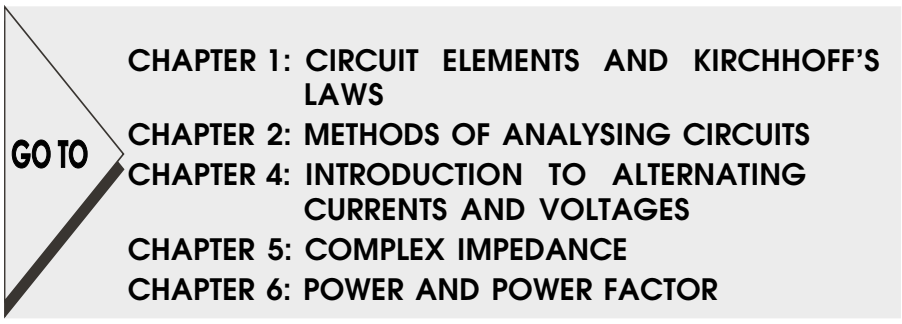
Roadmap to the Syllabus

As per the revised syllabus effective Aug. 2007

Unit 1: Introduction to Network Analysis

Properties of R-L-C elements; Definitions of current, voltage, charge, power; Properties of voltage sources, current sources (ideal, non-ideal, independent and dependent; Sources connected in series, parallel; Source transformations (problem solving); Definition of branch, node and loop; Sinusoidal and non-sinusoidal functions *v(t)* and *i(t)* applicable to R-L-C elements; problem solving using time domain.



Unit 2: Single Phase Circuits

Using sinusoidal voltages; Determination of average value, rms value, peak value, etc., for sinusoidal and non-sinusoidal waveforms; j operator for sinusoidal waveform; Concept of impedance, admittance, reactance, susceptance and their curves—KVL, KCL, problem solving with dc excitation; Sinusoidal excitation in frequency domain; Using impedance concept in mesh analysis and nodal analysis; Mesh and nodal analysis of dependant source circuits.

Concept of self-inductance, mutual inductance; Lenz's law, RH rule; Problem solving of couple circuits using impedance concepts.

CHAPTER 2: METHODS OF ANALYSING CIRCUITS
CHAPTER 7: STEADY STATE AC ANALYSIS
CHAPTER 9: COUPLED CIRCUITS
APPENDIX C: THE *j* FACTOR

Unit 3: Network Theorems

Thevenin's, Norton's, Millman's, Superposition, Reciprocity, Tellegen's, Maximum power transfer theorems; Statement and proofs; Problem solving using dependent and independent sources.

CHAPTER 3: USEFUL THEOREMS IN CIRCUIT ANALYSIS

Unit 4: Transients

Solutions by first-order differential equation; Concept of time constant; Problem solving using dc and ac excitations; Initial conditions problem solving; Higher order differential equations; second-order differential equations; Solutions for under damped, over damped, critically damped and for sustained oscillations; Problem solving; Using dc and ac excitations response of second-order differential equations as related to the *s* plane locations of roots.

CHAPTER 10: DIFFERENTIAL EQUATIONS
CHAPTER 11: TRANSIENTS

Unit 5: Two-port Networks

Z, V, ABCD, h-parameters and inverse ABCD, inverse h-parameters; Problem solving; Conversion of one parameter to another parameter; Condition of reciprocity and symmetry; two-port network connections in series, parallel and cascaded; Problem solving.

CHAPTER 15: TWO-PORT NETWORKS

Unit 6: Laplace Transforms

Laplace transforms of some important functions related to networks; Shifting theorem and its applications; Gate functions; Laplace transforms of periodic functions; Laplace transforms of operations (differentiation and integration); problem solving of transient circuits with dc and sinusoidal excitations using Laplace transform methods and response to non-sinusoidal periodic wave functions; concept of impulse functions and problem solving.

CHAPTER 12: INTRODUCTION TO LAPLACE TRANSFORMS
CHAPTER 13: APPLICATION OF THE LAPLACE TRANSFORM IN CIRCUIT ANALYSIS

Unit 7: Network Topology and Resonance

Various definitions; Incidence matrix; Formation of tie-set and cut-set schedules of networks; Dual networks. Series resonance; Parallel resonance; Problem solving; Properties of driving-point functions and transfer functions; Concept of pole and zeros.

CHAPTER 2: METHODS OF ANALYSING CIRCUITS
CHAPTER 3: USEFUL THEOREMS IN CIRCUIT ANALYSIS
CHAPTER 8: FREQUENCY DOMAIN ANALYSIS
CHAPTER 14: NETWORK FUNCTIONS
CHAPTER 16: S-DOMAIN ANALYSIS

Unit 8: Filters

LP, HP, BP, BE proto-type filter's design; m-derived filters of LP and Hp; Composite filter design of LP and HP; Design of various symmetrical type attenuators.

CHAPTER 17: FILTERS AND ATTENUATORS