II Year I Semester **L T P C**

Code: 20EE3001 **3 0 0 3**

ELECTRICAL CIRCUIT ANALYSIS

Preamble: This course aims at study of three phase systems, transient analysis, network synthesis and Fourier analysis for the future study and analysis of power systems.

Course Objectives

1. To study the transient behaviour of electrical networks with DC, pulse excitations.
2. To study the transient behaviour of electrical networks with AC excitations.
3. To study the performance of a network based on input and output excitation/response.
4. To understand the realization of electrical network function into electrical equivalent passive elements.
5. To understand the application of Fourier series and Fourier transforms for analysis of electrical circuits

Course Outcomes

1. Find the transient response of electrical networks for different types of excitations
2. Find parameters for different types of networks.
3. Realize electrical equivalent network for a given network transfer function.
4. Extract different harmonics components from the response of a electrical network.

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P010	PO11	P012	PSO1	PSO2	PSO3
CO1	3	3											2	1	
CO2	3	3											2	1	
CO3	3	3											2	1	
CO4	3	3											2	1	

1 – Weak, 2 – Moderate and 3 – Strong

Unit – I: Transient Analysis in DC Circuits 12 Hours

Transient response of R-L, R-C, R-L-C circuits for DC and pulse excitations, Solution using differential equations and Laplace transforms.

Unit – II: Transient Analysis in AC Circuits 10 Hours

Transient response of R-L, R-C, R-L-C circuits forAC excitations, Solution using differential equations and Laplace transforms.

Unit – III: Two port network 12 Hours

Two port network parameters – Z, Y, ABCD, Hybrid, Inverse ABCD, Inverse Hybrid parameters and their relations, different interconnections of two port networks-series, Cascaded and parallel networks, lattice network.

Unit – IV: Network Synthesis **14 Hours**

Positive real function - basic synthesis procedure -Hurwitz Polynomials-Testing of positive real function- LC immittance functions - RC impedance functions and RL admittance function - RL impedance function and RC admittance function - Foster and Cauer methods

Unit – V: Passive filters **12 Hours**

Classification of filters, Characteristics of ideal filters

Text Books:

1. Engineering Circuit Analysis by William Hayt and Jack E.Kemmerley, McGraw Hill Company, 6^{th} edition
2. Fundamentals of Electrical Circuits by Charles K.Alexander and Mathew N.O.Sadiku, McGraw Hill Education (India)

Reference Books:

1. Network Analysis: Van Valkenburg; Prentice-Hall of India Private Ltd.
2. Fundamentals of Electrical Circuits by Charles K.Alexander and Mathew N.O.Sadiku, McGraw Hill Education (India)
3. Electrical Circuit Analysis-2 by A Sudhakar, Shyammohan S Palli, McGraw Hill Education (India)
4. Circuit Theory (Analysis and Synthesis) by A.Chakrabarthi, DhanpatRai&Co.
5. Electric Circuits by David A. Bell, Oxford publications
6. Electric Circuits– (Schaum's outlines) by Mahmood Nahvi& Joseph Edminister, Adapted by K. Uma Rao, 5th Edition – McGraw Hill