BVM ENGINEERING COLLEGE [AN AUTONOMOUS INSTITUTION]

2EE01: ELECTRICAL CIRCUIT ANALYSIS
CREDITS - 4 (LTP:3,0,1)

Course Objectives:

The subject aims to provide the student with:

1. Understanding of concepts and principles of passive circuit analysis and synthesis
2. Ability to solve complex circuits using different theorems and methods.
3. Advanced understanding of electrical networks which will be useful for advance Subjects.

Teaching and Assessment Scheme:

Teaching Scheme (Hours per week)			Credits	Assessment Scheme				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE	CE	ESE	CE	
3	0	2	4	60	40	20	30	150

Course Contents:

Unit No	Topics	Teaching Hours
1	**Networks Theorem** Detail analysis on Source transformation, Node and Mesh Analysis, Thevenin's and Norton's Theorem. Maximum power transfer theorem, Reciprocity theorem, Compensation theorem, Substitution theorem, Millman Theorem, Analysis with dependent current and voltage sources. Concept of duality and dual networks.	10
2	**Solution of First and Second order networks** Detail analysis on Solution of first and second order differential equations for Series and parallel R-L, R-C, R-L-C circuits. Initial and final conditions in network elements, forced and free response, time constants, steady state and transient state response. Mesh Analysis of Circuits with Independent Sources, Mesh Analysis of Circuits Containing Dependent Sources.	08
3	**Sinusoidal steady state analysis** Representation of sine function as rotating phasor, phasor diagrams, impedances and admittances, AC circuit analysis, Discharging of a Capacitor through an inductor, Source free second order linear networks, and second order linear networks with constant inputs. Mutual coupled circuits, Dot Convention in coupled circuits, Ideal Transformer	08
4	**Electrical Circuit Analysis Using Laplace Transforms** Review of Laplace Transform, Analysis of electrical circuits using Laplace Transform for standard inputs, convolution integral, inverse Laplace transform, transformed network with initial conditions. Transfer function representation. Poles and Zeros. Frequency response (magnitude and phase plots), series and parallel resonances	06

Unit No	Topics	Teaching Hours
5	**Two Port Network, Network Functions and Graph Theory** Two Port Networks, terminal pairs, relationship of two port variables, impedance parameters, admittance parameters, transmission parameters and hybrid parameters, interconnections of two port networks. Networks topology and Graph Theory concepts, Matrix Representation for the network.	08
	TOTAL	**40**

List of references:

1. Franklin S. KUO*,"Network Analysis & Synthesis",* Wiley Publication
2. M.E Van Valkenburg*, "Network Analysis",* PHIPublication
3. K.S. Suresh Kumar*, "Electric Circuits and Networks"* Pearson Education
4. U.A. Patel,*"Circuits and Networks",* Mahajan Publications

Course Outcomes:

At the end of this course, students will demonstrate the ability to

1. Apply network theorems for the analysis of electrical circuits.
2. Obtain the transient and steady-state response of electrical circuits.
3. Analyse circuits in the sinusoidal steady-state.
4. Analyse two port circuit behaviour of the network.
5. Obtain graph structure of a network and solve the network.