G.H.RAISONI COLLEGE OF ENGINEERING

BACHELOR OF ENGINEERING

BOARD OF STUDIES IN ELECTRICAL ENGINEERING

BRANCH - ELECTRICAL (ELECTRONICS AND POWER

SEMISTER IV (ELECTRICAL ENGINEERING)

ELECTRICAL ENGINEERING MATHEMATICS

Unit 1 : Root Locus Techniques :- (10)

Mathematical model line of physical systems and its differential equations (mechanical systems-basic translational and rotational elements, electrical system-basis R-L-C series and parallel circuits), concept of transfer function, transfer function for elementary R-L-C circuits, elementary block diagram of single input, single output, closed loop system and its reduction.

Laplace transform of step, ramp and parabolic signals, Time response of first order and general second order systems for unit step input, Concept of characteristic equation q(s)= (t).vs.time response.

Root locus concept, construction of root loci (scope limited to up to third order systems), time constant and pole zero form of generalized characteristic equation q(s)=l + G(s)H(s)=0, construction rules (derivations may be excluded), Determination of roots for specified open loop gain, determination of open gain for a specified damping ratio.

Unit 2 : Polar and Bode Plots :-(8)

Concept of sinusoidal transfer functions, Polar plots(scope limited to up to third order systems) Bode plots-basic concepts, general procedure for constructing Bode plots, concept of octave and decade, determination of gain and phase crossover frequencies and corresponding phase angles and log magnitude, Determination of transfer function from asymptotic Bode Plots.

Unit 3 : Z - Transform :-(8)

Definition and properties, inversion z-transform, z-transforms pairs, correlation with Laplace transform, Laplace transform and z - transformation pairs, z-transfer functions for linear descrete systems, linear difference equations, inverse z-transforms and response of linear discrete systems(power series method, partial fraction expansion method)

Unit 4 : Fuzzy sets and Neural Networks :-(8)

Fuzzy sets and systems, crisp sets, overview of fuzzy logic and classical logic, fuzzy compliment, fuzzy union, fuzzy intersection and combinations of these fuzzy sets operations crisp and fuzzy relations.

Introduction to Neural network algorithms, back propagation and delta rule,
Hebbian learning.

Unit 5 : Numerical methods for algebraic and transcendental equations :-(8)
Solution of linear and non-linear algebraic and transcendental equations, method of false position, Newton-Raphson method, system of linear equations, Gauss elimination method, Gauss-Scidel method, Crout's method.

Unit 6 : Numerical methods for differential equations :- (8)
Numerical solution of ordinary differential equations by Taylor's series method, Runge Kutta method, Modified Euler method, predictor corrector method, solution of --------- differential equations.

TEXT BOOKS:
1.Control Systems Engineering, I.J. Nagraj and M. Gopal (for units 1,2,3 and 4)
2.Numerical Methods., S.S.Sastri
3.Fuzzy Engineering. Bari Kosko
4.Neural Networks, James A. Freeman and David Skapura

REFERENCE BOOKS:
1.Fuzzy sets Uncertainty and information, George, J. Klir and Tina A. Folger.

ELEMENTS OF ELECTROMAGNETICS

Unit 1 : Vector Analysis :- (10)
Idea of Vector & Scalars, Vector Algebra, Vector addition, vector subtraction, Dot product, Scalor product in cartesian co-ordinates system, conversion of variables from cartesian to cylendrics of cartetian to spherical and vice versa.

Unit 2 : Coulomb's law, Electrical field intensity and electric flux density :-(8)
Coulomb's law, electric field intensity, field often, point charges, field due to continuous volume charge distribution, field of line charge, field of sheet charges concept of flux density.

Unit 3 : Gauss's law, Energy and Potential of charge system :- (8)
Gauss's law, Application of Gauss's law, divergence theorem, defination of potential difference and potential, potential of a point charges, potential field of system of charge, potential gradient, Energy density in Electrostatic field.

Unit 4 : Conducters, Dielectric and Capacitance and Poisson's and Laplace's Equations (8)

Current and current density, continuity of current, metallic conductors, conductor properties and Boundary conditions, Nature of Dielectric materials capacitance and capacitances, Capacitance of parallel plate capacitor, Capacitance of two wire line, Poissons and Laplace equations.

Unit 5 : The Steady Magnetic Field and Magnetic Forces (8)
Biot Savarts law, Ampere's Circuital Law, Strokes theorem, Magnetic flux density, Scalar and Vector Magnetic potentials, force on moving charge, force between differential current elements, nature of Magnetical material, Magnatisation and permiability, Magnetic circuits, potential energy, and forces on magnetic materials, Inductance and mutual inductances.

