BE-301 ENGINEERING MATHEMATICS – I

Unit I

Numerical analysis: Errors & Approximations, Solution of Algebraic & Trancedental Equations (Regula Falsi ,Newton-Raphson, Secant Method), Solution of simultaneous linear equatins by Gauss Elimination, Gauss Jordan, Crout's methods , Jacobi's and Gauss-Siedel Iterative methods
Definite Integrals : Definite Integrals as a limit of a sum, its application in Summation of Series.

Unit II

Calculus : Expansion of functions by Maclaurin's and Taylor's theorem. Partial differentiation, Euler's theorem and its application in approximation and errors, Maxima and Minima of function of two variables, Curvature: Radius of curvature.

Unit III

Differential Equations : Solution of Ordinary Differential Equations(Taylor's Series, Picard's Method, Modified Euler's Method, Runge-Kutta Method,Milne's Predictor & Corrector method), Correlation and Regression, Curve Fitting (Method of Least Square). Linear Differential Equations with Constant Coefficients, Cauchy's Homogeneous differential Equation, Simultaneous differential Equations, Method of Variation of Parameters.

Unit IV

Matrices : Rank, Nullity, Solution of Simultaneous equation by elementary transformation, Consistency of System of Simultaneous Linear Equation, Eigen Values and Eigen Vectors, Cayley -Hamilton Theorem and its Application to find the inverse.

Unit V

Graph Theory : Graphs, Subgraphs, Degree and Distance, Tree, cycles and Network, Algebra of Logic, Boolean Algebra, Principle of Duality, Basic Theorems, Boolean Expressions and Functions. Elementary Concept of Fuzzy Logic

References:

1. Higher Engineering Mathematics by B.S. Grewal, Khanna Publication.
2. Engineering Mathematics volume I & III by D.K. Jain
3. Engineering Mathematics volume I by D.C.Agrawal

EC-302 Electrical Measurement & Measuring Instruments

Unit I : Philosophy of Measurement- Methods of measurement, Measurement system, Classification of instrument systems, Characteristics of instruments & measurement systems, Errors in measurement & its analysis, Standards.
Analog Measurement of Electrical Quantities- Electrodynamic, Thermocouple, Electrostatic & Rectifier type ammeters & voltmeters, Electrodynamic wattmeter, Three Phase wattmeter, Power in three phase systems, Errors & remedies in wattmeter and energy meter.

Unit II Instrument Transformers: CT and PT; their errors, Applications of CT and PT in the extension of instrument range, Introduction to measurement of speed, frequency and power factor.

Unit III Measurement of Parameters- Different methods of measuring low, medium and high resistances, measurement of inductance & capacitance with the help of AC Bridges, Q meter.

Unit IV AC Potentiometers- Polar type & Co-ordinate type AC potentiometers, application of AC Potentiometers in electrical measurement.
Magnetic Measurement- Ballistic galvanometer, Flux meter, Determination of hysteresis loop, measurement of iron losses.

Unit V Digital Measurement of Electrical Quantities- Concept of digital measurement, Block diagram, Study of digital voltmeter, Frequency meter, Spectrum analyzer, Electronic multimeter.
Cathode Ray Oscilloscope- Basic CRO circuit (block diagram), Cathode Ray Tube (CRT) & its components, Applications of CRO in measurement, Lissajous Pattern, Dual trace & dual beam oscilloscopes.

