
4.Solid State Pulse Circuits by David Bell.
5.Electronic Devices and Circuits – Allen Mottershed – PHI Publications
6.Electrical Engineering materials – A.J. Dekkar – PHI
7.Introduction to Solid State physics by Charles Kittel.- Wiley Publication
8.Nanoelectronics & Nanosystems by Glosekotter-Denstube
9.Tai-Ran Hsu, MEMS & Microsystems: Design and Manufacture. McGraw Hill, New York, 2002.
10.Nadim Maluf, An Introduction to Microelectromechanical Systems Engineering, Artech House 2000.

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ECE3.5 MANAGERIAL ECONOMICS

MODULE I

Introduction and general concepts :Demand and supply – Demand curve, Equilibrium, Aggregate Supply and Demand. (2Hrs)

National Income terms-GDP, Real v/s Nominal GDP, Net Domestic Product, GNP, National Income, Per capita income, Disposable Income,Price Index, (2Hrs)

Inflation (1 Hr)

Exchange Rates – Pure, flexible, Terminology for Exchange rate changes, Forex market, Exchange rate systems. (2Hrs)

Individual, firm and Market Demand and Supply, Price, Income and Cross Elasticity Applications of Elasticity, Estimation/forecasting of Demand. (2Hrs)

Pricing of multiple Products, Price Discrimination, Cost plus pricing, Market driven pricing decisions (1 Hr)

MODULE II

Costing And Financial Analysis: Break even Analysis, Basic Concepts-Contribution Cost, Break-even Volume, break-even revenue. (2Hrs)

Preparation of Income statement, Balance sheet, fund Flow statement, (2Hrs)

Understanding and analyzing them using financial ratios. Ratio Analysis Liquidity, Leverage and Profitability ratios (2Hrs)

Working Capital Management-Determinants of working capital, Financing of working Capital, Dangers of Excessive and shortage of working Capital (1 Hr)

Inviting investment proposals, Selection of project proposals. Capital Rationing, different Methods of Evaluation of Project-Payback Period. Accounting rate of return. Discounted cash Flow Methods – Net Present Value, Internal Rate of return, Profitability Index (2Hrs)

Sources of funds for Business-Share capital, Debentures, Loans (1 Hr)

MODULE III

General Principles Of Management: Different schools of Management, effectiveness, efficiency, Productivity, functions of Managers, (2Hrs)

Planning, Types of plans.Nature of Objectives, MBO, Merits and Demerits of MBO.Organisation, Purpose, Span of management, (2Hrs)

Departmentation, Structure of Organisation, O. D. Process, Organisational culture, values. Matrix Organisation, Unity of command, SBU, line and staff function, (3Hrs)

Decentralization, Advantages, Limitations, Marketing Mix, Advertisement, Sale Promotion, Sales Management and Training, Market Research –Tools, Methods, Analysis (3Hrs)

MODULE IV

Managing People: Motivation, Theories of Motivation, Maslow's Theory of Needs, Herzberg's Theory, Vroom's expectancy theory, Managing Creative Staff. (2Hrs)

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Leadership, leadership styles and behaviors. Human Resource Management, Staffing, Skills needed by Mangers, Recruitment and Selection, Appraisal Methods, (4Hrs)

Nature of Communication, Basic communication Process, Barriers in Communication, Guidelines for improved communication, Informal and formal communication, Principles of Effective communication (2Hrs)

Controlling, steps in Basic control process, Importance of Standards. (2Hrs)

TEXT BOOKS :

1. Varshney &Maheswari, Managerial Economics
2. Koontz, Harold and Weihrich Heinz, Essentials of Management, Tata McGraw Hill, New Delhi, 1998
3. Peterson, Lewis, Managerial Economics, Prentice-Hall

REFERENCE BOOKS:

1. Samuelson P.A., Economics, McGraw – Hill, 1998
2. Stoner, James, Freeman, Edward R. and Gilbert, Daniel R., Management, Prentice Hall, New Delhi, 1999
3. Hicks, Phillip E., Industrial Engineering and Management, McGraw Hill, New York,2994
4. Riggs, Bedworth, Randhawa, engineering Economics, Tata McGraw Hill.
5. Sepulveda, Schaum's Outlines.
6. Homgren, Datar, foster, Cost Accounting, Prentice – Hall.
7. Nellis, Parker, Essence of Business Economics

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ECE 3.6 INTRODUCTION TO JAVA

Course Objectives (Module wise):

Module I:

To teach about the evolution of Java , its environment, JVM, implementation of simple Java Programs and to introduce the elements of the object oriented paradigm.

