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MATHEMATICS –III
(2311)

Unit – I
Function of Complex variable

Analytic function, C-R equations, Cauchy's integral theorem, Cauchy's integral formula for derivatives of analytic function, Taylor's and Laurent's series, singularities, Residue theorem. Evaluation of real integrals of the type $\int_0^{2\pi} f(Cos\,\theta\,Sin\,\theta)\,d\theta$ and $\int_{-\infty}^{\infty} f(x)\,dx$

Unit – II
Statistical Techniques - I

Moments, Moment generating functions, Skewness, Kurtosis, Curve fitting, Method of least squares, Fitting of straight lines, Polynomials, Exponential curves etc., Correlation, Linear, non linear and multiple regression analysis, Probability theory.

Unit – III
Statistical Techniques - II

Binomial, Poisson and Normal distributions, Sampling theory (small and large), Tests of significations: Chi-square test, t-test, Analysis of variance (one way) , Application to engineering, medicine, agriculture etc.

Time series and forecasting (moving and semi-averages), Statistical quality control methods, Control charts, $\bar{X}$, R, p, np, and c charts.

Unit – IV
Numerical Techniques – I

Zeroes of transcendental and polynomial equation using Bisection method, Regula-falsi method and Newton-Raphson method, Rate of convergence of above methods.

Interpolation: Finite differences, difference tables, Newton's forward and backward interpolation , Lagrange's and Newton's divided difference formula for unequal intervals.

Unit – V
Numerical Techniques –II

Solution of system of linear equations, Gauss- Seidal method, Crout method. Numerical differentiation, Numerical integration , Trapezoidal , Simpson's one third and three-eight rules. Solution of ordinary differential (first order, second order and simultaneous) equations by Euler's, Picard's and forth-order Runge- Kutta mehods.

Books Recommended

1. Jain, Iyenger & Jain, Numerical Methods for Scientific and Engineering Computation. New Age International, New Delhi , 2003.
2. J.N. Kapur, Mathematical Statistics, S. Chand & company Ltd.,2000
3. R.K. Jain & S.R.K. Iyenger,Advance Engg Mathematics,Narosa Pub House, 2002.
4. Chandrika Prasad, Advanced Mathematics for Engineers, Prasad Mudralaya, 1996.
5. E. Kreysig, Advanced Engineering Mathematics, John Wiley & Sons, 2005.
6. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2005.
7. S.P.Gupta, Statistical Methods, Sultan and Sons, New Delhi, 2004.
8. Devore, Probability and Statistics, Thomson(Cengage) Learning, 2007.
9. Walpole, Myers, Myers & Ye, Probability and Statistics for Engineers & Scientists, Pearson Education, 2003.

SEMICONDUCTOR MATERIALS AND DEVICES
(2321)

Unit-I : Crystal Properties and charge Carriers in Semiconductors

Elemental and compound semiconductor materials, crystal lattice structure. Bonding forces and energy bands in solids, charge carriers in semiconductors, carrier concentrations, drift of carriers in electric and magnetic fields.

Unit-II : Excess Cariers in Semiconductors

Optical absorption, luminescence, carrier life time and photo conductivity, diffusion of carriers.

Unit-III : Junction Properties

Equilibrium conditions, biased junctions, steady state conditions, break down mechanism (rectifying diodes, Zener diodes). Transient conditions, metal semiconductor junctions, hetero junctions. (Varactor Diode, switching diodes and Schottky diodes.)

Unit-IV : Transitors and Optoelectronic Devices

Metal semiconductor field effect transistors (MESFET), metal insulator semiconductor field effect transistors (MISFET), Construction, Operation and characteristics of above devices. Photodiodes, photo detectors, solar cell, light emitting diodes, light emitting materials, optical fibre, semiconductor lasers, material for semiconductor lasers.
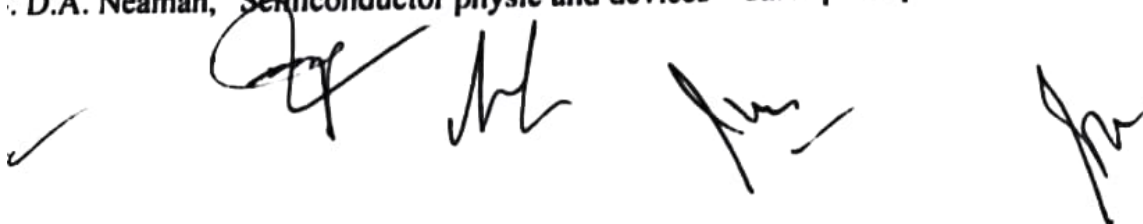
Unit-V : Power Devices

Four layer devices : P-N-P-N diode, semiconductor controlled rectifier (SCR),
bilateral devices : DIAC, TRIAC, IGBT.

