|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **B. TECH 2nd SEMESTER** | **L** | **T** | **P** | **C** |
| **3** | **-** | **-** | **3** |
| **19EE2T02: ELECTRICAL NETWORKS** |

**Course Outcomes: *After successful completion of this course, students should be able to:***

|  |  |  |
| --- | --- | --- |
| CO1 | : | Solve electrical networks using various techniques. |
| CO2 | : | Solve electrical networks using network topology concepts. |
| CO3 | : | Solve electrical circuits using network theorems with AC and DC excitations. |
| CO4 | : | Analyze the behavior of RLC networks for sinusoidal excitation. |
| CO5 | : | Analyze magnetic circuits. |

**SYLLABUS**

|  |  |  |
| --- | --- | --- |
| **UNIT-I** | **:** | **FUNDAMENTALS OF ELECTRICAL CIRCUITS** |
| Active and Passive Components and their V-I Relations - Dependent and Independent Sources - Source Transformation Technique - Network Reduction Techniques-Series, Parallel and Series – Parallel Combination of R, Land C (Each Element Separately) – Star/Delta and Delta/Star Transformation, Nodal Analysis and Mesh Analysis With Dependent and Independent Voltage and Current Sources for Both DC and AC Excitation. |
| **UNIT-II** | **:** | **NETWORK TOPOLOGY** |
| Definition- Graph- Node – Branch – Links – Twigs - Tree, Co-Tree Basic Cut-Set and Basic Tie-Set Matrices for Planar Networks –– Duality & Dual Networks. |
| **UNIT-III** | **:** | **SINGLE PHASE A.C CIRCUITS** |
| Sinusoidal Alternating Quantities – Phase and Phase Difference – Complex and Polar Forms of Representations, J-Notation, R.M.S, Average Values and Form Factor for Different Periodic Wave Forms - Concept of Reactance, Impedance, Susceptance and Admittance - Power Factor and Significance-Real and Reactive Power, Complex Power – Simple Problems. **Resonance:** Resonance-Series, Parallel Circuits, Concept of Band Width and Q Factor. |
| **UNIT-IV** | **:** | **NETWORK THEOREMS WITH DC & AC EXCITATION** |
| Superposition Theorem, Thevenin’s Theorem, Norton’s Theorem, Maximum Power Transfer Theorem, Reciprocity Theorem, Millman‘s Theorem and Compensation Theorem. |
| **UNIT-V** | **:** | **MAGNETIC CIRCUITS**  |
| 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. Fundamentals of Electric Circuits “Charles K.Alexander, Mathew N.O.Sadiku, Tata McGraw-Hill sixth edition-2019.
2. Circuits & Networks Analysis & Synthesis by A. Sudhakar and Shyammohan S Palli, Tata McGraw- Hill Fifth edition-2017.
3. 3000 Solved Problems in Electrical Circuit by Schaum’s solved problem series Tata McGraw-Hill Revised Edition 2018.
4. Circuit Theory by A.Chakrabarti Danapat Rai & Co publisher. Seventh - Revised edition (2018).

**REFERENCE BOOKS:**

1. Engineering Circuit Analysis by William Hayt and Jack E.Kemmerley,Mc Graw Hill Company,6th edition  Eighth edition (4 August 2013)
2. Network Analysis by N.C.Jagan, C.Lakshmi Narayana BS publications 2nd edition -2017
3. Network Analysis: Van Valkenburg; Prentice-Hall of India Private Ltd. Third edition, 2019.