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| **B. TECH 2nd SEMESTER** | **T** | **P** | **C** |
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| **BTEE2T01 NETWORKS & SYNTHESIS** |

**UNIT – I**

**Introduction to Electrical Circuits**: Network elements classification, Electric charge and current, Electric energy and potential, Resistance parameter – series and parallel combination, Inductance parameter – series and parallel combination, Capacitance parameter – series and parallel combination. Energy sources: Ideal, Non-ideal, Independent and dependent sources, Source transformation, Kirchhoff’s laws, Mesh analysis and Nodal analysis.

**UNIT – II**

**A.C Fundamentals and Network Topology**: Definitions of terms associated with periodic functions: Time period, Angular velocity and frequency, RMS value, Average value, Form factor and peak factor- problem solving, Phase angle, Phasor representation, Addition and subtraction of Phasors, mathematical representation of sinusoidal quantities, explanation with relevant theory, problem solving. Principle of Duality with examples.

**Network Topology:** Definitions of branch, node, tree, planar, non-planar graph, incidence matrix, Basic Tie-set schedule, Basic Cut-set schedule.

**UNIT – III**

**Steady State Analysis of A.C. Circuits:** Response to sinusoidal excitation - pure resistance, pure inductance, pure capacitance, impedance concept, phase angle, series R-L, R-C, R-L-C circuits problem solving. Complex impedance and Phasor notation for R-L, R-C, R-L-C problem solving using mesh and nodal analysis, Star-Delta conversion, Problem solving.

**UNIT – IV**

**Coupled Circuits and Resonance:** Coupled Circuits: Self inductance, Mutual inductance, Coefficient of coupling, analysis of coupled circuits, Natural current, Dot rule of coupled circuits, conductively coupled equivalent circuits- problem solving.

**Resonance:** Introduction, Definition of Q, Series resonance, Bandwidth of series resonance, Parallel resonance, Condition for maximum impedance, current in anti resonance, Bandwidth of parallel resonance, general case- resistance present in both branches, anti resonance at all frequencies.

**UNIT – V**

**Network Theorems:** Thevenin’s, Norton’s, Millman’s, Reciprocity, Compensation, Substitution, Max. Power Transfer, Tellegen’s Theorems - problem solving using dependent sources also.

**UNIT-VI**

**Network synthesis:** Positive real function, Basic Synthesis procedure, LC Immittance functions, RC Impedance functions, RL impedance function or RC admittance functions, Foster and Cauer methods.

**Text Books:**

1. Engineering Circuit Analysis – William H. Hayt, Jack E.Kemmerly, and S. Durbin, Tata McGraw-Hill Company,6th edition.
2. Electrical Circuit Analysis (Including Passive Network Synthesis) – C. L. Wadhwa, 2nd Edition, New Age International Publishers.

**Reference Books:**

1. Network Analysis – A. Sudhakar and Shyammohan S Palli, 1st Edition, Tata McGraw- Hill Publications.
2. Network Analysis – N.C.Jagan, C.LakshmiNarayana, 2ndedition , BS Publications.
3. Network Synthesis – Van Valkenburg, Prentice-Hall of India Private Ltd.
4. Introduction to circuit analysis and design – Tildon Glisson, Jr. Springer Publications