GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

NETWORK THEORY

Course Code: GR15A2035 L:3 T:1 P:0 C:4
II Year I Semester

Prerequisites: Knowledge of Basic Electrical and Electronics Engineering(BEE)

Course Objectives: At the end of the course the student is expected to

- Know three phase voltages and currents relations in star and delta connections.
- Know dc and ac transient analysis.
- Lear tie-set and cut-set methods of solving circuits.
- Lear dot convention, analysis of magnetic circuits.
- Find out various two-port network parameters for a given circuit.
- Design LPF, HPF, BSF and BPF.

Course Outcomes

- Ability to measure Three phase voltages and currents, active, reactive powers.
- Ability to express given Electrical Circuit in terms of A,B,C,D and Z,Y Parameter Model and solve the circuits.
- Ability to solve Circuits using Cut set ,Tie Set Methods.
- Ability to do dc and ac transient analysis for given circuit.
- Ability to analyse LP, HP, BS and BP filters.
- Ability to apply dot convention and to find out self and mutual inductance for a given circuit.

Unit-I

Magnetic Circuits and Network Topology : Magnetic Circuits: Faradays laws of electromagnetic induction, concept of self and mutual inductance, dot convention, coefficient of coupling, analysis of series and parallel magnetic circuit, composite magnetic circui.

Network Topology: Definitions - graph, tree, co-tree, twig, link, basic cutset and tieset matrices for planar networks, loop and nodal methods of analysis of networks with dependent and independent voltage and current sources, Duality and Dual networks.

Unit-II

Three Phase Circuits: Phase Sequence, Relation between line and phase voltages and currents in Star-Star, Delta-Delta, Star-Delta and Delta-Star balanced connections, analysis of unbalanced three phase circuits,

measurement of active and reactive power.

Unit-III

DC and AC Transient Analysis: DC Transient Analysis: Transient response of RL, RC, RLC circuits(series and parallel) for dc excitation by classical approach and Laplace Transform methods, Initial Conditions, Transient response of RL and RC circuits for different inputs such as step, ramp, pulse and impulse using Laplace Transform method.

AC Transient Analysis: Transient response of RL, RC, RLC circuits for sinusoidal excitation by classical and Laplace Transform methods.

Unit-IV

Network Parameters and Two Port Networks: Driving point and transfer impedance function networks, poles and zeros necessary conditions for driving point function and for transfer function.

Two port network parameters: Z, Y, hybrid, inverse hybrid, transmission and inverse transmission parameters, relation between various parameters, condition for symmetry and reciprocity for above parameters, two port network parameters using transformed variables.

Unit-V

Filters: Introduction to filters, constant K - RC, RL low pass, high pass, band pass, band stop filters.

Teaching Methodologies

1. NT ppts
2. Assignments uploaded in website
3. Softwares: Multisim.

Text Books

1. Fundamentals of Electric Circuits by Charles K.Alexander, Matthew N.O.Sadiku, Tata McGraw Hill Company.
2. Engineering Circuit Analysis by William H.Hayt.Jr, Jack E.Kemmerly and Steven M.Durbin by Tata McGraw Hill Company.
3. Circuits and Networks by T.K.Nagasarkar and M.S.Sukhija, Oxford University Press

Reference Books

1. Circuit Theory (Analysis and Synthesis) by A.Chakrabarti – DhanpatRai& Co
2. Network Theory by prof.B.N.Yoganarasimham.
3. Electrical Engineering Fundamentals by Vincent Deltoro
4. Circuit Theory by Sudhakar and ShyamMohan
5. Network Analysis by M.E.VanValkenburg, Prentice Hall of India
6. Electric Circuits by David A. Bell,Oxford University Press