BEA- 301 Mathematics-III

UNIT- I

Numerical Methods: Solution of polynomial and transcendental equations – Bisection method, Newton-Raphson method and Regula-Falsi method. Finite differences, Relation between operators, Interpolation using Newton's forward and backward difference formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae.

UNIT- II

Numerical Methods: Numerical Differentiation, Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules. Solution of Simultaneous Linear Algebraic Equations by Gauss's Elimination, Gauss's Jordan, Crout's methods, Jacobi's, Gauss-Seidal, and Relaxation method.,

UNIT- III

Numerical Methods: Ordinary differential equations: Taylor's series, Euler and modified Euler's methods. RungeKutta method of fourth order for solving first and second order equations, Milne's and Adam's predicator-corrector methods. Partial differential equations: Finite difference solution two dimensional Laplace equation and Poission equation, Implicit and explicit methods for one dimensional heat equation (Bender-Schmidt and Crank-Nicholson methods), Finite difference explicit method for wave equation.

UNIT- IV

Transform Calculus: Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem. Evaluation of integrals by Laplace transform, solving ODEs by Laplace Transform method, Fourier transforms.

UNIT-V

Concept of Probability: Probability Mass function, Probability Density Function, Discrete Distribution: Binomial, Poisson's, Continuous Distribution: Normal Distribution, Exponential Distribution.

References:

1. P. Kandasamy, K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.
2. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.
3. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,
4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2010.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
6. Veerarajan T., Engineering Mathematics, Tata McGraw-Hill, New Delhi, 2008.
7. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book
8. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
9. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968. Statistics.

EEA- 302 Electromagnetic Field

UNIT-I

Review of Vector Calculus Vector algebra-addition, subtraction, components of vectors, scalar and vector multiplications, triple products, three orthogonal coordinate systems (rectangular, cylindrical and spherical), vector calculus-differentiation, partial differentiation, integration, vector operator del, gradient, divergence a nd curl;integraltheorems of vectors. conversion of a vector from one coordinate system to another.

UNIT-II

Static Electric Field Coulomb's law, electric field intensity, electrical field due to point charges. line, surface and volume charge distributions, gauss law and its applications. absolute electric potential, potential difference, calculation of potential differences for different configurations. electric dipole, electrostatic energy and energy density.

UNIT-III

Conductors, Dielectrics and Capacitance Current and current density, ohms law in point form, continuity of current, boundary conditions of perfect dielectric materials. permittivity of dielectric materials, capacitance, capacitance of a two wire line, poisson's equation, laplace's equation, solution of laplace and poisson's equation, application of laplace's and poisson's equations.

UNIT-IV

Static Magnetic Fields Biot-Savart law, ampere law, magnetic flux and magnetic flux density, scalar and vector magnetic potentials, steady magnetic fields produced by current carrying conductors.

Magnetic Forces, Materials and Inductance: Force on a moving charge, force on a differential current element, force between differential current
elements, nature of magnetic materials, magnetization and permeability, magnetic boundary conditions, magnetic circuits, inductances and mutual inductances.

UNIT-V

Time Varying Fields and Maxwell's Equations Faraday's law for electromagnetic induction, displacement current, point form of maxwell's equation, integral form of maxwell's equations, motional electromotive forces, boundary conditions.

Electromagnetic Waves: Derivation of wave equation, uniform plane waves, maxwell's equation in phasor form, wave equation in phasor form, plane waves in free space and in a homogenous material, wave equation for a conducting medium, plane waves in lossy dielectrics, propagation in good conductors, skin effect, poynting theorem.

