

BEA-301 Engineering Mathematics-III

UNIT-I

Numerical Methods – 1 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 – 2 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 – 3 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 predictor-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, 2006.
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 Stall, 2003 (Reprint).
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

EXA- 302 Signals and Systems

UNIT-I

Classification of signals and systems: Continuous time signals (CT signals), Discrete time signals (DT signals) - Step, ramp, pulse, impulse, sinusoidal and exponential signals, basic operations on signals, classifications of CT and DT signals- Periodic and aperiodic signals, energy and power signals, random signals, CT systems and DT systems, basic properties of systems, basic properties of systems, linear time invariant systems and properties.

UNIT-II

Analysis of continuous time signals: Time and frequency domain analysis, Fourier series analysis, spectrum of CT signals, Fourier transform and Laplace transform, region of convergence, wavelet transform.

UNIT-III

Linear time invariant continuous time systems: Differential equations representation, block diagram representation, state variable representation and matrix representation of systems, impulse response, step response, frequency response, reliability of systems, analog filters.

UNIT-IV

Analysis of discrete time signals: Convolution sum and properties, sampling of CT signals and aliasing, DTFT and properties, Z transform and properties, inverse Z transform.

UNIT-V

Linear time invariant discrete time systems: Difference equations, block diagram representation, impulse response, analysis of DT LTI systems using DTFT and Z transform, state variable equations and matrix representation of systems, Digital filters.

REFERENCES

1. Alan V. Oppenheim, Alan S. Willsky, S Hamid Nawab, 'Signals and Systems', 2nd edition 2015 Pearson New International Edition
2. A. Anand Kumar, Signals and Systems, PHI, III edition, 2015
3. Mahmood Nahvi, Signals and Systems, McGraw Hill
4. Simon Haykins and Barry Van Veen, Signals and Systems, Wiley India
5. A. Nagoor Kani; 'Signals and Systems' McGraw Hill
6. Robert A. Gabel and Richard A. Roberts, Signals & Linear Systems, Wiley.
7. Rodger E. Ziemer, William H. Tranter, D. Ronald Fannin. Signals & systems, Pearson Education.

EXA- 303 Electrical Measurements and Instruments

UNIT-I

Galvanometers – Theory, principle of operation and construction of ballistic galvanometer, D'Arsonval galvanometer, Definition of analog & digital instruments, Classification of analog instruments, their operating principle, Operating force, Types of supports, Damping, Controlling.

UNIT-II

Different types of Ammeter & Voltmeter – PMMC, MI, Electrodynamometer, Induction, Expression for control & deflection torque, their advantages, disadvantages & error, Extension of range of instruments using shunt & multiplier. Digital Voltmeter, Ammeter, Multimeter and Wattmeter.

UNIT-III

Instrument transformers: Potential and current transformers, ratio and phase angle errors, testing of instrument transformers, Difference between CT and PT, errors and reduction of errors.

UNIT-IV

Measurement of power: Power in AC and DC Circuit, Electrodynamometer type of wattmeter, Construction, theory, operation & error, Low power factor & UPF wattmeter, Double element and three element dynamometer wattmeter, Measurement of power in three phase circuit, one, two & three wattmeter method, Measurement of reactive power by single wattmeter, Measurement of power using CTs & PTs]

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UNIT-V

Measurement of Energy: Single phase and three phasedigital / Electronic energy meter – construction & operation – Energy flow and power calculations, errors – Testing by phantom loading, Tri-vector meter, Maximum demand meter, Ampere hour meter.

Power factor meter– Single phase and three phase Electro-dynamometer type & moving iron type. **Frequency meter** – Vibrating reed, Resonance type & Weston type, Synchronoscope, **Ohmmeter** –series & stunt type, Megger & Ratio meter.

Resistance Measurement – Classification of low, medium & high resistance – Voltmeter-Ammeter method, Wheatstone Bridge, Kelvin's double bridge & loss of charge methods for resistance measurement, Earth resistance measurement.

Magnetic Measurement – B-H Curve, Hysteresis Loop determination, Power loss in sheet metal – Lloyd Fischer square for measurement of power loss.

Topics for the laboratory (Expandable):

1. Measurement of low resistance using Kelvin's Double bridge
2. Measurement of medium resistance using Wheatstone's bridge
3. Measurement of high resistance by loss of charge method
4. Measurement of Insulation resistance using Megger

5. Measurement of earth resistance by fall of potential method and verification by using earth tester
6. Measurement of power in a single phase ac circuit by 3 voltmeter/ 3 Ammeter method
7. Calibration of a dynamometer type of wattmeter with respect to a standard/Sub Standard wattmeter
8. Calibration of single phase digital/ Electronic type energy meter.
9. Calibration of a dynamometer type of wattmeter by Phantom Loading method.
10. Measurements using Instrument Transformers.
11. Study of various types of Indicating Instruments.
12. Measurement of Power in three phase circuit by one, two & three wattmeters.

