

PVP SIDDHARTHA INSTITUTE OF TECHNOLOGY, KANURU, VIJAYAWADA
(Autonomous)
FRESHMAN ENGINEERING DEPARTMENT
I B.Tech — I SEMESTER
ELECTRONIC AND COMPUTER ENGINEERING

T P C
4+1 - 4

EM IT 4 - NETWORK THEORY

UNIT – I

Introduction to Electrical Circuits : Network elements classification, Electric charge and current, Electric energy and potential, Resistance parameter – series and parallel combination, Star delta conversion - Inductance parameter – series and parallel combination, Capacitance parameter – series and parallel combination. Energy sources: Ideal, Non-ideal, Independent sources, Kirchoff's laws, Mesh analysis and Nodal analysis problem solving with resistances only with independent sources.

UNIT – II

Network Theorems: Thevenin's, Norton's, Milliman's, Reciprocity, Superposition, Maximum Power Transfer theorems, - problem solving using independent sources.

UNIT-III

**Analysis of first and second order circuits with DC excitation
First order differential equations, Definition of time constants, R-L circuit, R-C circuit with DC excitation, Evaluating initial conditions procedure, second order differential equations, problem solving using R-L, RC & RLC elements with DC excitation.**

UNIT-IV

A.C Fundamentals: Definitions of terms associated with periodic functions: Time period, Angular velocity and frequency, RMS value, Average value, Form factor and peak factor problem solving, Phase angle, Phasor representation, Addition and subtraction of phasors, problem solving

UNIT-V

Steady State Analysis of A.C Circuits : Response to sinusoidal excitation - pure resistance, pure inductance, pure capacitance, impedance concept, phase angle, series and parallel R-L, R-C, R-L-C circuits problem solving. Transient response of R-L, R-, R-L-C circuits for sinusoidal AC excitation.

UNIT – VI

Coupled Circuits : Coupled Circuits: Self inductance, Mutual inductance, Coefficient of coupling, analysis of coupled circuits, Natural current, Dot rule of coupled circuits, Conductively coupled equivalent circuits- problem solving.

UNIT – VII

Resonance: Introduction, Definition of Q, Series resonance, Bandwidth of series resonance, Parallel resonance, Condition for maximum impedance, Bandwidth of parallel resonance, general case- resistance present in both branches,

UNIT – VIII

Two-port networks : Relationship of two port networks, Z-parameters, Y-parameters, Relationship between parameter sets, Parallel connection of two port networks, Cascading of two port networks.

Filters : L.P.F, H.P.F, B.P.F, Band Elimination, All pass prototype filters design.

TEXT BOOKS :

- 1. Fundamentals of electric circuits by Charles K Alexander, Mathews N.O.Sadikar, TMH**
- 2. Network theory by A.Sudhakar & Syam Mohan, S. Pillai, TMH**
- 3. Basic Circuit Analysis by DR Cunningham, Jaico Publishers.**

REFERENCES :

- 1. Electric Circuit Analysis by Hayt and Kimbarle, TMH**
- 2. Network Analysis – ME Van Valkenburg, Prentice Hall of India, 3rd Edition, 2000.**
- 3. Network lines and Fields by John. D. Ryder 2nd edition, Asia publishing house.**
- 4. Network Analysis and Filter Design by Chadha, Umesh Publications.**