II Year I Semester	L	T	P	C
17EE304	3	1	0	3

ELECTRICAL CIRCUIT ANALYSIS – II

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.

Learning Objectives:
- To study the concepts of balanced and unbalanced three-phase circuits.
- To study the transient behaviour of electrical networks with DC, pulse and AC excitations.
- To study the performance of a network based on input and output excitation/response.
- To understand the realization of electrical network function into electrical equivalent passive elements. To understand the application of Fourier series and Fourier transforms for analysis of electrical circuits.

Unit – I
Balanced Three Phase Circuits:
Phase sequence- star and delta connection - relation between line and phase voltages and currents - analysis of balanced three phase circuits - measurement of active and reactive power.

Unit – II
Unbalanced Three Phase Circuits:
Analysis of three phase unbalanced circuits: Loop method – Star-Delta transformation technique, Millman's method, Two wattmeter methods for measurement of three phase power.

Unit – III
Transient Analysis in DC and AC Circuits:
Transient response of R-L, R-C, R-L-C circuits for DC and AC excitations, Solution using differential equations and Laplace transforms.

Unit – IV
Two Port Networks:
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, Poles and zeros of network functions.

Unit – V
Network Synthesis:
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 – VI
Fourier Analysis and Transforms:
Fourier theorem- Trigonometric form and exponential form of Fourier series, Conditions of symmetry- line spectra and phase angle spectra, Analysis of electrical circuits to non sinusoidal periodic waveforms.
Fourier integrals and Fourier transforms – properties of Fourier transforms physical significance of the Fourier Transform and its application to electrical circuits.

Course Outcomes:

After completion of the course, students will be able to:

- Solve three- phase circuits under balanced and unbalanced condition
- Find the transient response of electrical networks for different types of excitations.
- Find parameters for different types of network.
- Realize electrical equivalent network for a given network transfer function.
- Extract different harmonics components from the response of a electrical network.

Text Books:

1. Engineering Circuit Analysis by William Hayt and Jack E.Kemmerley,McGraw Hill Company,6 th edition
2. Network synthesis: Van Valkenburg; Prentice-Hall of India Private Ltd

References:

1. Fundamentals of Electrical Circuits by Charles K.Alexander and Mathew N.O.Sadiku, McGraw Hill Education (India)
2. Introduction to circuit analysis and design by TildonGlisson. Jr, Springer Publications.
3. Circuits by A. Bruce Carlson , Cengage Learning Publications
4. Network Theory Analysis and Synthesis by Smarajit Ghosh, PHI publications
5. Networks and Systems by D. Roy Choudhury, New Age International publishers
6. Electric Circuits by David A. Bell, Oxford publications
7. Circuit Theory (Analysis and Synthesis) by A. Chakrabarthi, Dhanpat Rai & Co.