Text Book

1. Ben G. Streetman, "Solid state electronic devices", Pearson Eduction, 2003, Fifth edition .

Reference Books :

1. J. Millman and Halkiyas, "Integrated Electronics", TMH, 2002.

2. S.M. Sze, "Physics of Semiconductor devices", John Wiley.

3. Adir Bar-Lev, "Semiconductor and electronic devices", PHI.

4. D.A. Neaman, "Semiconductor physic and devices – basic principles", Home wood IL, 1992.

NETWORK ANALYSIS AND SYNTHESIS
(2312)

Unit – I :
Graph Theory : Graph of a Network, definitions, tree, co tree , link, basic loop and basic cut set, Incidence matrix, cut set matrix, Tie set matrix Duality, Loop and Node methods of analysis.

Unit – II :
Network Theorems (Applications to ac networks): Super-position theorem, Thevenin's theorem, Norton's theorem, maximum power transfer theorem, Reciprocity theorem. Millman's theorem, compensation theorem, Tellegen's theorem.

Unit – III :
Network Functions :
Concept of Complex frequency , Transform Impedances Network functions of one port and two port networks, concept of poles and zeros, properties of driving point and transfer functions, time response and stability from pole zero plot, frequency response and Bode plots.
Transient Analysis Of Networks
Network elements, Transient response of R-L, R-C, R-L-C for DC and sinusoidal excitation, Initial condition, Solution using differential equation approach and Laplace transform method.

Unit – IV :
Two Port Networks:
Characterization of LTI two port networks Z,Y, ABCD and h parameters, reciprocity and symmetry. Inter-relationships between the parameters, inter-connections of two port networks, Ladder and Lattice networks. T & Π Representation.

Unit – V :
Network Synthesis :
Positive real function; definition and properties; properties of LC, RC and RL driving point functions, synthesis of LC, RC and RL driving point immittance functions using Foster and Caucer first and second forms.

Text Books:
1. M.E. Van Valkenburg," Network Analysis", Prentice Hall of India
2. D.Roy Choudhary,"Networks and Systems" Wiley Eastern Ltd.
3. Donald E. Scott : "An Introduction to Circuit analysis: A System Approach" McGraw Hill Book Company.
4. A.Chakrabarti,"Circuit Theory" Dhanpat Rai & Co.
Reference Books :
5. M.E. Van Valkenburg,"An Introduction to Modern Network Synthesis",Wiley Eastern Ltd.
6. W.H. Hayt & Jack E-Kemmerly, Engineering Circuit analysis" Tata McGraw Hill.
7. Soni, Gupta ,"Circuit Analysis", Dhanpat Rai & Sons.
8. Ram Kalyan, Linear Circuits Oxford University Press.

ELECTRONICS MEASUREMENTS AND INSTRUMENTATION
(2313)

Unit-I : Theory of Measurement
Introduction, Types of error, Error analysis: uncertainity , precision, accuracy. statistical analysis, Gaussian error distribution.

Unit-II : Transducers
Passive transducers : Resistive, Inductive and capacitive
Active transducers : Thermoelectric, piezoelectric & photoelectric

Unit-III : Analog Meters
AC analog meters: Principle of operation, Average, Peak and RMS responding voltmeters, sampling voltmeters.
Electronics Analog meters: Electronics analog DC and AC voltmeter and ammeters, Electronic analog ohmmeter and multimeter.

Unit-IV :Digital Meters
Digital voltmeter, digital multimeter, Display devices : indicating system, numeric & alpha number display using LCD & LED, specification of digital meters: display digit & counts resolution, sensitivity , accuracy, speed & settling time etc.

