

I B. Tech. – II Semester
(19BT20241) NETWORK ANALYSIS
(Common for ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: Physics at Intermediate Level.

COURSE DESCRIPTION: Fundamentals of electrical circuits; Analysis of single phase AC circuits; Network theorems; Transient analysis and Two port networks.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

- CO1. Analyze and solve various DC and single phase AC circuits by applying conceptual knowledge of network reduction, analyzing techniques and theorems
- CO2. Design the Components for resonant, transient circuits and Two-port networks meeting the specified needs using circuit concepts.

DETAILED SYLLABUS:

UNIT-I: FUNDAMENTALS OF ELECTRICAL CIRCUITS (9 Periods)

Basic definitions of network, circuit, node, branch and loop; network reduction techniques-series, parallel, series-parallel circuits, current division and voltage division rules; source transformation, wye-to-delta and delta-to-wye transformations; nodal analysis and super node concept, mesh analysis and super mesh concept – numerical problems with dependent and independent AC & DC sources.

UNIT-II: ANALYSIS OF SINGLE PHASE AC CIRCUITS (9 Periods)

Analysis of single phase AC circuits: impedance and admittance, impedance triangle; power triangle; Sinusoidal response of R, L and C elements with different combinations; current locus; Resonance, bandwidth and quality factor for series and parallel networks.

UNIT-III: NETWORK THEOREMS (8 Periods)

Superposition, Thevenin's, Norton's, Maximum power transfer, Millmann's and Reciprocity theorems for DC & AC Excitations (without proof).

UNIT-IV: TRANSIENT ANALYSIS (10 Periods)

Transient response of RL, RC and RLC for DC excitation and Sinusoidal excitation - Solution by using Differential equation and Laplace Transforms method.

UNIT-V: TWO PORT NETWORKS**(9 Periods)**

Network Functions - Driving point and transfer functions. Impedance parameters, admittance parameters, transmission (ABCD) parameters, hybrid parameters, conversion of one parameter to another, conditions for reciprocity and symmetry, interconnection of two-port networks in series, parallel and cascaded configurations.

Total Periods: 45**TEXT BOOKS:**

1. Charles K. Alexander, Mathew N O Sadiku, *Fundamentals of Electric Circuits*, 5th edition, McGraw Hill Education (India) Private Limited, New Delhi, 2013.
2. A. Sudhakar, Shyammohan S Palli, *Circuits and Networks Analysis and Synthesis*, 5th edition, McGraw Hill Education (India) Private Limited, New Delhi, 2015.

REFERENCE BOOKS:

1. J. A. Edminister, M. D. Nahvi, *Theory and Problems of Electric Circuits*, 4th edition, Schaum's outline series, McGraw Hill, New Delhi, 2004.
2. W H Hayt, J E Kemmerly, S M Durbin, *Engineering Circuit Analysis*, 6th edition, McGraw Hill, New Delhi, 2008.

ADDITIONAL LEARNING RESOURCES

1. <https://nptel.ac.in/courses/117106108/>
2. <https://ocw.mit.edu/high-school/physics/exam-prep/electric-circuits/>