

## **B.E. 301 - ENGINEERING MATHEMATICS II**

### **Unit I**

Fourier Series: Introduction of Fourier series , Fourier series for Discontinuous functions, Fourier series for even and odd function, Half range series    Fourier Transform: Definition and properties of Fourier transform, Sine and Cosine transform.

### **Unit II**

Laplace Transform: Introduction of Laplace Transform, Laplace Transform of elementary functions, properties of Laplace Transform, Change of scale property, second shifting property, Laplace transform of the derivative, Inverse Laplace transform & its properties, Convolution theorem, Applications of L.T. to solve the ordinary differential equations

### **Unit III**

Second Order linear differential equation with variable coefficients : Methods one integral is known, removal of first derivative, changing of independent variable and variation of parameter, Solution by Series Method

### **Unit IV**

Linear and Non Linear partial differential equation of first order: Formulation of partial differential equations, solution of equation by direct integration, Lagrange's Linear equation, charpit's method. Linear partial differential equation of second and higher order: Linear homogeneous and Non homogeneous partial diff. equation of nth order with constant coefficients. Separation of variable method for the solution of wave and heat equations

### **Unit V**

Vector Calculus: Differentiation of vectors, scalar and vector point function, geometrical meaning of Gradient, unit normal vector and directional derivative, physical interpretation of divergence and Curl. Line integral, surface integral and volume integral, Green's, Stoke's and Gauss divergence theorem

### **References**

- (i)     Advanced Engineering Mathematics by Erwin Kreyszig, Wiley India
- (ii)    Higher Engineering Mathematics by BS Grewal, Khanna Publication
- (iii)   Advance Engineering Mathematics by D.G.Guffy
- (iv)    Mathematics for Engineers by S.Arumungam, SCITECH Publication
- (v)     Engineering Mathematics by S S Sastri. P.H.I.

## **EE- 302 Electrical Engg. Materials**

### **Unit I**

Conducting Material: Classification and main properties, High resistivity alloy: Constant Mangann, Nichrome, Electrochemical, properties of copper, Aluminum, steel tungsten, Molybdenum, Platinum, Tantalum, Niobium, Mercury, Nickel, Titanium, Carbon, Lead, thermal, Bitmetals, thermocouple, materials, specific resistance, conductance, variation of resistance with temperature, super conductors.

### **Unit II**

Semi Conductor Materials: General conception, variation of electrical conductivity, Elements having semiconductor properties, general application, hall effect, energy levels, conduction in semiconductors, Intrinsic conduction, impurity conduction, P and N type impurities, electrical change, Neutrality, Drift, Mobility current flow in semi conductors P-N junction formation by alloying, Elasing (forward and reverse) of P-n junction, Reverse separation current, Zener effect, Junction, capacitance, hall defects and hall coefficient.

### **Unit III**

Magnetic Materials: Details of magnetic materials, reduction between B.H. and  $\square$ , soft and hard magnetic materials. Di-magnetic, Para magnetic and Ferromagnetic materials, electrical sheet steel, cast iron. Permanent magnetic materials. Dynamic and static hysteresis loop. Hysteresis loss, eddy current loss, Magnetisation, magnetic susceptibility, coercive force, core temperature, rectangular hysteresis loop, Magnet rest square loop core materials, iron silicon, Iron alloys.

### **Unit IV**

Insulating Materials: General electrical mechanical and chemical properties of insulating material, Electrical characteristics volume and surface resistivity complex permittivity loss, and dielectric loss, equivalent circuits of an imperfect dielectric polarization and polarisability classification of dielectric.

### **Unit V**

Mechanical Properties: Classification insulating materials on the basis of temperature rise. General properties of transformer oil, commonly used varnishes, solidifying insulating materials, resins, bituminous waxes, drying oils, Fibrous insulating materials, wood, paper and cardboard, insulating textiles, varnished adhesive tapes, inorganic fibrous material and other insulating materials, such as mica, ceramic, bakelite, ebonite, glass, PVC, rubber, other plastic molded materials.