Module II:

To teach about arrays, strings, vectors, interfaces and packaging by putting classes together

Module III:

To teach about thread programming, error handling and Applet programming

Module IV:

To teach about graphics programming and files handling in Java

Instructional Objectives:

To create solutions that meet the contemporary expectations, learning a portable, reliable and easy to use language like Java is essential. The objective thus is to teach the students this popular language on which a large number of applications are built for various platforms including desktop, web and mobile.

ECE 3.6 INTRODUCTION TO JAVA

MODULE I

Java Evolution
Java history, Java features, How Java differs from C and C++, Java and Internet, Java and World Wide Web, Web Browsers, Hardware and Software Requirements, Java Support Systems, Java Environment (2Hrs)

Overview of Java Language
Introduction, Simple java Program, More of Java, An Application with Two Classes, Java Program Structure, Java Tokens, Java Statements, Implementing a Java Program, Java Virtual Machine, Command Line Arguments, Programming Style. (3Hrs)

Classes, Objects and Methods
Introduction, Defining a Class, Fields Declaration, Methods Declaration, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, Nesting of Methods, Inheritance:Extending a class, Overriding Methods, Final Variables and Methods, Final Classes, Finalizer Methods, Abstract Methods and classes, Methods with Varargs, Visibility Control (5Hrs)

MODULE II

Arrays, Strings and Vectors
Introduction, One-dimensional Arrays, Creating an Array, Two-dimensional arrays, Strings, Vectors, Wrapper Classes, Enumerated Types, Annotations (2Hrs)

Interfaces: Multiple Inheritance
Introduction, Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface Variables (3Hrs)

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Packages: Putting Classes Together
Introduction, Java API Packages, Using System Packages, Naming Conventions, Creating Packages, Accessing a Package, Using a Package, Adding a class to a Package, Hiding Classes, Static Import (5Hrs)

MODULE III

Multithreaded Programming
Introduction, Creating Threads, Extending the Thread Class, Stopping and Blocking a Thread, Life Cycle of a Thread, Using Thread Methods, Thread Exceptions, Thread Priority, Synchronization, Implementing the 'Runnable' Interface, Inter-thread Communication (4Hrs)

Managing Errors and Exceptions
Introduction, Types of Errors, Exceptions, Syntax of Exception Handling Code, Multiple Catch Statements, Using Finally Statement, Throwing our own Exceptions, Using Exceptions for Debugging (4Hrs)

Applet Programming
Introduction, How Applets Differ from Applications, Preparing to Write Applets, Building Applet Code, Applet Life Cycle, Creating an Executable Applet. (2Hrs)

MODULE IV

Graphics Programming
Introduction, The Graphics Class, Lines and Rectangles, Circles and Ellipses, Drawing Arcs, Drawing Polygons, Line Graphs, Using Control Loops in Applets, Drawing Bar Charts, Introduction to AWT Package, Introduction to Swings. (5Hrs)

Managing Input / Output Files in Java
Introduction, Concepts of Streams, Stream Classes, Byte Stream Classes, Character Stream Classes, Using Streams, Other Useful I/O Classes, Using the File Class, Input /Output Exceptions, Creation of Files, Reading/Writing Characters, Reading/Writing Bytes, Handling Primitive Data Types, Concatenating and Buffering Files, Random Access Files, Interactive Input and Output, Other Stream Classes (5Hrs)

TEXT BOOK :
1. Programming with Java – A Primer, Fourth Edition by E. Balagurusamy

REFERENCE BOOKS:
1. Introductory Java by David Parsons
2. Introduction to JAVA Programming – Y. Daniel Liang, 6th Edition, Pearson Education, 2007
3. Java - The Complete Reference – Herbert Schildt, 7th Edition, Tata McGraw Hill, 2007

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ECE 4.1 APPLIED MATHEMATICS IV

