NETWORK ANALYSIS

II Semester: EEE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AEEB03	Foundation	3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

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.

COURSE LEARNING OUTCOMES (CLOs):

1. Analyze three phase star and delta circuits with different configuration.
2. Understand the concept of Phasor diagram for three phase systems.
3. Discuss the active, reactive and apparent power and power factor in three phase circuits.
4. Estimate the transient response of series and parallel circuits with AC and DC excitation.
5. Evaluate the transient response of first and second order electric circuits using differential equation approach.
6. Determine the transient response of first and second order electric circuits using Laplace transform technique.
7. Explain the concept of locus diagram for series and parallel circuits.
8. Generalize the concept of network functions for one port and two port networks.
9. Examine the electric networks in time domain and frequency domain.
10. Calculate Z, Y, ABCD, H and image parameters of two port network.
11. Relate various two port parameters and inter relationships between them.
12. Outline the concepts of interconnections of two port networks.
13. Design of low pass, high pass, band pass, band elimination filters and their characteristics.
14. Summarize the characteristics of electric circuit using Matlab.
15. Use the technique of Fourier transforms to solve the electric circuit problems.
16. Apply the concept of network theorems, switching transient to solve real time world applications.
17. Process the knowledge and skills for employability and to succeed national and international level competitive examinations.

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 star and delta circuits, three phase three wire and three phase four wire systems, shifting of neutral point, analysis of balanced and unbalanced three phase circuits, measurement of active and reactive power.

Module -II	DC AND AC TRANSIENT ANALYSIS	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: Elementary treatment of locus diagrams of RL, RC and RLC circuits (series and parallel combinations). 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 PORT NETWORK 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 AND DIGITAL SIMULATION OF CIRCUITS**	**Classes: 10**
Filters: Low pass, high pass, band pass, band elimination filters, introduction to active filter, filter design. Digital Simulation: MATLAB simulation and mathematical modeling of R, RL, RC and RLC circuits with DC and AC excitations: steady state and transient analysis, time and frequency domain analysis, frequency and phase spectra by Fourier analysis; basic test signals representation, filter design.		

Text Books:

1.A Chakrabarthy, "Electric Circuits", Dhanpat Rai & Sons, 6th Edition, 2010.
2.A Sudhakar, Shyammohan S Palli, "Circuits and Networks", Tata McGraw-Hill, 4th Edition, 2010.
3. M E Van Valkenberg, "Network Analysis", PHI, 3rd Edition, 2014.
4. Rudrapratap, "Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers", Oxford University Press, 1st Edition, 1999.

REFERENCE

1. John Bird, "Electrical Circuit Theory and technology", Newnes, 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.

Web References:

1.https://www.igniteengineers.com
2.https://www.ocw.nthu.edu.tw
3.https://www.uotechnology.edu.iq
4.https://www.iare.ac.in

E-Text Books:

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