CIRCUIT ANALYSIS-I (THEORY) EE-100

Pre-requisite: none
Credit Hours 03
Contact Hours 48

RECOMMENDED BOOKS

- J. David Irwin and Robert M. Nelms, "Basic Engineering Circuit Analysis," (Latest Edition), John Wiley & Sons
- Charles K. Alexander, Matthew Sadiku "Fundamentals of Electric Circuits", (Latest Edition), McGraw Hill Higher Education.

REFERENCE BOOKS

- William H. Hayt, Jack Kemmerly and Steven M. Durbin, "Engineering Circuit Analysis," (Latest Edition), McGraw-Hill,
- Nilsson Riedel "Electric Circuits" (Latest Edition).

OBJECTIVE OF COURSE

The objective of this course is the analysis of physical circuits through the use of Kirchhoff's laws and ideal circuit element models. Strong emphasis is placed on the formulation of nodal equations for linear resistive circuits as a foundation, but generalizations necessary for handling nonlinear elements are also highlighted. Consequences of linearity are emphasized through superposition and Thevenin /Norton equivalents. Transient analysis of first order circuits with unit step inputs and switched dc sources is emphasized to promote understanding of time-domain linear circuit response.

S.NO	CLO/PLOS MAPPING	DOMAIN	PLO
01	**Define basic concepts**, network laws and theorems used to analyze linear circuits.	C1	01
02	**Analyze** the linear circuits using the network laws and theorems-	C4	02
03	**Describe** the behavior of energy storing elements and their transient response analysis.	C2	01
04	**Analyze** the steady state response of resistive and reactive elements to AC excitation.	C4	02

COURSE CONTENTS

Basic Electrical Concepts

- Charge, Current, Voltage, Power
- Voltage and Current source

Voltage and Current Laws

- Ohm's Law
- Kirchhoff's Current Law
- Kirchhoff's Voltage Law
- Voltage Division in Series
- Current Division in Parallel
- Series and Parallel Sources

Nodal and Mesh Analysis

- Nodal Analysis and Super Node
- Mesh Analysis and Super Mesh
- Comparison between Nodal and Mesh Analysis

Circuit Analysis Techniques

- Linearity and Superposition
- Source Transformation
- Thevenin's and Norton's Theorem
- Maximum Power Transfer
- Delta-Wye Transformations

Energy Storing Elements

- The Inductor
- The Capacitor
- Physical construction and Mathematical Model

First Order Circuits (RL and RC)

- Transient Response
- Steady State Response
- Unit Step Response

Steady State AC Circuits

- Introduction to sinusoids and Phasors
- Impedance and admittance
- Kirchhoff's Law and analysis in frequency domain
- Power calculations and power factor.
- Simple Applications