Text book:-

1. A.K. Sawhney; 'A course in Electrical & Electronic Measurements & Instrumentation'; Dhanpat Rai & co(p) Ltd ,New Delhi

Reference books:-

1. G. K. Banerjee, 'Electrical and Electronic Measurements'. PHI Learning Pvt.Ltd.
2. R. B. Northrop, 'Introduction to Instrumentation and Measurement'; CRC press Taylor & Francis
3. Vijay Singh; 'Fundamentals of Electrical & Electronic Measurements', New Age International Publishers.

EXA-304 Network Analysis

UNIT-I

Introduction to circuit elements R,L,C and their characteristics in terms of linearity & time dependent nature, voltage & current sources controlled & uncontrolled sources KCL and KVL analysis, Nodal & mesh analysis, analysis of magnetically coupled circuits, Transient analysis :- Transients in RL, RC&RLC Circuits, initial conditions, time constants. Steady state analysis- Concept of phasor & vector, impedance & admittance, Network topology, concept of Network graph, Tree, Tree branch & link, Incidence matrix, cut set and tie set matrices, dual networks, Dot convention, coupling co- efficient, tuned circuits, Series & parallel resonance.

UNIT-II

Network Theorems for AC & DC circuits- Thevenins & Norton's, Superpositions, Reciprocity, Compensation, Substitution, Maximum power transfer, and Millman's theorem, Tellegen's theorem, problems with dependent & independent sources.

UNIT-III

Frequency domain analysis – Laplace transform solution of Integro-differential equations, transform of waveform synthesized with step ramp, Gate and sinusoidal functions, Initial & final value theorem, Network Theorems in transform domain

UNIT-IV

Concept of signal spectra, Fourier series co-efficient of a periodic waveform, symmetries as related to Fourier coefficients, Trigonometric & Exponential form of Fourier series.]

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UNIT-V

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 network.

Topics for the laboratory (Expandable):

1. To Verify Thevenin Theorem.
2. To Verify Superposition Theorem.
3. To Verify Reciprocity Theorem.
4. To Verify Maximum Power Transfer Theorem.
5. To Verify Millman's Theorem.
6. To Determine Open Circuit parameters of a Two Port Network and to Determine Short Circuit parameters of a Two Port Network.
7. To Determine A,B, C, D parameters of a Two Port Network
8. To Determine h parameters of a Two Port Network
9. To Find Frequency Response of RLC Series Circuit.
10. To Find Frequency Response of RLC parallel Circuit.

REFERENCES

1. M.E. Van Valkenburg, Network Analysis, Pearson
2. William H Hayt. & Jack E. Kemmerly, Steven M Durbin; Engineering Circuit Analysis; McGrawHill
3. Richard C Dorf, James A Svoboda, Introduction to Electric Circuits, Wiley India, 2015
4. Charles K. Alexander & Matthew N.O. Sadiku: Electrical Circuits; McGrawHill
5. J David Irwin, Robert M Nelms, Engineering Circuit Analysis, Wiley India, 2015
6. Robert L Boylestad, introductory circuit analysis, Pearson, 2016
7. M S Sukhija, T K Nagsarkar; Circuits and Networks, Oxford University Press, 2015
8. Samarajit Ghosh, Network Theory Analysis and Synthesis

EXA-305 Analog Electronics

UNIT-I

Semiconductor Diodes: Theory of P-N junction, temperature dependence and break down characteristics, junction capacitances, Zener diode, Varactor diode, Tunnel diode, PIN diode, LED, Photo diode, Schottky diode, Diode applications: series –parallel configurations, full wave and half wave rectification, voltage multiplier circuits, diode testing.

UNIT-II

Transistors: BJT, types & configuration, working principle, characteristics, and region of operation, load line, biasing methods, Small signal analysis of transistor (low frequency) using h-parameters, thermal runaway and thermal stability. FET, MOSFET, Transistor as an amplifier, gain, bandwidth, frequency response.

UNIT-III

Feedback amplifier and Oscillators: Feedback amplifier, negative feedback, voltage-series, voltage shunt, current series and current shunt feedback, Sinusoidal oscillators, L-C (Hartley-Colpitts) oscillators, RC phase shift, Wien bridge, and Crystal oscillators. Power amplifiers, class A, class B, class A B, C amplifiers, their efficiency and power Dissipation, Push-pull and complementary symmetry push-pull amplifier.

UNIT-IV

Wave Shaping circuits: Switching characteristics of diode and transistor, turn ON, OFF time, reverse recovery time, transistor as switch, Multivibrators, Bistable, Monostable, Astable multivibrators. Clipper and clamper circuit, Differential amplifier, calculation of differential, common mode gain and CMRR using h- parameters, Darlington pair, Boot strapping technique. Cascade and cascade amplifier.

UNIT-V

Operational Amplifier: Operational amplifier basics, practical Op-amp circuits & characteristics, slew rate, bandwidth, offset voltage, basic current, application, inverting, non-inverting amplifier, summer, average, differentiator, integrator, differential amplifier, instrumentation amplifier, log and antilog amplifier, voltage to current and current to voltage converters, comparators Schmitt trigger, active filters, 555 timer and its application.

