NETWORK ANALYSIS

III Semester: EEE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AEEB09	Core	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

I. COURSE OVERVIEW:

This course introduces the basic concepts of network theory which is the foundation for all subjects of the electrical engineering discipline. The emphasis of this course is laid on the basic analysis of circuits with network theorems for both DC and AC excitation. The course also includes transient analysis of DC and AC circuits, network functions, and two port network parameters, locus diagrams, design and analysis of filters.

II. OBJECTIVES:

The course should enable the students to:

I. Analyze three phase star and delta connected circuits to calculate the active and reactive power.
II. Understand the transient response of series and parallel RL, RC and RLC circuits for DC and AC excitations
III. Discuss the concepts of locus diagram, network functions and to calculate the two port network parameters.
IV. Design different types of filters and perform the digital simulation of electric circuits.

III. COURSE OUTCOMES (COs):

COs	Course Outcome
CO 1	Apply Thevenin and Norton theorems to analyze and design for maximum power transfer and the concept of linearity and the associated technique of superposition to circuits and network.
CO 2	Analyse the transient response of series and parallel circuits with DC and AC excitation using differential approach and Laplace transform approach
CO 3	Understand the locus diagram representation and various functions of network.
CO 4	Understand the features of two port networks and to obtain their equivalent circuits.
CO 5	Design low pass, high pass, band pass and band elimination filter networks.

IV. SYLLABUS:

MODULE-I	THREE PHASE CIRCUITS	Classes: 09
Three phase circuits: Star and delta connections, phase sequence, relation between line and phase voltages and currents in balanced systems (both Y&Δ), three phase three wire and three phase four wire systems, analysis of balanced and unbalanced three phase circuits, measurement of active and reactive power.		
MODULE-II	**SOLUTION OF FIRST AND SECOND ORDER NETWORKS**	**Classes: 09**

Transient response: Initial conditions, transient response of RL, RC and RLC series and parallel circuits with DC and AC excitations, differential equation and Laplace transform approach.

MODULE-III	LOCUS DIAGRAMS AND NETWORKS FUNCTIONS	Classes: 09

Locus diagrams: Locus diagrams of RL, RC, RLC circuits;

Network Functions: The concept of complex frequency, physical interpretation, transform impedance, series and parallel combination of elements, terminal ports, network functions for one port and two port networks, poles and zeros of network functions, significance of poles and zeros, properties of driving point functions and transfer functions, necessary conditions for driving point functions and transfer functions, time domain response from pole-zero plot.

MODULE-IV	TWO PORTNETWORK PARAMETERS	Classes: 09

Two port network parameters: Z, Y, ABCD, hybrid and inverse hybrid parameters, conditions for symmetry and reciprocity, inter relationships of different parameters, interconnection (series, parallel and cascade) of two port networks, image parameters.

MODULE-V	FILTERS	Classes: 09

Filters: Classification of filters, filter networks, classification of pass band and stop band, characteristic impedance in the pass and stop bands, constant-k low pass filter, high pass filter, m-derived T-section, band pass filter and band elimination filter.

V. Text Books:

1. A Chakrabarthy, "Electric Circuits", Dhanpat Rai & Sons, 6th Edition, 2010.
2. A Sudhakar, Shyam mohan S Palli, "Circuits and Networks", Tata McGraw Hill, 4th Edition, 2010.

VI. Reference Books:

1. John Bird, "Electrical Circuit Theory and technology", Newness, 2nd Edition, 2003.
2. C L Wadhwa, "Electrical Circuit Analysis including Passive Network Synthesis", New Age International, 2nd Edition, 2009.
3. David A Bell, "Electric Circuits", Oxford University press, 7th Edition, 2009.
4. M E Van Valkenburg, "Network Analysis", Prentice Hall India, 3rd Edition, 2014.
5. Rudra Pratap, "Getting started with MATLAB: A Quick Introduction for Scientists and Engineers", Oxford University Press, 1st Edition, 1999.

VII. Web References:

1. https://www.igniteengineers.com
2. https://www.ishuchita.com/PDF/Matlab%20rudrapratap.pdf
3. https://www.ocw.nthu.edu.tw
4. https://www.uotechnology.edu.iq
5. https://www.iare.ac.in

VIII. E-Text Books:

1. https://www.bookboon.com/en/concepts-in-electric-circuits-ebook
2. https://www.jntubook.com
3. https://www.allaboutcircuits.com

4. https://www.archive.org