R-15

II B.Tech I Sem

15AEE03-ELECTRICAL CIRCUITS- II

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Objectives:

To make the students learn about:

- The analysis of three phase balanced and unbalanced circuits
- How to measure active and reactive power in three phase circuits
- How to determine the transient response of R-L, R-C, R-L-C series circuits for d.c and a.c excitations
- Applications of Fourier transforms to electrical circuits excited by non-sinusoidal sources
- Different types of filters and equalizers

UNIT- I Network Topology

Definitions – Graph – Tree, Basic Cutset and Basic Tieset Matrices for Planar Networks – Loop and Nodal Methods of Analysis of Networks with Dependent & Independent Voltage and Current Sources – Duality & Dual Networks. Nodal Analysis, Mesh Analysis, Super Node and Super Mesh for D.C Excitations.

UNIT- II Three Phase A.C 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 and Unbalanced Three Phase Systems. Analysis of Three Phase Unbalanced Circuits-Loop Method- Application of Millman's Theorem- Star Delta Transformation Technique – for balanced and unbalanced circuits, Measurement of Active and reactive Power.

UNIT- III Transient Analysis

D.C Transient Analysis: Transient Response of R-L, R-C, R-L-C Series Circuits for D.C Excitation-Initial Conditions-Solution Method Using Differential Equation and Laplace Transforms, Response of R-L & R-C Networks to Pulse Excitation.

A.C Transient Analysis: 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

BOS - Chairman

UNIT- IV Fourier 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 and Application to Electrical Circuits.

UNIT V: Filters & Circuits Simulation

Filters – Low Pass – High Pass and Band Pass – RC, RL filters– derived filters and composite filters design – Attenuators – Principle of Equalizers – Series and Shunt Equalizers – L Type, T type and Bridged – T and Lattice Equalizers.

Circuit Analysis – Description of Circuit elements, nodes and sources, Input and Output variables – Modeling of the above elements – Types of DC analysis.

Outcomes:

After completing the course, the student should be able to do the following:

- Analyze three phase balanced and unbalanced circuits and determine line voltages, line currents, phase voltages and phase currents
- Measure active and reactive power consumed by a given three phase circuit
- Determine the transient response of R-L, R-C, R-L-C circuits for d.c and a.c excitations
- Apply Fourier transforms to electrical circuits excited by non-sinusoidal sources
- Design different types of filters

Text Books:

1. Electrical Circuit Theory and Technology 4th Edition, John Bird, Rovtled / T&F, 2011.
2. Network Analysis 3rd Edition, M.E Van Valkenberg, PHI, .

References:

1. Circuit Theory (Analysis & Synthesis) 6th Edition, A. Chakrabarti, Dhanpat Rai & Sons, 2008.
2. Electric Circuits by N.Sreenivasulu, REEM Publications
3. Engineering circuit analysis by William Hayt and Jack E. Kemmerly, Mc Graw Hill Company, 6th edition.

BOS-Chairman