References:

1. M. N. O. Sadiku, "Elements of Electromagnetics", Oxford University Publication, 2014.
2. A. Pramanik,"Electromagnetism-Theory & applications",PHI Learning Pvt. Ltd, New Delhi,2009.
3. A. Pramanik, "Electromagnetism-Problems with solution", Prentice Hall India, 2012.
4. G.W. Carter, "The electromagnetic field in its engineering aspects", Longmans, 1954.
5. W.J. Duffin, "Electricity and Magnetism", McGraw Hill Publication, 1980.
6. W.J. Duffin, "Advanced Electricity and Magnetism", McGraw Hill, 1968.
7. E.G. Cullwick, "The Fundamentals of Electromagnetism", Cambridge University Press, 1966.
8. B. D. Popovic, "Introductory Engineering Electromagnetics", Addison-Wesley Educational Publishers, International Edition, 1971.
9. W. Hayt, "Engineering Electromagnetics", McGraw Hill Education, 2012

EEA- 303 Electrical Machines – I

UNIT-I

Magnetic Fields And Magnetic Circuits Review of magnetic circuits - mmf, flux, reluctance, inductance; review of Ampere Law and Biot Savart Law; Visualization of magnetic fields produced by a bar magnet and a current carrying coil - through air and through a combination of iron and air; influence of highly permeable materials on the magnetic flux lines.

UNIT-II

Electromagnetic Force And Torque B-H curve of magnetic materials; flux-linkage vs current characteristic of magnetic circuits; linear and nonlinear magnetic circuits; energy stored in the magnetic circuit; force as a partial derivative of stored energy with respect to position of a moving element; torque as a partial derivative of stored energy with respect to angular position of a rotating element. Examples - galvanometer coil, relay contact, lifting magnet, rotating element with eccentricity or saliency

UNIT-III

DC Machines Basic construction of a DC machine, magnetic structure - stator yoke, stator poles, pole-faces or shoes, air gap and armature core, visualization of magnetic field produced by the field winding excitation with armature winding open, air gap flux density distribution, flux per pole, induced EMF in an armature coil. Armature winding and commutation - Elementary armature coil and commutator, lap and wave windings, construction of commutator, linear commutation Derivation of back EMF equation, armature MMF wave, derivation of torque equation, armature reaction, air gap flux density distribution with armature reaction.

UNIT-IV

DC Machine - Motoring and Generation Armature circuit equation for motoring and generation, Types of field excitations – separately excited, shunt and series. Open circuit characteristic of separately excited DC generator, back EMF with armature reaction, voltage build-up in a shunt generator, critical field resistance and critical speed, V-I characteristics and torque-speed characteristics of separately excited, shunt and series motors. Speed control through armature voltage. Losses, load testing and back-to-back testing of DC machines

UNIT-V

Transformers Principle, construction and operation of single-phase transformers, equivalent circuit, phasor diagram, voltage regulation, losses and efficiency Testing - open circuit and short circuit tests, polarity test, back-to-back test, separation of hysteresis and eddy current losses Three-phase transformer - construction, types of connection and their comparative features, Parallel operation of 1-phase and three-phase transformers, Autotransformers - construction, principle, applications and comparison with two winding transformer, Magnetizing current, effect of nonlinear B-H curve of magnetic core material, harmonics in magnetization current, Phase conversion - Scott connection, three-phase to six-phase conversion, Tap-changing transformers - No-load and on-load tap-changing of transformers, Three-winding transformers, Cooling of transformers.

References

1. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 2013.
2. A. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBS Publishers, 2004.
3. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
4. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.
5. I. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.
6. Electric Machinery, Ashfaque Hussain,2010

List of Experiments :-

1. To Perform turn ratio and polarity test on 1-phase transformer
2. To perform load test on a 1-phase transformer and plot its load characteristic
3. To perform OC and SC tests on a 1-phase transformer and determine its equivalent circuit and its efficiency and regulation at different load and power factor.
4. To perform Sumpner's test on two 1-phase transformer and determine its efficiency at various load.
5. To analyse open ckt. Characteristics of self excited DC generator
6. To analyse load characteristics of DC compound generator.
7. To perform load test on DC shunt motor.
8. To perform load test on DC series motor.
9. To perform speed control of DC shunt motor.
10. To conduct Swinburne's test on DC machine to determine efficiency when working as generator and motor without actually loading the machine.

EEA-304 Analog Electronics

UNIT-I

Diode C(P-N junction diode, I-V characteristics of a diode; review of half-wave and full-wave rectifiers, Zener diodes, clamping and clipping circuits.