#### **References:**

1. TTTI Madras; Electrical Engineering Materials; TMH.
2. Electrical Engineering Materials & Devices; John Allison ;TMH
3. Materials for Electrical Engineering: B.M. Tareev
4. Anderson; Di-Electrics :
5. Kortisky; Electrical Engineering Materials:
6. Indulkar and S. Thruvengadem; Electrical Engineering Materials; S. Chand
7. Dekkor AK; Electrical Engineering Materials; PHI.

## EE - 303 Electrical Instrumentation

### Unit I

**Measurement** and error, Accuracy and precision, sensitivity resolution, Error & Error analysis, Effect of temperature, Internal friction, Stray field, Hysteresis and Frequency variation & method of minimizing them, Loading effects, due to shunt connected and series connected instruments, calibration curve, Testing & calibration of instruments.

Galvanometers – Theory & operation of ballistic galvanometer, D'Arsonval galvanometer, galvanometer motion & damping, Sensitivity, Flux meter, Vibration galvanometer, Spot deflection 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, Hotwire, Electrostatic, Induction, Rectifier, Ferro dynamic & Electro-thermic, Expression for control & deflection torque, their advantages, disadvantages & error, Extension of range of instruments using shunt & multiplier.

### 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.

**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.

### Unit IV

**Measurement of Energy:** Single phase induction type energy meter – construction & operation – driving and braking torques – errors & compensations – Testing by phantom loading and using R.S.S. meter- Three phase energy meter – Tri-vector meter – Maximum demand meter, Ampere hour meter.

Potentiometer – DC potentiometer standardization – Lab type Crompton's potentiometer, application of DC potentiometer, AC polar type and coordinate type potentiometer, their construction and applications.

### Unit V

**Miscellaneous Instruments & Measurements:** **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 & shunt type, Multi-meter, Megger & Ratio meter.

**Resistance Measurement** – Classification of low, medium & high resistance – Voltmeter, Ammeter, 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.

#### **References:**

1. E W Golding & F C Widdis; Electrical Measurement & Measuring Instruments; Wheeler Pub.
2. A.K. Sawhney; Electrical & Electronic Measurements & Instrument; Dhanpat Rai & Sons Pub.
3. Buckingham & Price; Electrical Measurements; Prentice Hall

**List of experiments (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 a induction type single phase 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.

## **EE - 304 Semiconductor Devices and circuits**

### **Unit I**

Semiconductor device, theory of P-N junction, temperature dependence and break down characteristics, junction capacitances, Zener diode, Varactor diode, PIN diode, LED, Photo diode, Transistors BJT, FET, MOSFET, types, working principal, characteristics, and region of operation, load line biasing methods,. transistor as an amplifier, gain, bandwidth, frequency response, Various applications of diode and special diodes.

### **UNIT II**

Small signal analysis of transistor (low frequency) using h-parameters, thermal runaway and thermal stability.

### **Unit III**

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, Pushpull and complimentary pushpull amplifier.

### **Unit IV**

Switching characteristics of diode and transistor, turn ON, OFF time, reverse recovery time , transistor as switch , Multivibrators, Bistable, Monostable, Astable multivibrators. Clippers and clampers, 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 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.

### **References:**

1. Nashelsky & Boysted; Electronic Devices and Circuits; PHI
2. Millman Halkias; Electronic Devices and Circuits; McGraw- Hill
3. Achuthan MA and Bhatt KN; Fundamentals of semiconductor devices; TMH
4. Neamen Donald; Semiconductor Physics and devices
5. Millman & Grabel; Micro Electronics; McGraw-Hill
6. Bogart; Electronic Devices and Circuits; Universal Book Stall, NDelhi
7. Millman & Halkias; Integrated Electronics; McGraw- Hill.
8. Tobbey; OP- Amps their design and Application
9. R.A. Gaikward; OP- Amp and linear Integreted circuit; PHI
10. D. Raychowdhary and Shail Jain; Linear Integrated Circuits
11. Botkar; Integrated Circuits; Khanna
12. Clayton; Applications of linear Integrated circuits
13. I.J. Nagrath; Electronics -Analog and Digital; PHI

### **List of experiments (Expandable):**

- 1 V-I Characteristics of different types of Diodes.
- 2 Applications of diodes and Design of various clipping and clamping circuits.
- 3 Design half & full wave rectifier
- 4 Design & Analysis of transistor amplifier in CE, CB & CC configuration.
- 5 Design & Analysis of JFET Amplifier.

