

**1/4 B.Tech. SECOND SEMESTER
ELECTRICAL CIRCUIT ANALYSIS-I**

EE2T5**(Only for EEE during I B.Tech., II semester)****Credits: 3****Lecture: 3 periods/week****Internal assessment: 30 marks****Tutorial: 1 period /week****Semester end examination: 70 marks****Course Objectives:**

Electrical Circuit Analysis-I is the foundation for all subjects of the Electrical Engineering discipline.

- Apply basic laws: Ohms law, KVL, KCL.
- Analyze resistive networks' and simplify complicated networks.
- Use different circuit analysis techniques: Nodal analysis- mesh analysis to find branch currents and node voltages
- Deal with circuit containing energy storage elements.
- Perform Phasor frequency domain analysis.
- Find the Basic Cut-set and Basic Tie-set matrices for planar networks and duality.
- Know the basic concepts of ac circuits, three phase loads and power measurement for both balanced and unbalanced three phase circuits.

Course Outcomes:

1. Apply knowledge of mathematics, science, and engineering to the analysis and design of DC and single phase ac electrical circuits.
2. Identify, formulate, and solve engineering problems in the area of Electrical circuits
3. Design an electric system, or process to meet desired needs within realistic constraint
4. Understand the basic concepts of electrical circuits and also basic laws of electrical circuits and their application to electrical circuits.
5. Learns the basic concepts of single phase AC circuits.
6. Understand the basic concepts of three phase electrical circuits.
7. Can measure the power in both balanced and unbalanced three phase circuits
8. Student can do frequency domain analysis.
9. Student will get the ability to participate and try to succeed in competitive examinations.

UNIT I**Basic Laws and Network topology**

Circuit concepts –Resistor(R)-Inductor (L)-Capacitor(C)-Voltage and Current Sources - Voltage, Current relationship for passive bilateral elements - Ohm's law Kirchhoff's laws - voltage division, current division - Source Transformation – wye delta / delta-wye transformation – Definitions – Graph – node – branch – links – twigs - Tree, co-tree Basic Cut-set and Basic Tie-set matrices for planar networks — Duality & Dual networks.

Unit II**Methods of Analysis:**

Nodal analysis - mesh analysis - super node and super mesh analysis of Networks with dependent and independent voltage and current sources for both DC and AC excitation

UNIT III**Part A: Single Phase A.C Circuits:**

Sinusoidal alternating quantities – Phase and Phase difference – Complex and polar forms of representations, J-notation, R.M.S, Average values and form factor for different periodic

wave forms - Concept of Reactance, Impedance Susceptance and Admittance-Power Factor and significance-Real and Reactive power, Complex Power.

Part B: 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 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 active and reactive power.

Learning Resources

Text Books:

1. "Fundamentals of Electric Circuits "Charles K.Alexander, Mathew N.O.Sadiku, Tata McGraw-Hill.
2. Circuits & Networks Analysis & Synthesis by A. Sudhakar and Shyammohan S Palli, Tata McGraw- Hill.
3. 3000 Solved Problems in Electrical Circuit by Schaum's solved problem series Tata McGraw- Hill.
4. Circuit Theory by A.Chakrabarti Danapat Rai & Co publisher.

Reference Books:

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

Web Resources:

1. <http://nptel.ac.in/courses.php>
2. <http://jntuk-coerd.in/>