Network Analysis

Course Code	23EC3201	Year	I	Semester	II
Course Category	Programcore	Branch	ECE	Course Type	Theory
Credits	3	L-T-P	3-0-0	Pre requisites	NIL
Continuous Internal Evaluation	30	Semester End Evaluation	70	Total Marks	100

Course Outcomes		
Upon successful completion of the course, the student will be able to		BL
CO1	Interpret fundamental concepts of network analysis	L2
CO2	Apply nodal and mesh analysis, network simplification theorems to solve the given problems.	L3
CO3	Analyze the given circuits to find the transient and steady state response.	L4
CO4	Inspect the given circuit and situation related to resonance and magnetic coupling to find the parameters.	L4
CO5	Analyze the two-port networks for finding the characteristic parameters and equivalent circuits.	L4
CO6	Communicate concepts and technologies related to electrical network analysis effectively in written reports.	

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of Correlations (3:High, 2:Medium, 1:Low)														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2				1			1		1		1	1	1
CO2	3				1			1		1		1	1	1
CO3		3			1			1		1		1	1	1
CO4		3			1			1		1		1	1	1
CO5		3			1			1		1		1	1	1
CO6								1		3		2		
Avg.* (Rounded to nearest integer)	3	3			1			1		1		1	1	1

Syllabus		
Unit No.	Contents	Mapped CO
I	**Analysis Methods(DC):** Types of circuit components-series and parallel connections, Star - Delta conversion and vice versa, Ohm's law, Kirchoff's laws, Mesh and Nodal Analysis using dependent and independent sources. **Steady State Analysis:** A.C. Fundamentals, Steady state analysis of A.C Circuits: Impedance concept, phase angle, series R-L, R-C, R-L-C circuits problem solving. Complex impedance and phasor notation for R-L, R-C, R-L-C problem solving.	CO1, CO2, CO3, CO6

II	**Network Theorems:** Types of Sources and Source Transformations, Principal of Duality with examples. Superposition, Thevnin's, Norton's, Reciprocity and Maximum Power Transfer theorems – problem solving using dependent and independent sources.	CO1, CO2, CO6
III	**Resonance:** Introduction, Definition of Q, Series resonance, Bandwidth of series resonance, Parallel resonance, general case- resistance present in both branches, anti-resonance at all frequencies. **Coupled Circuits**: Self-inductance, Mutual inductance, Coefficient of coupling.	CO1,CO4, CO6
IV	**Transient Analysis:** Time domain and frequency domain analysis based on Laplace Transforms. First order differential equations, Definition of time constants, R-L circuit, R-C circuit, evaluating initial conditions procedure, second order differential equations, homogeneous, non-homogenous, problem-solving using R-L-C elements with DC and AC excitation.	CO1,CO3, CO6
V	**Two-port Networks:** Relationship of two port networks, Z- parameters, Y-parameters, Transmission line parameters, h- parameters, Relationships Between Parameter Sets, Parallel & seriesconnection of two port networks. **Image and iterative impedances:** Image and iterative transfer constants, Insertion loss	CO1,CO5, CO6

Learning Resources
Text Books
1. M.E. Van Valkenburg, Network Analysis, Prentice Hall of India, Revised 3rd Ed., 2019
2. William H. Hayt, Jack Kemmerly, Jamie Phillips, Steven M. Durbin, Engineering Circuit Analysis, Mc Graw Hill 9th Ed., 2020
3. John. D. Ryder, Network lines and Fields, 2nd Ed., Pearson Education, India
4. Ravish R Singh, Network Analysis and Synthesis, Tata McGraw Hill Education (India) Pvt. Ltd, New Delhi.
Reference Books
1.D. Roy Choudhury, Networks and Systems, New Age International Publications, 2013
2.Joseph Edminister and Mahmood Nahvi, Electric Circuits, Schaum's Outline Series, 7thEd., Tata McGraw Hill Publishing Company, New Delhi, 2017
3.Charles K. Alexander and Matthew N.O. Sadiku, Fundamentals of Electric Circuits,7th Ed., McGraw-Hill Education
e-Resources & other Digital Material
1.https://www.youtube.com/playlist?list=PLC7D3EAEFA0CC0420&app=desktop
2.https://www.tutorialspoint.com/network_theory/network_theory_quick_guide.htm
3.https://nptel.ac.in/courses/108/105/108105159/