Network Analysis

Course Code	23EC3201	**Year**	I	**Semester**	II
Course Category	Program core	**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

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**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	1													
CO2	3								1	1				1
CO3		3							1	1				1
CO4		2							1	1				1
CO5		2							1	1				1
Avg.	3	3							1	1				1

Syllabus		
Unit No.	**Contents**	**Mapped CO**
1	**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.	CO-1,2,3

2	**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.	CO-1,2
3	**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.	CO-1,4
4	**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.	CO-1,3
5	Two-port Networks: Relationship of two port networks, Z- parameters, Y-parameters, Transmission line parameters, h- parameters, Relationships Between Parameter Sets, Parallel & series connection of two port networks. **Image and iterative impedances:** Image and iterative transfer constants, Insertion loss	CO-1,5

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, 7th Ed., 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/