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: 15	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES:

The students will try to learn:

I Understand the three phase systems for star and delta connected systems and perform three phase power calculations for balanced and unbalanced loads.

II Present the necessary mathematical background for the transient analysis of DC & AC circuits and study the transients using differential equation and Laplace transform approach for series and parallel circuits.

III Comprehend the concept of locus diagram for series and parallel circuits and discuss network functions and the stability criteria for one port and two port network

IV Evaluate the parameters of two port networks and learn their interrelation and interconnection of networks.

V Classify and design different types of filters and study their characteristics.

COURSE OUTCOMES:

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

CO 1 **Know the importance of three phase circuits and analyze the star &delta connected balanced and unbalanced loads.**

CO 2 **Measure the three-phase active power and reactive power using two wattmeter and one wattmeter methods, respectively.**

CO 3 **Evaluate the initial and steady state conditions of R L and C parameters**

CO 4 **Determine the transient response of first and second order electric circuits using differential equation and Laplace transform techniques.**

CO 5 **Explain the concept of locus diagram for series and parallel circuits.**

CO 6 **Generalize the concept of network functions for one port and two port networks.**

CO 7 **Draw the pole-zero plot from the time domain response and hence the determine the stability criteria of network functions.**

CO 8 **Calculate Z, Y, T and h parameters of two port networks and find the condition for symmetry and reciprocity of two port parameters.**

CO 9 **Determine the relationships between the different two port parameters and outline the concepts of interconnection of two port networks.**

CO 10 **Classify network filters based on frequency characteristics and model equations for filter networks.**

CO 11 **Design low pass, high pass, band pass and band elimination filters and study their characteristics.**

CO 12 **Apply mathematical and simulation programs to solve various real life topics through circuit solution.**

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: 08**
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: 10**
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.		

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.

Reference Books:

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, 2 nd Edition, 2009.
3. David A Bell, “Electric Circuits”, Oxford University press, 7th Edition, 2009.
4. M E Van Valkenberg, “Network Analysis”, Prentice Hall India, 3rd Edition, 2014.
5. Rudrapratap, “Getting started with MATLAB: A Quick Introduction for Scientists and Engineers”, Oxford University Press, 1 st Edition, 1999.

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

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