2EL02: NETWORK THEORY
CREDITS - 3 (LTP:3,0,0)

Course Objective:

1. Understanding of concepts and principles of passive circuit analysis and synthesis.
2. Ability to solve complex circuits using different theorems and methods.
3. Advanced understanding of electrical networks which will be useful for advance Subjects.

Teaching and Assessment Scheme:

Teaching Scheme (Hours per week)			Credits	Assessment Scheme				Total Marks
				Theory		Practical		
L	T	P	C	ESE	CE	ESE	CE	
3	0	0	3	60	40	00	00	100

Course Contents:

Unit No.	Topics	Teaching Hours
1	**Basic Nodal and Mesh Analysis:** Node and Mesh Analysis, matrix approach of network containing voltage and current sources, and reactance, source transformation and duality.	08
2	**Network Theorems & Useful Circuit Analysis Techniques:** Network theorems: Superposition, reciprocity, Thevenin's, Norton's, Maximum power Transfer and compensation theorem as applied to AC. circuits.	10
3	**Laplace Transform for steady state and transient analysis:** Discrete spectra and symmetry of waveform, steady state response of a network to non-sinusoidal periodic inputs, power factor, effective values, Fourier transform and continuous spectra, three phase unbalanced circuit and power calculation.	09
4	**Different Network Functions:** Partial fractions, singularity functions, waveform synthesis, analysis of RC, RL, and RLC networks with and without initial conditions with Laplace transforms evaluation of initial conditions.	09
5	**Frequency Domain Techniques:** Transient behavior, concept of complex frequency, Driving points and transfer functions poles and zeros of admittance function, their properties, sinusoidal response from pole-zero locations, convolution theorem and Two port network and interconnections, Behaviors of series and parallel resonant circuits, Introduction to band pass, low pass, high pass and band reject filters.	09
	Total	**45**

List of References:

1. Van, Valkenburg.; *"Network analysis*"; Prentice hall of India,2000.
2. Sudhakar, A., Shyammohan, S. P.; *"Circuits and Network*"; Tata McGraw-Hill New

Delhi, 1994.
3. A William Hayt, "*Engineering Circuit Analysis*" 8th Edition, McGraw-Hill Education.

Course Outcomes (COs):

At the end of this course students will demonstrate the ability to

1. Understand basics electrical circuits with nodal and mesh analysis.
2. Understand and apply electrical network theorems.
3. Apply Laplace Transform for steady state and transient analysis.
4. Analyze different network functions.
5. Understand and apply the frequency domain techniques.