MODULE I

Bessel's and Legendre's equations and their solutions, (3Hrs)

Bessel's functions of first kind and second kind. Recurrence relations for Bessel's functions of first kind and applications. (2Hrs)

Orthogonality for Bessel's functions and Bessel's Fourier series. (2Hrs)

Generating functions for Bessel's functions. Relation between Laplace equation and Bessel's equation. (3Hrs)

MODULE II

Series solution for Legendre's equation and Legendre's polynomials, (3Hrs)

Recurrence relations for Legendre's polynomials and Orthogonality for Legendre's polynomials. (3Hrs)

Legendre Fourier Series expansion. Relation between Laplace equation and Legendre equation. (4Hrs)

MODULE III

Complex Integration, Cauchy's Integral theorem and its application. (4Hrs)

Integral formula for simply and multiply connected domains and its applications. (2Hrs)

Taylors and Laurents Series and their application. Singular points. (4Hrs)

MODULE IV

Liouvilles theorem with applications.Residue theorem and applications. (4Hrs)

Contour Integration. Boundary value problems. (4Hrs)

Derivation and solution of one dimensional heat equation using separation of variable method. (2Hrs)

TEXT BOOKS:
1.Engineering Mathematics by B.S.Grewal
2.Complex Variables and Its applications by Churchill and Brown

REFERENCE BOOKS:
1.Complex Analysis by Schaum Series
2.Special Functions by K.P.Gupta
3.Complex Variables (Theory and Applications): H.S.Kasana, PHI

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ECE 4.2 SIGNALS AND SYSTEMS

MODULE I

Introduction:
Definitions and concept of different types of signals; continuous time and discrete time signals; transformation of independent variable; exponent ional and sinusoidal signal; unit impulse and unit step functions. (5Hrs)

Systems: continuous time and discrete time system and basic system properties. MATLAB programs. Linear time invariant (LTI) systems: Introduction: Discrete time LTI system; the convolution sum; continuous time LTI systems; the convolution integral; properties of LTI systems. MATLAB programs. (5Hrs)

MODULE II

Fourier series: introduction; response of LTI system to complex exponential; Fourier series representation of continuous-time periodic signals; convergence of the Fourier series; properties (5Hrs)

Fourier series representation of discrete time periodic signals; properties of discrete- time Fourier series MATLAB programs. (5Hrs)

MODULE III

Continuous-time Fourier transform: Representation of periodic signals: Fourier transform of periodic signals and their properties; convolution property; multiplication property. MATLAB programs. (3Hrs)

Discrete- time Fourier transform: Representation of a periodic signals; Fourier transform for periodic signals; properties; convolution property; multiplication property. (4Hrs)

Sampling:
Introduction; representation of continuous time signals by its samples; sampling theorem; reconstruction of a signal from its samples using interpolation; the effects of under sampling; aliasing; Discrete-time processing of continuous-time signals; sampling of discrete- time signals; Mat lab exercises. (3Hrs)

MODULE IV

The Laplace transform: introduction; laplace transforms; the region of convergence; inverse laplace transform; Analysis and characterization of LTI system using the laplace transform. Unilateral laplacetransforms. MATLAB programs. (5Hrs)

The Z-transform: introduction; Z-transform; the region of convergence; the inverse Z-transform; properties of Z-transform; analysis and characterization of LTI system using Z-transforms. (5Hrs)

TEXT BOOKS:
1.Alan V Oppenheim,A.S.Willsky,Signals and systems,PHI

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REFERENCE BOOKS:

1.Simon Haykins , Signals and Systems
2.Salivahanan s, Vallavaraj. A.and Gnanapriya c,Digital signal processing,Tata McGraw Hill
3.Nagrath, I.J.sharan,Rajan R.And Kumar,S, Signal and systems,Tata McGraw Hill
4.Ziemer,R.E.Trantor,W.H.and Fannin, D.R.Signal and Systems,Pearson education, Asia.

