2/4 B.Tech. THIRD SEMESTER

EE3T4 ELECTRICAL CIRCUIT ANALYSIS-II Credits : 3

Lecture: 3 periods/week Internal Assessment: 30 Marks

Tutorial: 1 period /week Semester end examination: 70 Marks

Course Objectives:

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

- Verifies Circuit Theorems for D.C and A.C Excitation.
- Calculates the Two port network parameters.
- Determine transient and steady state responses of first order and second order circuits including switches for D.C Excitation and sinusoidal excitation.
- Application of Laplace Transforms to electrical circuits with different inputs.
- To do Analysis of Electrical Circuits to non sinusoidal periodic waveforms using Fourier analysis.

Course Outcomes:

1. Apply knowledge of mathematics, science, and engineering to the analysis and design of ac single phase and three phase 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. Gets familiar with the circuit theorems for DC and AC excitation.
5. Can do the time response analysis of electrical circuits for DC and AC excitation and also can derive different network parameters.
6. Can analyse electrical circuits in time domain using Laplace Transforms and Fourier analysis.
7. Student will get the ability to participate and try to succeed in competitive examinations

UNIT I

Circuit Theorems for DC and A.C Excitation.

Linearity Property – Superposition - Thevenin's Theorem, Norton's theorem Superposition Theorem, Maximum Power Transfer Theorem, Millman's theorem, Tellegen's, Reciprocity and compensation theorems.

UNIT II

Two Port Networks

Two port network parameters – Z, Y, ABCD and hybrid parameters and their relations, Interconnection of Two-Port networks

UNIT III

Part A: 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.

Part B. **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, Fourier transforms.

UNIT IV

Time Response of Circuits (DC Excitation):

Time response of R-L, R-C, R-L-C series circuits for Zero input, Step input, pulse input - Initial conditions-solution method using differential equation and Laplace transforms.

UNIT V

Time Response of Circuits: (Sinusoidal Excitation)

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.

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, McGraw Hill Company, 6^{th} edition
2. Network Analysis by N.C.Jagan, C.Lakshmi Narayana BS publications 2^{nd} edition.
3. Network Analysis: Van Valkenburg; Prentice-Hall of India Private Ltd.