Subject Code : CCSIE4

CC – VI – THEORY OF CIRCUITS.

Unit – I : Fundamental Ideas of AC Circuits.

DC – AC – Instantaneous value – Peak value – Phase – Amplitude – Frequency – Phase difference – Average value of AC wave – RMS value – Form factor – Phasor representation of sinusoidals – Complex notation – Exponential notation – Polar notation – Impedance of RL, RC and RLC – Power factors and phasor diagrams.

Unit – II : Resonance and Transients:

Resonance : Series and parallel resonances – Effects of variations of Q – Inductively coupled circuits – Single tuned and double tuned coupled circuits – Coefficient of coupling – Critical coupling – Bandwidth and frequency response.

Transient response of RL circuits to DC excitation – Response of RLC to DC – Natural and forced oscillation – Decrement and logarithmic decrement – Application of Laplace Transform for transient solutions.

Unit – III: Network Analysis and Topology.

Network Analysis: Definitions – Kirchhoff's laws and their applications to the solution of network problems – Branch and loop currents – Node and node pair voltages – Mesh and node analysis.

Elements of Network topology: Graph of a network – Concept of tree – Branches and chords – Applications to network solution.

Unit – IV: Network theorems.

Equivalence theorem – Equivalent networks – Star-mesh transformation – Superposition theorem – Thevenin's and Norton's theorems – Reciprocity theorem – Compensation – Maximum power transfer theorem – Millman's theorem – Concept of duality and dual networks – Inverse networks.

Unit – V: T-Network

L, T lattice – Bridge – T and twin T networks – Network parameters – Insertion loss and reflection factor – Attenuators – Equalisers.

Constant K low pass – Band pass and band elimination types of filters – M derived filters – Design of composite filters.

Books for Study:

1. Electrical technology – B.L. Theraja – S.Chand & Co. – 1987.
2. Industrial Electronics – G.K. Mithal – Khanna Publishers – 1991.
3. Engineering Circuit analysis – Hayt and Kammerley –McGraw Hill.

Books for Reference :

1. Network analysis – Vanvalkenberg - Prentice Hall, New Jersey.
2. Communication Engineering – Everitt and Anner - McGraw Hill.
3. Electric Network Theory – Schilling.