NETWORK ANALYSIS

III Semester: EEE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AEEB09	Core	3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

COURSE OBJECTIVES:

The course should enable the students to:

I. Apply network theorems to obtain the equivalent circuit of electrical networks.
II. Analyze the transient response of series and parallel RL, RC, RLC circuits for DC and AC excitations.
III. Explain the concept of locus diagram for series and parallel circuits and network functions for one port and two port networks.
IV. Calculate the two port network parameters and Discuss their interrelation and interconnection of networks.
V. Design different types of filters and study their characteristics.

COURSE OUTCOMES (COs):

CO 1: Apply Thevenin's 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: Analyze 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.

COURSE LEARNING OUTCOMES (CLOs):

1. Verify the law of conservation of energy, superposition principle, reciprocity and maximum power transfer condition for the electrical network with DC excitation.
2. Summarize the procedure of Thevenin's, Norton's and Milliman's theorems to reduce complex network into simple equivalent network
3. Estimate the transient response of series and parallel circuits with DC excitation.
4. Analyze the transient response of series and parallel circuits with AC 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. Observe t he Time Response From pole - zero plot.
10. Examine the electric networks in time domain and frequency domain.
11. Calculate Z, Y, ABCD, H and image parameters of two port network.
12. Derive the condition for symmetry and reciprocity for different parameters of two port networks.
13. Inter relationships between various two port networks them.

14. Outline the concepts of interconnections of two port networks.
15. Design of low pass, high pass, band pass, band elimination and study their characteristics.
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	NETWORK THEOREMS (DC AND AC)	Classes: 09

Network Theorems: Tellegen's, superposition, reciprocity, Thevenin's, Norton's, maximum power transfer, Milliman's and compensation theorems for DC and AC excitations, numerical problems.

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.

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", Prentice Hall India, 3rd Edition, 2014.

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", 2nd Edition, 2009.
3. David A Bell, "Electric Circuits", Oxford University press, 7th Edition, 2009.
4. Rudrapratap, "Getting started with MATLAB: A Quick Introduction for Scientists and Engineers", Oxford University Press, 1st Edition, 1999.

Web References:
1. http://www.efunda.com/math/math_home/math.cfm 2. http://www.ocw.mit.edu/resourcs/#Mathematics 3. http://www.sosmath.com 4. http://www.mathworld.wolfram.com
E-Text Books:
1. http://www.keralatechnologicaluniversity.blogspot.in/2015/06/erwin-kreyszig-advanced-engineering-mathematics-ktu-ebook-download.html 2. http://www.faadooengineers.com/threads/13449-Engineering-Maths-II-eBooks