NETWORK ANALYSIS

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – III (EC/TC)

Subject Code	15EC34	IA Marks	20
Number	04	Exam Marks	80
Total Number of Lecture Hours	50 (10 Hours per Module)	Exam Hours	03

CREDITS – 04

Course objectives: This course enables students to:

- Describe basic network concepts emphasizing source transformation, source shifting, mesh and nodal techniques to solve for resistance/impedance, voltage, current and power.
- Explain network Thevenin's, Millman's, Superposition, Reciprocity, Maximum Power transfer and Norton's Theorems and apply them in solving the problems related to Electrical Circuits.
- Explain the behavior of networks subjected to transient conditions.
- Use applications of Laplace transforms to network problems.
- Describe Series and Parallel Combination of Passive Components as resonating circuits, related parameters and to analyze frequency response.
- Study two port network parameters like Z, Y, T and h and their inter-relationships and applications.

Modules	**RBT Level**
Module -1	
Basic Concepts: Practical sources, Source transformations, Network reduction using Star – Delta transformation, Loop and node analysis with linearly dependent and independent sources for DC and AC networks, Concepts of super node and super mesh.	**L1, L2,L3,L4**
Module -2	
Network Theorems: Superposition, Reciprocity, Millman's theorems, Thevinin's and Norton's theorems, Maximum Power transfer theorem.	**L1, L2, L3,L4**
Module -3	
Transient behavior and initial conditions: Behavior of circuit elements under switching condition and their Representation, evaluation of initial and final conditions in RL, RC and RLC circuits for AC and DC excitations. **Laplace Transformation & Applications**: Solution of networks, step, ramp and impulse responses, waveform Synthesis.	**L1, L2, L3,L4**
Module -4	
Resonant Circuits: Series and parallel resonance, frequency- response of series and Parallel circuits, Q–Factor, Bandwidth.	**L1, L2, L3,L4**
Module -5	

Two port network parameters: Definition of Z, Y, h and Transmission parameters, modeling with these parameters, relationship between parameters sets.	**L1, L2, L3,L4**

Course Outcomes: After studying this course, students will be able to:

- Determine currents and voltages using source transformation/ source shifting/ mesh/ nodal analysis and reduce given network using star-delta transformation/ source transformation/ source shifting.
- Solve network problems by applying Superposition/ Reciprocity/ Thevenin's/ Norton's/ Maximum Power Transfer/ Millman's Network Theorems and electrical laws to reduce circuit complexities and to arrive at feasible solutions.
- Calculate current and voltages for the given circuit under transient conditions.
- Apply Laplace transform to solve the given network.
- Evaluate for RLC elements/ frequency response related parameters like resonant frequency, quality factor, half power frequencies, voltage across inductor and capacitor, current through the RLC elements, in resonant circuits
- Solve the given network using specified two port network parameter like Z or Y or T or h.

Question paper pattern:

- The question paper will have ten questions.
- Each full question consists of 16 marks.
- There will be 2 full questions (with a maximum of Three sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

1. M.E. Van Valkenberg (2000), "Network analysis", Prentice Hall of India, 3rd edition, 2000, ISBN: 9780136110958.
2. Roy Choudhury, "Networks and systems", 2nd edition, New Age International Publications, 2006, ISBN: 9788122427677.

Reference Books:

1. Hayt, Kemmerly and Durbin "Engineering Circuit Analysis", TMH 7th Edition, 2010.
2. J. David Irwin /R. Mark Nelms, "Basic Engineering Circuit Analysis", John Wiley, 8thed, 2006.
3. Charles K Alexander and Mathew N O Sadiku, " Fundamentals of Electric Circuits", Tata McGraw-Hill, 3rd Ed, 2009.

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