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| **B. TECH 2nd SEMESTER** | **L** | **T** | **P** | **C** |
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| **16EE2T01: Electrical Networks** |

**COURSE OBJECTIVES**

The student able to understand

1. The concepts of passive elements, types of sources and various network reduction techniques.
2. The applications of network topology to electrical circuits.
3. The applications of network theorems for analysis of electrical networks.
4. The behavior of RLC networks for sinusoidal excitations and performance of R-L, R-C and R-L-C circuits with variation of one of the parameters.
5. The concept of resonance and magnetic coupled circuit.

**COURSE OUTCOMES**

At the end of course the students are able to solve

1. Various electrical networks in presence of active and passive elements.
2. Electrical networks with network topology concepts.
3. Electrical networks by using principles of network theorems with DC and AC excitation
4. Any R, L, C network with sinusoidal excitation and any R, L, C network with variation of any one of the parameters i.e R, L, C. and f.
5. Any magnetic circuit with various dot conventions.

**UNIT-I**

**Fundamental of Electrical Circuits:** Active and passive components and their V-I relations. Sources (dependent and independent) - source transformation technique –Ohm’s and Kirchhoff’s laws- Network reduction techniques (series, parallel and series – parallel combination of R, Land C separately) - Star-to-delta and delta-to-star transformation, nodal analysis and mesh analysis.

**UNIT-II**

**Network Topology:** Definitions of Graph and Tree. Basic cutset and tieset matrices for planar networks. Loop and nodal methods of analysis of networks with dependent and independent voltage and current sources. Duality and Dual networks.

**UNIT-III**

**Theorems with DC Excitation:** Superposition theorem, Thevenin’s theorem, Norton’s theorem, Maximum Power Transfer theorem, Reciprocity theorem, Millman’s theorem and compensation theorem.

**UNIT-IV**

**Single Phase A.C Systems:** Periodic waveforms (determination of AC fundamentals). Concept of phase angle and phase difference, addition and subtraction of phasors. Complex and polar forms of representations, steady state analysis of R, L and C circuits, series and parallel circuits. Power Factor and its significance – Real, Reactive power and apparent Power.

**UNIT-V**

**Theorems with AC Excitation:** Superposition theorem, Thevenin’s theorem, Norton’s theorem, Maximum Power Transfer theorem, Reciprocity theorem, Millman’s theorem and compensation theorem.

**UNIT-VI**

**Resonance:** Locus diagrams for various combination of R, L and C. Resonance, concept of band width and Quality factor.

**Magnetic Circuit:** Basic definition of MMF, flux and reluctance. Analogy between electrical and magnetic circuits. Faraday’s laws of electromagnetic induction Concept of self and mutual inductance. Dot convention-coefficient of coupling and composite magnetic circuit. Analysis of series and parallel magnetic circuits.

**Text Books:**

1. Engineering circuit analysis by William Hayt and Jack E.Kemmerley, Mc Graw Hill Company, 6th edition.
2. Network synthesis: Van Valkenburg; Prentice-Hall of India Private Ltd.

**Reference Books:**

1. Networks Analysis by A. Sudhakar, Shyammohan S.Pillai, The McGraw-Hill Companies
2. Introduction to circuit analysis and design by Tildon Glisson, Jr, Springer Publications
3. Circuits by A.Bruce Carlson , Cengage Learning Publications
4. Network Theory Analysis and Synthesis by Smarajit Ghosh, PHI publications