## NETWORK ANALYSIS
## SEMESTER – III (EC/TC)
### [As per Choice Based Credit System (CBCS) Scheme]

| Course Code | 17EC35 | | CIE Marks | 40 |
|---|---|---|---|---|
| Number of Lecture Hours/Week | 04 | | SEE Marks | 60 |
| 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.

### 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.

**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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