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ECE 4.3 ELECTRICAL TECHNOLOGY

MODULE I

DC generator: - Principle, types of generators and EMF equation. (2Hrs)

DC motor:- Principle, voltage equation- illustrative examples, torque equation- illustrative examples, motor characteristics, speed control- illustrative examples, losses- illustrative examples, starters- three point starter. (4Hrs)

Three phase induction motors:- Principle, construction, slip- illustrative examples, starting torque- illustrative examples, torque under running condition- illustrative examples, torque slip characteristics, starting- illustrative examples and speed control. (4Hrs)

MODULE II

Single phase induction motors: - working of resistance start, capacitor start, capacitor start capacitor run, permanent capacitor single phase induction motors. (3Hrs)

Stepper motors: - operation of permanent magnet stepper motor, variable reluctance stepper motor, hybrid stepper motor. (2Hrs)

Synchros: - construction, principle of operation. (2Hrs)

Servomotor: - DC servomotor, Two phase AC servomotor. (1Hr)

Drives: - concept of an electric drives, four quadrant diagram of speed torque characteristics, classification and application of drives, braking of DC motors. (2Hrs)

MODULE III

DC potentiometers: - Slide wire potentiometer- illustrative examples, Crompton's potentiometer, applications. (3Hrs)

AC potentiometer: - Drysdale's polar potentiometer. (2Hrs)

Electrodynamometer type wattmeter: - construction, operation, torque equation. (2Hrs)

Energy meter: - construction, working, torque equation- illustrative examples. (2Hrs)

Current transformer: - use of CT for current measurement, relationships in a CT- illustrative examples, errors. (1Hr)

MODULE IV

AC bridges: - Maxwell's inductance bridge, Maxwell's inductance capacitance bridge, Hay's bridge, Owen's bridge, Schering's bridge, Wein's bridge-illustrative examples on all above mentioned bridges and Wagner's earthing device. (5Hrs)

Illumination: - Definitions, Law of Inverse squares, Lambert's cosine law- illustrative examples. (2Hrs)

Electric heating: - principle of resistance heating, high frequency eddy current heating, dielectric heating. (1Hr)

Introduction to power systems: - introduction to generation of electrical energy, hydal power plant, thermal power plant, nuclear power plant. Typical AC electrical power system. (2Hrs)

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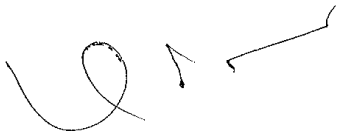
1. A textbook of electrical technology---B.L. Theraja (Vol II)
2. A Course in electrical and electronics measurements and instruments: - A.K.Sawhney.

REFERENCE BOOKS

1. Electrical Power: - J.B.Gupta
2. A first course in Electrical Drives: - S.K. Pillai
3. A textbook of electrical technology:-B.L. Theraja (Vol I)



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ECE 4.4 ELECTROMAGNETIC FIELDS AND WAVES

MODULE I

System of coordinates :
Cartesian, cylindrical and spherical coordinate system, transformation from cartesian to cylindrical and spherical coordinate system, transformation from cylindrical to spherical coordinates. (3Hrs)

Integration of scalar and vector functions :
Line integrals, surface integral, volume integral. (2Hrs)

Differentiation of scalar and vector functions :
Gradient of a scalar function, gradient in Cartesian, cylindrical and spherical coordinates.
Divergence of a vector field, divergence in Cartesian, cylindrical and spherical coordinates, Divergence theorem
Circulation of a vector field, Curl of a vector in Cartesian,cylindrical and spherical coordinates, Stoke's theorem.
Conservative and non-conservative fields, Helmholtz's theorem (4Hrs)

Electrostatics :
Coulomb's Law, Electric Field Intensity due to point charges and distributed charges. (1Hr)

MODULE II

Electrostatics :
Electric Flux density, Electric flux, Postulates of the electrostatic field, Gauss's law and its applications,
Electric potential: Electrical potential due to point charges and distributed charges. (2Hrs)

Energy in electrostatic field :
Energy due to point and distributed charges. (1Hr)

Boundary value problems :
Poisson's equations for the electrostatic field, Laplace's equation for the electrostatic field, Solution methods, Uniqueness theorem, Solution by direct integration, Solution by the method of Images. (3Hrs)

Interface Conditions :
Interface conditions between two dielectrics, Interface conditions between dielectrics and conductors. (1Hr)

Capacitance :
Parallel plate capacitor, Capacitance of infinite structures (1Hr)