6 Design & Analysis of MOSFET Amplifier.

7 To study and construct power amplifiers of various classes.

8 Study of various oscillators.

9 Char. of Op-Amp (input offset voltage, slew rate CMRR, BW, Input bias current )

10 Linear application of OP-Amp (voltage follower, inverting and non-inverting amplifier and their frequency response adder subtractor differential amplifier, integrator and differential frequency response) .

11 study of Op-Amp as a comparator

12 design of Schmitt trigger

13 Design of monoastable & astable multivibrator

NOTE- All experiments (wherever applicable) should be performed through the following steps.

**Step 1:**

Circuit should be designed/ drafted on paper.

**Step 2:** Where ever applicable the designed/drafted

circuit should be simulated using Simulation S/W (TINA-V7/ PSPICE/ Labview/ CIRCUIT MAKER etc.).

**Step 3:** The designed/drafted circuit should be tested on the bread board and compare the results with the simulated results.

**Step 4:** Where ever required the bread board circuit should be fabricated on PCB.

## **EE - 305 Network Analysis**

### **Unit I**

Introduction to circuit elements R,L,C and their characteristics in terms of linearity & time dependant 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.

### **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.

### **References:**

1. M.E. Van Valkenburg, Network Analysis, (PHI)
2. F.F.Kuo, Network Analysis.
3. Mittal GK; Network Analysis; Khanna Publisher
4. Mesereau and Jackson; Circuit Analysis- A system Approach; Pearson.
5. Sudhakar & Pillai; Circuit & Networks- Analysis and Synthesis; TMH
6. Hayt W.H. & J.E. Kemmerly; Engineering Circuit Analysis; TMH
7. Decarlo lin; Linear circuit Analysis; Oxford
8. William D Stanley : Network Analysis with Applications, Pearson Education
9. Roy Choudhary D; Network and systems; New Age Pub
10. Charles K. Alexander & Matthew N.O. Sadiku: Electrical Circuits :TMH
11. Chakraborti :Circuit theory: Dhanpat Rai
12. B.Chattopadhyay & P.C.Rakshit; Fundamental of Electrical circuit theory; S Chand
13. Nilson & Riedel , Electric circuits ;Pearson

### **List of experiments (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.

7. To Determine Short Circuit parameters of a Two Port Network.
8. To Determine A,B, C, D parameters of a Two Port Network
9. To Determine h parameters of a Two Port Network
10. To Find Frequency Response of RLC Series Circuit.
11. To Find Frequency Response of RLC parallel Circuit.

NOTE- - All experiments (wherever applicable) should be performed through the following steps.

**Step 1:** Circuit should be designed/ drafted on paper. **Step 2:** Where ever applicable the designed/drafted circuit should be simulated using Simulation S/W (TINA-V7/ PSPICE/ Labview/ CIRCUIT MAKER etc.). **Step 3:** The designed/drafted circuit should be tested on the bread board and compare the results with the simulated results. **Step 4:** Where ever required the bread board circuit should be fabricated on PCB.



## **EE - 306 Java Technology**

### **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. Util, 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, 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

### **UNIT-V**

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.

### **EE -307 Self Study (Internal Assessment)**

**Objective of Self Study:** is to induce the student to explore and read technical aspects of his area of interest / hobby or new topics suggested by faculty.

**Evaluation** will be done by assigned faculty based on report/seminar presentation and viva.

### **EE -308 Seminar / Group Discussion(Internal Assessment)**

**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.