Unit-V : Oscilloscopes & Bridges
Types of oscilloscopes, controls, Measurements of voltage, frequency , time & Phase. High frequency measurements. Horizontal and Vertical deflection system of CRT.
Bridges : Direct current and alternating current bridges, LCR bridges

Unit-VI: Function Generators & Analyzers
Function Generators: Sine-wave, non- sinusoidal, frequency synthesis techniques & digital signal generators.
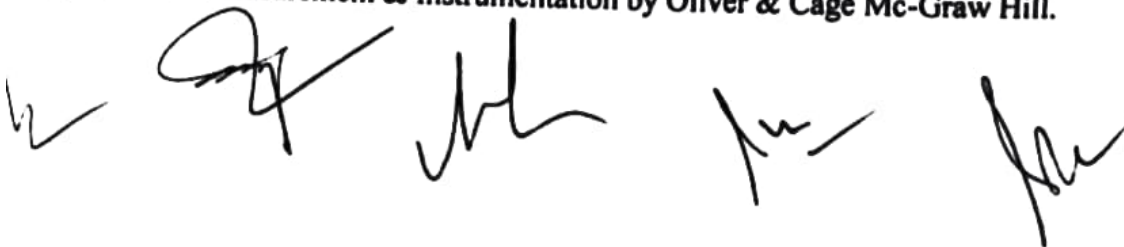Signal Analyzers : Distortion, wave and spectrum analyzers, network analyzer.

Text Books :

1. Electronic Instruments & Instrumentation Technology by MMS Anand, PHI Pvt. Ltd., New Delhi Ed. 2005
2. Electronics Instrumentation by H.S. Kalsi TMH Ed. 2004

Reference Books :

1. Electronics Instrumentation & Measurement Techniques by W.D. cooper & A.D. Helfrick, PHI 3rd Ed.
2. Electronic Measurement & Instrumentation by Oliver & Cage Mc-Graw Hill.

DIGITAL ELECTRONICS
(2322)

Unit-I : Number System & Codes

Number systems and their inter conversion, Binary Arithmetic (Addition, Subtraction, Multiplication And Division), Diminished radix and radix compliments, BCD codes, excess 3 codes, grey codes, Hamming Codes, error detection and correction.

Boolean Algebra & Logic Gates : Digital logic gates, Boolean Algebra, Basic theorems and properties of Boolean algebra, Boolean Functions, Canonical and standard form map method, two variable, three variable, four variable, five variable maps, Sum of products and Product of sums simplification, NAND and NOR implementation.

Unit-II : Combinational Logic Circuits

Binary Adders and subtractors , Binary Multiplier, Magnitude Comparator, Multiplexers / Demultiplexers, encoder / decoders, decimal adders , ROM as decoder,

Unit-III : Sequential Logic Circuits

Introduction, SR Flip –Flops , JK flip flops, D flip flops, T flip flop, master slave flip flop, excitation table , Inter-conversions of flip flops, Classification of sequential circuits, Design of shift registers, synchronous counters , Asynchronous Counters, Ring counter, Johnson counter and their applications. A to D and D to A converter.

Unit-IV : Logic Families

Diode, BJT & MOS as a switching element concept of transfer characteristics, Input characteristics and output characteristics of logic gates, Fan-in, Fan-out, Noise margin, circuit concept and comparison of various logic families: RTL, DTL, TTL, IIL, ECL, NMOS, CMOS Tri-state logic, open collector output, Totem pole, Interfacing between logic families, packing density, power consumption & gate delay.

Unit-V : Memories

Sequential, Random Access, NMOS & CMOS Static and Dynamic Memory elements, one and multi-dimensional selection arrangement, Read-only memories, Formation of memory banks. PLA, PAL.

Unit-VI: ASM charts: Representation of sequential circuits using ASM charts, synthesis of output and next state functions, Data path ,control path partition-based design.

Text Books :

1. Digital Design by M Moris Mano, 2nd Edn.PHI

2. Introduction to Digital Microelectronic Circuits, by Gopalan, TMH

Reference Books :

1. Switching Circuit & Logic Design by Hill & Peterson, Wiley

2. Digital Circuit & Logic Design, by Holsworth.