Conduction and Convection current density :
Convection current and convection current density, Conduction current and Conduction current density, Power dissipation and Joule's law, The continuity equation. (2Hrs)

MODULE III

The Static Magnetic Field :
Magnetic Field, Magnetic Field Intensity, Magnetic Flux Density and Magnetic Flux, Postulates of static Magnetic field, Magnetic Vector potential, Magnetic Scalar potential, Magnetic Dipole
Biot Savart Law, Ampere's circuital Law.
Behaviour of Magnetic Materials, Diamagnetic and Ferromagnetic materials. (3Hrs)

Magnetic circuits :
Magnetomotive force, Magnetic reluctance, Forces in the magnetic field. (1Hr)

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Energy stored in the magnetic field:
Magnetostatic energy in terms of fields. (1Hr)

Time varying Electric and Magnetic fields :
Faraday's Law, Lenz's Law, Electromotive force, Eddy currents. (2Hrs)

Maxwell's Equations :
Continuity equation for time varying fields, Displacement current density, Generalized Ampere's Law, Maxwell's equations in differential, integral and time harmonic representation. (2Hrs)

Interface conditions for Electromagnetic Field :
Interface condition for the electric field, interface condition for the magnetic field. (1Hr)

MODULE IV

Electromagnetic wave equation and its solution:
Electromagnetic waves, Time dependent wave equation, Time Harmonic Wave Equation, Solution of the wave equation for uniform plane waves in free space , perfect dielectrics. (2Hrs)

Poynting's Theorem:
Poynting vector, Complex Poynting vector, Electromagnetic power density. (2Hrs)

Propagation of Plane waves in Materials :
Propagation of plane waves in lossy dielectrics, low loss dielectrics and conductors, Concept of Phase and Group velocity. (1Hr)

Polarization of Plane Waves :
Concept of Polarization, Linear, Elliptical and Circular Polarization (2Hrs)

Reflection and Transmission of Plane Waves :
Reflection and Transmission at a General Dielectric Interface with Normal Incidence, Standing Waves, Oblique incidence on a conducting surface with perpendicular polarization and parallel polarization,
Brewster's Angle, Total Internal Reflection. (3Hrs)

TEXT BOOKS :

1. Engineering Electromagnetics by Nathan Ida, 2nd Edition, Springer International Edition.
2. Elements of Electromagnetics by Mathew Sadiku, 4th edition, Oxford University Press.

REFERENCE BOOKS :

1. Electromagnetics by John D. Kraus,5th Edition, Mcgraw Hill.
2. Theory and Problems in Electromagnetcs by Joseph Edminister, Schaum Series, McGraw Hill
3. Field and Wave Electromagnetics by David K. Cheng, Second Edition, Pearson Education
4. Engineering Electromagnetics by William H. Hayt and John A. Buck, Seventh Edition, Tata McGraw Hill Edition.

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ECE 4.5 LINEAR INTEGRATED CIRCUITS

MODULE I

Differential Amplifiers (4 types), Derivations, FET diff. amp, constant current bias, current mirror (2Hrs)

Op- amps parameters, definitions, Measurements, offset compensation, Functional block diagrams and working specification of IC741, equivalent circuit of Op-amp and transfer curve (2Hrs)

Feedback in op-Amp, Frequency response and methods of frequency compensation (1Hr)

Applications of Operational amplifiers (linear amplifiers and filters , Inverting and non inverting amplifiers, Ac & DC Differentiator, Integrator, summing & difference amplifier. (2Hrs)

Instrumentation amplifier, voltage follower, V-I & I-V converter,Precision rectifier, Log and antilog amplifier (2Hrs)

Design of Active filters such as Butterworth low pass, high pass, band pass, notch filters (1Hr)

MODULE-II

Op-Amps as Comparators, zero crossing detectors, Schmitt trigger, ramp generators, Triangular wave generator. (2Hrs)

Analysis of the waveform with SPICE (1Hr)

Oscillators : wein bridge oscillator, phase shift oscillators , design & problems (2Hrs)

Voltage regulators. Specifications, functional block diagrams of IC 723, Design of IC 723 as high & low voltage regulators (2Hrs)