Text Book:
1. E. W. Golding & F. C. Widdis, "Electrical Measurement &Measuring Instrument", A. W. Wheeler & Co. Pvt. Ltd. India
2. A. K. Sawhney, "Electrical & Electronic Measurement & Instrument", Dhanpat Rai & Sons, India
3. Purkait, "Electrical & Electronics Measurement & Instrumentation", TMH
Reference Books:
4. Forest K. Harris, "Electrical Measurement", Willey Eastern Pvt. Ltd. India
5. M. B. Stout , "Basic Electrical Measurement", Prentice Hall of India
6. W. D. Cooper, "Electronic Instrument & Measurement Technique", Prentice Hall International
7. J. B. Gupta, "Electrical Measurement & Measuring Instrument", S. K. Kataria & Sons

EC-303 Digital Electronics

Unit-I :Number Systems : Decimal, binary, octal, Hexadecimal, Excess 3, Gray ASCII, decimal number system and conversion , binary weighted codes, signed numbers, 1s and 2s complement codes, Binary arithmetic,
Boolean Algebra: Binary logic functions , Boolean laws, truth tables, associative and distributive properties, DeMorgans theorems, realization of switching functions using logic gates

Unit-II : **Combinational Logic:**: AND, OR, NOT, XOR, XNOR, NAND, NOR, realization of boolean function using universal gates. Half and full adder, half and full subtractor, Series and parallel adder, BCD adders, lookahead carry generator. Decoders, Encoders, multiplexers and de-multiplexers. Analysis and design of combination circuits, realization of various Boolean functions using NAND,NOR gates and multiplexers.

Unit-III : Flip-Flops: R-S, Clocked R-S, T, D, J-K, race around problem, Master-slave J-K., State and Excitation Tables.
Shift registers and counters :synchronous and asynchronous counters, Binary ripple counter, up-down counter, Johnson and ring counter. Analysis and Design of Sequential Circuits

Unit-IV : Semiconductor memories: Organization and construction of RAM, SRAM, DRAM, RAMBUS ROM, PROM, EPROM, EEPROM, PAL and PLAs etc

Unit-V : Logic families: RTL, DTL, TTL, ECL, IIL, PMOS, NMOS and CMOS logic etc. Interfacing between TTL and MOS, vice-versa.

References:

1. M. Mano : Digital Logic and Computer Design, Pearson Education
2. W.H. Gothman : Digital Electronics, PHI.
3. Millman and Taub : Pulse, Digital and Switching Waveforms, MGH
4. Salivahanan and Ari Vahagan : Digital Circuits and Design, Vikas Publishing House
5. Leach and Malvino : Digital Principles and Applications, TMH

List of ECperiments:

1. To test and study of operation of all logic Gates for various IC's.
2. Implementation of AND, OR, NOT, NOR, X-OR and X-NOR Gates by NAND and NOR Universal gates.
3. Binary Addition by Half Adder and Full Adder circuit.
4. Binary Subtraction by Half Subtractor and Full Subtractor circuit.
5. Design a BCD to Excess-3 code converter.
6. Verification of the Demorgan's Theorem.
7. MultiplECer/DemultiplECer based boolean function realization.

EC-304 Electronic Devices

Unit I : Semiconductor :-intrinsic and Extrinsic, p-type and n-type, energy band diagrams, majority and minoritycarrier, charge density in semiconductor, generation and recombination of charges, process of diffusion,diffusion and drift currents, Hall effects and its applications. p-n junction, depletion layer, potential barrier,electric field, forward and reverse biased junction, current components in p-n diode, current equation, V-Icharacteristics, cut in voltages of Si and Ge diode, transition and diffusion capacitance, powerdissipation,.

UnitII : Semiconductor Diode:-Semiconductor diodes, ideal & practical diode equivalentcircuit & frequency response, graphical analysis of diode circuits, Signal diodes, Power Diode, Zener diode, Varactor diode, Schottky diode, PIN diode,Tunnel diode, Photo diode. Direct tunneling equivalent cirucuit, Tunnel diode oscillator; Solar Cell, LED, LEDs specification & geometry of LEDs, Colours of LEDs, LCD, Diffusion and Transitioncapacitance of P-N junction diode, Simple zener regulators.

Unit *III:* Diode Applications: p-n junction diode as rectifier, clipper and clamper, The diode as a circuit element,The Load line concept, The Pieceswise linear diode modal, Clipping circuits, Clipping at two independentlevels, Comparators, Sampling Gate, Rectifiers, Other full wave circuits, Capacitor filter additional diodescircuits.

