| Semester | III | Course Title | Network Analysis | Course Code | 18 EC 35 |
|---|---|---|---|---|---|
| Teaching Period | 50 Hours | L – T – P – TL* | 3 – 1 – 0 – 4 | Credits | 4 |
| CIE* | 40 Marks | SEE* | 60 Marks | Total | 100 Marks |
| 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:

- **Solve** electrical circuits by applying the knowledge of mesh and nodal method, network topol and demonstrate using circuit simulation tools.
- **Analyze** complex electric circuits using different transformation techniques, network theoren and Laplace transforms to arrive at feasible solutions.
- **Analyze** series and parallel resonant circuits and measure the performance.
- **Evaluate** the behavior of R, R-L, R-L-C electrical circuits considering Initial conditions
- **Construct** two port models for given network by determining Z, Y, h and T

**Text Books:**


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


**Reference Books:**


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