Specifications, functional block diagrams of IC LH 105 (1Hr)

Three terminal regulator IC78XX, 79XX, LM309, LM317, voltage regulator and tracking regulator. (1Hr)

Principles and working of switching mode regulators, applications of switching regulator IC 78540, Universal Switching regulator (1Hr)

MODULE III

Introduction to resolution & accuracy in convertors, quantization error, sample & hold circuit (1Hr)

ADC and DAC: A/D and D/A conversion principles, principle of successive approximation, successive approximation ADC, binary weighted resistors & R-2R resistor ladder (Design & problems) (3Hrs)

Specifications, functional block diagrams, applications of 0809 & 0808 (1Hr)

Phase- Locked loop(PLL)
Basic principles of phase-locked-loop and block diagram (1Hr)

Transfer characteristics of PLL, Lock Range, and Capture range. (1Hr)

Applications of PLL as frequency multiplier, AM Demodulation, FM demodulation, (2Hrs)

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Study of PLL IC 565 and its applications design (1Hr)

MODULE IV

Op-Amps as bistable, monostable and astable multivibrator (2Hrs)

IC 555: Functional block diagram and specification, Modes of IC555 (1Hr)

Applications of IC555 as monostable & astable multivibrator (design) (2Hrs)

IC 555: Application as VCO, missing pulse detector, frequency divider, ramp generator, PWM (2Hrs)

Waveforms generating ICs:
Study of IC566, IC 8038 and IC XR2206 and their applications in waveforms generations (3Hrs)

TEXT BOOKS :

1. Ramakant Gayakwad, Op-Amps and linear integrated circuits, Prentice Hall of India Pvt. Ltd.
2. Botkar, K.R. Integrated Circuits, Khanna Pub
3. SPICE by Gorden W. Roberts & Adel Sedra, Oxford

REFERENCE BOOKS:

1.Millman And Halkias, integrated electronics: Analog and digital circuits system McGraw Hill Pub.
2. Sergio Franco, Design with operational amplifiers and analog integrated circuits, McGraw Hill.
3.Modern Digital Electronics by R. P. Jain, TMH
4.SPICE by Circuits & Electronics using Pspice by Muhamad H. Rassid, PHI

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ECE 4.6 DATA STRUCTURES USING C++

MODULE I

Object Oriented Programming: Basic concepts and benefits of OOP, Basic, User defined and derived data types. (2Hrs)

Reference variables, Arithmetic and logical operators, scope resolution and memory management operators. Expressions and control structures. (4Hrs)

Functions in C++, Classes & Objects, Constructors & Destructors. (4Hrs)

MODULE II

Operator Overloading: Definition, Overloading unary and binary operators, manipulation of strings. (4Hrs)

Inheritance: derived classes, Types of inheritance, constructors in derived classes, nesting of classes. (3Hrs)

Pointers: pointers to objects, this pointer, pointers to derived classes. Virtual functions, Templates: Class templates & Function templates. (3Hrs)

MODULE III

Linked list: Single, Doubly, Circular linked lists. Stacks: as an array and linked list, applications of stacks. (4Hrs)

Queues: as an array and linked list, Circular, deque. (4Hrs)

Trees: Traversal of binary tree, BST, operations on BST, Reconstruction of Binary tree. Heap. (3Hrs)

MODULE IV

Graphs: Definitions and Terminology, DFS & BFS, Spanning Tree. (4Hrs)

Searching: Linear search, Binary search. (2Hrs)

Sorting: Bubble sort, selection sort, Quick sort, Insertion sort, Merge sort, Heap sort, Binary Tree sort. (4Hrs)

TEXT BOOKS:

1. Object Oriented Programming with C++ by E. Balagurusamy.
2. Data Structures through C++ by Yeshwant Kanetkar
3. Let Us C++ by Yeshwant Kanetkar

REFERENCE BOOKS:

1. Object Oriented Programming in Turbo C++ by Robert Lafore
2. Schaum Series Programming with C++ by John Hubbard
3. Programming with C++ by Ravichandran
4. C++ Primer by Lippman and Lajoie.
5. Mastering C++ by Venugopal, Rajkumar, Ravishankar
6. Data Structures using C++ by Tenenbaum.

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