Unit IV :Bipolar junction transistor - Construction, basic operation, current components and equations,. CB, CE and CC-configuration, input and output characteristics, Early effect, region of operation, active, cutoff and saturation region Ebers-Moll model, , power dissipation in transistor (Pdmax rating), Photo transistor, Uni-junction Transistor (UJT) : Principle of operation, characteristics.

Unit V : FET construction- Construction, n channel and p channel, characteristics, parameters, Equivalent model and voltage gain, Enhancement and depletion MOSFET and its Characteristics, analysis of FET in various configuration.

References:

1. Boylestad and Nashelsky: Electronic Devices and Circuit Theory, Pearson Education
2. Millman and Halkias: Integrated electronics, TMH
3. Graham Bell: Electronic Devices and Circuits, PHI
4. Sendra and Smith: Microelectronics, Oxford Press.
5. Donald A Neamen: Electronic Circuits Analysis and Design, TMH

List of ECperiments

1. V-I characteristics of various Diodes (p-n, Zener, Varactor, Schottky, Tunnel, Photodiode etc)
2. Characteristics of Transistors (BJT and FET)
3 Applications of diodes and Design of various clipping and clamping circuits
4 Design half & full wave rectifier
5 Design & Analysis of transistor amplifier in CE, CB & CC configuration.
6 Design & Analysis of JFET Amplifier.
7 Design & Analysis of MOSFET Amplifier.

EC-305 Network Theory

Unit I : Network Theory : Circuit Theory Concepts – Mesh and Node Analysis; Network Star – Delta Transformation. Steady State Analysis of AC Circuits- Sinusoidal and Phasor Representation of Voltage and Current, Single Phase AC circuit behavior of R, L & C, Combination of R, L & C in series and parallel, Resonance, Bandwidth and Quality Factor
Network Topology : 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: Circuit Analysis : Natural response and forced response, Transient response and steady state response for arbitrary inputs (DC and AC), Evaluation of time response both through classical and Laplace methods

Unit IV : Network function & Two port networks : concept of complex frequency, Network & Transfer functions for one port & two ports, poles and zeros, Necessary condition for driving point & transfer function. Two port parameters – Z,Y, ABCD, Hybrid parameters, their inverse & image parameters, relationship between parameters, Interconnection of two ports networks, Terminated two port

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 admittance functions using Foster and Cauer first and second forms.

References:
1 M.E. Van Valkenburg, "Network Analysis", Prentice Hall of India
2 A.Chakrabarti, "Circuit Theory" DhanpatRai& Co.
3 C.L Wadhwa, "Network Analysis and Synthesis" New Age International Publishers, 2007.
4 D.RoyChoudhary, "Networks and Systems" Wiley Eastern Ltd.
5 Donald E. Scott: "An Introduction to Circuit analysis: A System Approach" McGraw Hill

List of Practicals
1. Study of various commands of PSPICE.
2. To determine node voltages and branch currents in a resistive network.
3. To obtain Thevenin's equivalent circuit of a resistive network.
4. To obtain transient response of a series R-L-C circuit for step voltage input.
5. To Verify Thevenin Theorem.
6. To Verify Superposition Theorem.
6. To Verify Reciprocity Theorem.
7. To Verify Maximum Power Transfer Theorem.
8. To Verify Millman's Theorem.
9. To Determine Open Circ
uit parameters of a Two Port Network.

EC-306 Software Lab-I (Circuit Simulator)

1. Study of circuit simulation software (any one- TINA-PRO/ PSPICE/ CIRCUIT MAKER/ GPSIM/SAPWIN etc).
2. Designing and Simulation of Different Electronics Circuit .
3. Designing and Simulation of Different Network Circuit.
4. Designing and Simulation of Digital Logic Circuit.
5. Designing and fabrication of PCB with circuit simulator