2/4 B.Tech. FIRST SEMESTER

EE3T5 Electrical Circuit Analysis-II Credits: 4

Lecture: 4 periods/week **Internal assessment: 30 marks**
Tutorial: 1 period /week **Semester end examination: 70 marks**

Objective: Electrical Circuit Analysis-II is the foundation for all subjects of the Electrical Engineering discipline. The emphasis of this course is laid on the basic analysis of circuits which includes Theorems for AC, Three phase circuits, Transient analysis, Laplace transforms, network topology and Fourier series and transforms

Learning outcomes:

1. Upon completion of this course student will be able to understand the network topology and can draw the graph and derive the required matrix equations and can draw locus diagrams
2. Can analyze and measure power for 3Φ, balanced and unbalanced networks and will learn different relations between line and phase values of voltage and current
3. Can find the transient response f the circuit and can apply Laplace and Fourier Transforms for simple electrical circuits.

UNIT-I Network topology:
Definitions – Graph – Tree, Basic Cutset and Basic Tieset matrices for planar networks – Loop and Nodal methods of analysis of Networks with dependent & independent voltage and current sources – Duality & Dual networks.

UNIT-II Locus diagrams & Resonance:
Locus diagrams - series R-L, R-C, R-L-C and parallel combination with variation of various parameters - Resonance-series, parallel circuits, concept of band width and Q factor.

UNIT-III Circuit Theorems (A.C Excitation):
Nodal Analysis, Mesh Analysis, Superposition Theorem, Source Transformation, Thevenin's, Norton's, Maximum Power Transfer Theorem for A.C Excitation.

UNIT-IV Balanced Three phase circuits:
Three phase circuits: Phase sequence- Star and delta connection-Relation between line and phase voltages and currents in balanced systems-Analysis of balanced three phase circuits-Measurement of Active and Reactive power in balanced Three Phase systems.

UNIT-V Unbalanced Three phase circuits:
Analysis of Three Phase unbalanced circuits-Loop Method- Application of Millman's Theorem-Star Delta Transformation Technique – Two Wattmeter Method of measurement of three phase power.

UNIT-VI Laplace Transforms:
Introduction, Definition of Laplace Transforms, Properties of Laplace Transform, Laplace Transform of Step, Ramp, Pulse and Impulse Signals, Laplace Transform of Periodic Signals, Convolution Integral, Application to Circuits, Inverse Laplace Transforms.

UNIT-VII Time Response of Circuits:
Transient response of R-L, R-C, R-L-C series circuits for sinusoidal excitations-Initial conditions-Solution method using differential equations and Laplace transforms.

UNIT-VIII .Fourier analysis of A.C Circuits:
Trigonometric form and exponential form of Fourier series – conditions of symmetry- line spectra and phase angle spectra, Average Power and RMS Values- Analysis of Electrical Circuits to non sinusoidal periodic waveforms.

Text Books:

- "Fundamentals of Electric Circuits" Charles K.Alexander, Mathew N.O.Sadiku, Tata McGraw-Hill.
- Circuits & Networks Analysis & Synthesis by A. Sudhakar and Shyammohan S Palli, Tata McGraw- Hill.
- 3000 Solved Problems in Electrical Circuit by Schaum's solved problem series Tata McGraw- Hill.
- Circuit Theory by A.Chakrabarti Danapat Rai & Co publisher.

Reference Books:

- Engineering Circuit Analysis by William Hayt and Jack E.Kemmerley, McGraw Hill Company, 6 th edition
- Network Analysis by N.C.Jagan, C.Lakshmi Narayana BS publications 2nd edition.
- Network Analysis: Van Valkenburg; Prentice-Hall of India Private Ltd.