# 23EE1201- ELECTRICAL CIRCUIT ANALYSIS -I

**(EEE)**

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| **Course Category:** | Professional core | **Credits:** | 3 |
| **Course Type:** | Theory | **Lecture-Tutorial-Practical:** | 3-0-0 |
| **Pre-requisite:** | Basic Electrical Engineering | **Sessional Evaluation:**  **External Exam Evaluation:**  **Total Marks:** | 30  70  100 |

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| **Course Objectives:** | Students undergoing this course are expected to learn: | |
| 1. Basic characteristics of R, L, C parameters, network reduction techniques& and analysis of DC networks. 2. Basics of magnetic circuits and analysis of magnetic circuits. 3. Basics of AC circuits and steady state analysis of R, L& C circuits. 4. Concept of Series, parallel resonance and current locus diagrams. 5. Network theorems and their applications. | |
| **Course Outcomes:** | After completing the course the student will be able to: | |
| **CO1** | Understand the basic characteristics of R, L, C parameters , network reduction techniques & analysis of DC networks. |
| **CO2** | Demonstrate the basics of magnetic circuits and analysis of magnetic circuits with Dot convention. |
| **CO3** | Acquire knowledge on basics concepts of AC circuits and steady state analysis of R, L & C circuits. |
| **CO4** | Accomplish the computation of Quality factor, band width and current locus diagram for a given electrical circuit. |
| **CO5** | Solve Electrical networks by using principles of network theorems. |
| **Course Content:** | UNIT-I :Introduction to Electrical Circuits Basic Concepts of passive elements of R, L, C and their V-I relations, Sources (dependent and independent), Kirchoff’s laws, Network reduction techniques (series, parallel, series - parallel, star-to-delta and delta-to-star transformation), source transformation technique, nodal analysis and mesh analysis to DC networks with dependent and independent voltage and current sources., node and mesh analysis.  **UNIT –II : 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.  **UNIT III Single Phase Circuits**  Characteristics of periodic functions, Average value, R.M.S. value, form factor, representation of a sine function, concept of phasor, phasor diagrams, node and mesh analysis.  Steady state analysis of R, L and C circuits to sinusoidal excitations-response of pure resistance, inductance, capacitance, series RL circuit, series RC circuit, series RLC circuit. parallel RL circuit, parallel RC circuit.  **UNIT IV Resonance and Locus Diagrams**  **Series Resonance:** Characteristics of a series resonant circuit, Q-factor, selectivity and bandwidth, expression for half power frequencies Parallel resonance: Q-factor, selectivity and bandwidth.  **Locus diagram**: RL, RC, RLC with R, L and C variables.  **UNIT V Network theorems (DC & AC Excitations)**  Superposition theorem, Thevenin’s theorem, Norton’s theorem, Maximum Power Transfer theorem, Reciprocity theorem, Millman’s theorem and compensation theorem. | |
| **Text books**  **&**  **Reference books:** | **Text books**:   1. Engineering Circuit Analysis by William Hayt and Jack E. Kemmerley, Mc Graw Hill Company,6th edition. 2. Network Analysis: Van Valkenburg; Prentice-Hall of India Private Ltd   **Reference books:**   1. Fundamentals of Electrical Circuits by Charles K. Alexander and Mathew N.O. Sadiku, Mc Graw Hill Education (India) 2. Linear Circuit Analysis by De Carlo, Lin, Oxford publications 3. Electric Circuits – (Schaum’s outlines) by Mahmood Nahvi & Joseph Edminister, Adapted by Kuma Rao, 5th Edition – Mc Graw Hill. 4. Electric Circuits by David A. Bell, Oxford publications 5. Introductory Circuit Analysis by Robert L Boylestad, Pearson Publications. 6. Circuit Theory (Analysis and Synthesis) by A. Chakrabarthi, Dhanpat Rai & Co. | |
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