NETWORK THEORY

Course Code: 13-ES 203

L-T-P: 3-1-0 Credits: 4

Pre – requisite: 13-BS101

SYLLABUS:

Circuit Concept, R, L, C parameters, concept of mutual inductance, dot convention, coefficient of coupling, voltage and current sources, source transformation, specifications of Active and Passive elements, voltage – current relationship for passive elements. Kirchoff's Laws, Response of R-L, R-C, R-L-C (Series and parallel combinations) for impulse, step, ramp excitations, Magnetic Circuits – Analysis of series and parallel magnetic circuits. AC Circuits: RMS and average values and form factor of different periodic wave forms (Sinusoidal, rectangular, triangle and sawtooth), steady state analysis of R, L and C (in series, parallel and series parallel combinations) with sinusoidal excitation, concept of reactance, impedance, susceptance and Admittance, Phase and Phase difference, concept of power factor, Real and Reactive powers, j-notation, complex and polar forms of representations, complex power. Series and parallel resonance, bandwidth, selectivity, Q factor, current locus diagrams. Three phase circuits: phase sequence, star and delta connection, Relation between line and phase voltages and currents in balanced systems, Analysis of balanced and unbalanced 3 phase circuits, star/delta transformation. Network topology: definitions, graph, tree, basic cut-set and basic tie set matrices for planar network, Loop and Nodal methods of analysis of networks (including coupled circuits), duality and dual networks. Network theorems: (without proof): Superposition, Reciprocity, Thevinin's, Norton's, Maximum power transfer. Application to steady state analysis, network functions, driving point and transfer functions –poles and Zeros one port and two port networks. Two port network parameters: Z, Y, Transmission and Hybrid parameters and their relationships. Transient response of R-L, R-C, R-L-C circuits (Series and parallel combinations) for D.C and sinusoidal excitations, initial conditions, time domain and Laplace transform methods of solutions.

TEXT BOOKS:

1. M. E. Van Valkenberg, "Network Analysis", Prentice-Hall of India Pvt. Ltd., 3rd edition, 1998.
2. William Hayt and jack E. Kemmerly, "Engineering circuit analysis" Tata Mc Graw-Hill Companies, 5th edition.

REFERENCE BOOKS:

1. Charles K Alexander, Mathew N O Sadiku, "Fundamentals of Electric Circuits", Tata McGraw Hill Education Pvt. Ltd., Third Edition, 2012.
2. D. Roy Choudhury, "Networks and Systems", New Age International Limited Publishers, 1998.
3. J. Edminister & M. Nahvi, "Electric circuits", Schaum's outlines Tata Mc Graw Hill Publishing Company Ltd., 1999.
4. Mohd. H. Rashid, "Spice for circuits & Electronics using PSPICE", Prentice-Hall of India, 2nd edition.