Topics for the laboratory (Expandable):

1. Design & measure the frequency response of an RC coupled amplifier using discrete components.
2. Design a two stage RC coupled amplifier and determine the effect of cascading on gain and bandwidth.
3. Study the effect of voltage series, current series, voltage shunt and current shunt feedback on amplifier using discrete components.
4. Design & realize inverting, non-inverting and buffer amplifier using 741 op-amps.
5. Verify the operation of a differentiator circuit using op amp IC 741 and show that it acts as a high pass filter.

6. Verify the operation of an integrator circuit using op amp 741 and show that it acts as a low pass filter.
7. Design & Verify the operation of adder and subtractor circuit using op amp 741.
8. Plot frequency response of AC coupled amplifier using op amp 741 and study the effect of negative feedback on the bandwidth and gain of the amplifier.
9. Study of IC 555 as astable and monostable multivibrator.
10. Design & realize using op amp 741, wein-bridge oscillator

REFERENCES

1. Robert L Boylestad, Louis Nashelsky; Electronic Devices and Circuits; Pearson
2. Jacob Millman, Cristos C Halkias, Satyabrata Jit; Electronic Devices and Circuits; McGraw-Hill
3. Anil K Maini, Electronic Devices and Circuits, Wiley
4. S Salivahanan, N Suresh Kumar; Electronic Devices and Circuits; McGraw- Hill

EXA- 306 Computer Programming-I (JAVA)

UNIT-I

Basic Java Features - C++ Vs JAVA, JAVA virtual machine, Constant & Variables, Data Types, Class, Methods, Objects, Strings and Arrays, Type Casting, Operators, Precedence relations, Control Statements, Exception Handling, File and Streams, Visibility, Constructors, Operator and Methods Overloading, Static Members, Inheritance: Polymorphism, Abstract methods and Classes

UNIT-II

Java Collective Frame Work - Data Structures: Introduction, Type-Wrapper Classes for Primitive Types, Dynamic Memory Allocation, Linked List, Stack, Queues, Trees, Generics: Introduction, Overloading Generic Methods, Generic Classes, Collections: Interface Collection and Class Collections, Lists, Array List and Iterator, Linked List, Vector. Collections Algorithms: Algorithm sorts, Algorithm shuffle, Algorithms reverse, fill, copy, max and min Algorithm binary Search, Algorithms add All, Stack Class of Package java. Until, Class Priority Queue and Interface Queue, Maps, Properties Class, Un-modifiable Collections.

UNIT-III

Advance Java Features - Multithreading: Thread States, Priorities and Thread Scheduling, Life Cycle of a Thread, Thread Synchronization, Creating and Executing Threads, Multithreading with GUI, Monitors and Monitor Locks. Networking: Manipulating URLs, Reading a file on a Web Server, Socket programming, Security and the Network, RMI, Networking, Accessing Databases with JDBC: Relational Database, SQL, MySQL, Oracle.

UNIT-IV

Advance Java Technologies - Servlets: Overview and Architecture, Setting Up the Apache Tomcat Server, Handling HTTP get Requests, Deploying a web Application, Multitier Applications.

UNIT-V

Using JDBC from a Servlet, Java Server Pages (JSP): Overview, First JSP Example, Implicit Objects, Scripting, Standard Actions, Directives, Multimedia: Applets and Application: Loading, Displaying and Scaling Images, Animating a Series of Images, Loading and playing Audio clips

Advance Web/Internet Programming (Overview): J2ME, J2EE, EJB, XML.

References:

1. Deitel & Deitel, "JAVA, How to Program"; PHI, Pearson.
2. E. Balaguruswamy, "Programming In Java"; TMH Publications
3. The Complete Reference: Herbert Schildt, TMH
4. Peter Norton, "Peter Norton Guide To Java Programming", Techmedia.
5. Merlin Hughes, et al; Java Network Programming , Manning Publications/Prentice Hall

List of Program to be perform (Expandable)

1. Installation of J2SDK
2. Write a program to show Concept of CLASS in JAVA
3. Write a program to show Type Casting in JAVA
4. Write a program to show How Exception Handling is in JAVA
5. Write a Program to show Inheritance and Polymorphism
6. Write a program to show Interfacing between two classes
7. Write a program to Add a Class to a Package
8. Write a program to demonstrate AWT.
9. Write a program to Hide a Class
10. Write a Program to show Data Base Connectivity Using JAVA
11. Write a Program to show “HELLO JAVA ” in Explorer using Applet
12. Write a Program to show Connectivity using JDBC
13. Write a program to demonstrate multithreading using Java.
14. Write a program to demonstrate applet life cycle.

EXA- 307 Self Study /GD Seminar

Objective of GD and seminar is to improve the mass communication and convincing / understanding skills of students and it is to give student an opportunity to exercise their rights to express themselves. Evaluation will be done by assigned faculty based on group discussion and power point presentation.