I B.Tech II Sem

15AEE02-ELECTRICAL CIRCUITS – I

L T P C
3 1 0 3

Objectives: To make the student learn about

- Basic characteristics of R,L,C parameters
- The concepts of real power, reactive power, complex power, phase angle and phase difference
- How to compute two port network parameters
- Network reduction techniques, star to delta and delta to star transformations
- Series and parallel resonances, bandwidth, current locus diagrams
- Network theorems and their applications

UNIT- I   Introduction To Electrical & Magnetic Circuits

Electrical Circuits: Circuit Concept, R, L and C Parameters - Independent and Dependent Voltage and Current Sources -Source Transformation, Voltage - Current Relationship for Passive Elements (For Different Input Signals: Square, Ramp, Saw Tooth, Triangular. Kirchhoff's Laws, Network Reduction Techniques: Series, Parallel, Series Parallel, Star-to-Delta or Delta-to-Star Transformation. Examples

Magnetic Circuits: Faraday's Laws of Electromagnetic Induction, Concept of Self and Mutual Inductance, Dot Convention, Coefficient of Coupling, Composite Magnetic Circuit-Analysis of Series and Parallel Magnetic Circuits, MMF Calculations.

UNIT- II   Single Phase A.C Circuits

R.M.S, Average Values and Form Factor for Different Periodic Wave Forms: Sinusoidal Alternating Quantities. Phase and Phase Difference, Complex and Polar Forms Of Representations, j-Notation, Steady State Analysis of R, L and C (In Series, Parallel and Series Parallel Combinations) With Sinusoidal Excitation, Concept of Power Factor, Concept of Reactance, Impedance, Susceptance and Admittance-Real and Reactive Power and Complex Power. Examples.

UNIT- III   Locus Diagrams & Resonance

Series R-L, R-C, R-L-C and Parallel Combination with Variation of Parameters. Resonance: Series, Parallel Circuits, Concept of Bandwidth and Q Factor.

(V.GANESH)
(Bos-chairman)

UNIT- IV Network Theorems

Thevenin's, Norton's, Maximum Power Transfer, Millman's Theorems, Tellegen's, Superposition, Reciprocity and Compensation Theorems for D.C And Sinusoidal Excitations.

UNIT- V Two Port Networks

Two Port Network Parameters: Impedance, Admittance, Transmission and Hybrid Parameters and their Relations. Concept of Transformed Network, Two Port Network Parameters Using Transformed Variables.

Outcome: After completing the course, the student should be able to do the following:
- Given a network, find the equivalent impedance by using network reduction techniques
- Given a circuit and the excitation, determine the real power, reactive power, power factor etc,.
- Determine the current through any element and voltage across any element
- Apply the network theorems suitably

Text Books:
1. Electrical Circuit Theory and Technology 4th Edition, John Bird, Rovtledge/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, William Hayt and Jack E. Kemmerly, Mc Graw Hill Company, 6th edition.
4. Circuits & Networks by A. Sudhakar and Shyammohan S Palli, Tata McGraw- Hill

V.Sava

BOS- Chairman