Unit 6 :(8)
Maxwell's equations and boundary conditions, Elementary idea of Electromagnetic waves, uniform plane wave.

TEXT BOOKS:
Engineering Electromagnetics 3rd Edition Mc graw Hill , W.H.Hayt

DIGITAL CIRCUITS

Unit 1 : (10)
Analog Vs, Digital systems, transistor as a switch, Boolean algebra, Booleanidentities logic problems, Binary, Gray, Octal, Hex and ASCII codes, gates and their truth tables, D'Morgan's law, Sum of product and product of Sums.

Unit 2 : (8)
Combinational basic concepts, SSI, MSI and VLSI circuit classification, standard TTL, CMOS characteristics, Decoders, Encoders, Multiplexers, Demultiplexers, code converters, characteristics of display devices, standard configuration of gates as SSI/MSI/LSI circuits. Arithmetic circuits-Addres, subtractors (half and full), BCD adder/substractor, concept of ALU.

Unit 3 : (8)
Karanaugh Map, simplification of sum of products and products of sum, solution to problems using MUX as a function generator, simplification of logical functions using Ouine-Mclausky method.

Unit 4 : (8)
Introduction to flip-flop, latches, concept of clock, memories organisation with flip-flop as basic cell, RAM, ROM, EPROM and EEPROM as overview, master slave combination and conversion of one type to another type flip-flop, Multivibrators and their design parameters.

Unit 5 : (8)
Excutation tables and introduction to sequential circuits, counters synchronous/ asynchronous, different module counters with reset/clear facility, Design of counters of arbitrary module with K-maps, Lock free counters.

Unit 6 : (8)
Introduction to sequential system, Design of sequential system, using Moore and Miley system fundamental mode sequential circuits.

TEXT BOOKS:
Digital Integrated Electronics By Herbart Taub (Mc Graw Hill)
Digital Logic Design By R.P.Jain (P.H.I)
Introduction to Digital Systems By Palmer (T.M.G.)

ELECTRICAL MACHINES- I.

Unit 1 : 3 Phase Transformer :-(10)
Transformer operation and principle, o.c. & d.c. test on three phase transformer, determination of equivalent circuit. Parameters, Regulation, Efficiency, Magnetising current and harmonics, polarity test, various connections with vector groups.

Unit 2 : (8)
Three phase to two phase conversion, parallel operation of three phase transformer, methods of cooling, temperature rise test, maintenance of transformer, insulation of transformer.

Unit 3 : D. C. Machines :- (10)
Basic principle & operation, Armature reaction & commutation, Compensating winding, interpoles, Types of excitation, Characteristics of shunt, series & compound motor and generator speed control of d. e. shunt & series motor constant horse power & constant torque drive of d. c. motor.

Unit 4 : Three Phase Induction Motor :-(8)

Types of induction motor and production of torque, Torque-slip characteristics, No load blocked rotor test, equivalent circuit & determination of equivalent circuit parameters, Circle diagram, losses, efficiency, double cage motor, operating characteristics & influence of machine parameter on the performance of motor.

Unit 5 : (8)
Starting of 3 phase I. M., Speed control of I. M. by pole changing, frequency control, rotor resistance by varying supply voltage, braking regenerative braking, plugging, dynamic braking Crawing & Cogging.

Unit 6 : Single Phase I. M. :-(6)
Double field- revolving and cross field theory split phase motor shaded pole motor, equivalent circuit, Torque-slip characteristics.

TEXT BOOKS:

1.Electrical Machines By P.K .Mukherjee & S. Chakraborty
2.Electrical Machines By Dr. P.S. Bimbhra
3.Electrical Machines By I.S. Nagrath & Dr. D.P. Kothari
4.Performance & Design of A.C. M/C. by M.G.Ray

COMPUTER PROGRAMMING.

Unit 1 : (8)
Introduction to computers and operating systems, Working with DOS, WINDOWS and networking.

Unit 2 : (8)
Structure of 'C' program, Data types, Storage class, variables, expressions and Operators.

Unit 3 : (10)
Program control statements, concept of function and Recursion, I/O through Printf, Scanf, File I/O Open- close, Read and Write.

Unit 4 : (8)
Arrays, Searching (Linear and Binary), Sorting(Bubble, Selection Sort) file Handling.

Unit 5 : (8)
Pointers and structures, Singly linked list Insertion, deletion and updation.

Unit 6 : (8)
Introduction to 'C' concepts.

TEXT BOOKS:

A text book on Programming Languages C & C++ By Kakade & Deshpande.
Pascal & C Programming By Venugopal.
C Programming languages By B.W. Kernighan and D.M. Ritchi
Let us C By Y. Kanetkar.
Computer Programming in C By Balguru Swami.