UNIT-II

BJT C Structure and I-V characteristics of a BJT; BJT as a switch. BJT as an amplifier: small-signal model, biasing circuits, current mirror; common-emitter, common-base and common-collector amplifiers; Small signal equivalent circuits, high-frequency equivalent circuits

UNIT-III

MOSFET circuits MOSFET structure and I-V characteristics, MOSFET as a switch, MOSFET as an amplifier: small-signal model and biasing circuits, common-source, common-gate and common-drain amplifiers; small signal equivalent circuits - gain, input and output impedances, trans-conductance, high frequency equivalent circuit.

UNIT-IV

Differential, Multi-Stage And Operational Amplifiers Differential amplifier; power amplifier; direct coupled multi-stage amplifier; internal structure of an operational amplifier, ideal op-amp, non-idealities in an op-amp (Output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product)

UNIT-V

Linear Applications Of Op-Amp Idealized analysis of op-amp circuits. Inverting and non-inverting amplifier, differential amplifier, instrumentation amplifier, integrator, active filter, P, PI and PID controllers and lead/lag compensator using an op-amp, voltage regulator, oscillators (Wein bridge and phase shift), Analog to Digital Conversion.

Nonlinear Applications Of Op-Amp (6 Hours): Hysteretic comparator, zero crossing detector, square-wave and triangular-wave generators, precision rectifier, peak detector.

References:

1. A. S. Sedra and K. C. Smith, “Microelectronic Circuits”, New York, Oxford University Press, 1998.
2. J. V. Wait, L. P. Huelsman and G. A. Korn, “Introduction to Operational Amplifier theory and
3. applications”, McGraw Hill U. S., 1992.
4. J. Millman and A. Grabel, “Microelectronics”, McGraw Hill Education, 1988.
5. P. Horowitz and W. Hill, “The Art of Electronics”, Cambridge University Press, 1989.
6. P.R. Gray, R.G. Meyer and S. Lewis, “Analysis and Design of Analog Integrated Circuits”, John Wiley & Sons, 2001.

List of Experiments :-

1. V-I characteristics of various Diodes (P-N , Zener, Varactor, Schottky, Tunnel, Photodiode.
2. Characteristics of Transistors (BJT and FET)
3. Design of various clipping and clamping circuits
4. Design of 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

EEA- 305 Electrical Circuit Analysis

UNIT-I

Network Theorems Superposition theorem, thevenin theorem, norton theorem, maximum power transfer theorem, reciprocity theorem, compensation theorem, analysis with dependent current & voltage sources, node & mesh analysis, duality & 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, R-L-Ccircuits, 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 with initial 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 & admittance parameters, transmission and hybrid parameters, interconnections of two port networks.

References:

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.
4. C. K. Alexander and M. N. O. Sadiku, "Electric Circuits", McGraw Hill Education, 2004.
5. K. V. V. Murthy and M. S. Kamath, "Basic Circuit Analysis", Jaico Publishers, 1999.

List of Experiments :-

1. To determine node voltages and branch currents in a resistive network.
2. To obtain Thevenin's equivalent circuit of a resistive network.
3. To obtain transient response of a series R-L-C circuit for step voltage input.
4. To Verify Thevenin Theorem.
5. 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 Circuit parameters of a Two Port Network.

EEA- 306 Java Programming

List of Experiments :-

1. Study of circuit simulation software (any one- TINA-PRO/ PSPICE/ CIRCUIT MAKER/ GPSIM/SAPWIN,MATLAB 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
6. Write a Program to show Inheritance and Polymorphism
7. Write a program to show Interfacing between two classes
8. Write a program to Add a Class to a Package
9. Write a program to demonstrate AWT.
10. Write a program to Hide a Class
11. Write a Program to show Data Base Connectivity Using JAVA
12. Write a Program to show “HELLO JAVA ” in Explorer using Applet
13. Write a Program to show Connectivity using JDBC
14. Write a program to demonstrate multithreading using Java.
15. Write a program to demonstrate applet life cycle.

EEA- 307 Self study /GD Seminar

The main objective is to improve the mass communication and convincing/understanding skills of students .And to give the students an opportunity to exercise their rights to express themselves.The evaluation will be done based on their presentation work and group discussion.