**23EE12P2- NETWORK ANALYSIS AND SIMULATION LABORATORY**

**(ECE)**

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| **Course Category:** | Professional core | **Credits:** | 1.5 |
| **Course Type:** | Laboratory | **Lecture-Tutorial-Practical:** | 0-0-3 |
| **Pre-requisite:** | Basic concepts of Ohm’s Law, Kirchhoff’s Laws. Basic knowledge of Network Theorems | **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. The study and analyse a given electric circuits.  2. To verify Kirchoff’s laws and network theorems.  3. To study resonance characteristics and design resonant circuit for given specifications.  4. To analyze transient behavior of DC and AC circuits  5. To evaluate Q factor and Bandwidth of a Series & Parallel Resonance circuit.  6. To measure two port parameters of a twin-T network and study its frequency response. | |
| **Course Outcomes:** | After completing the course the student will be able to: | |
| CO1 | Analyse the electric circuits experimentally. |
| CO2 | Acquire hands on experience in verifying Kirchoff’s laws and network theorems. |
| CO3 | Design resonant circuit for given specifications. |
| CO4 | Evaluate two-port network parameters. |
| CO5 | Enumerate Q-factor and Bandwidth of a Series & Parallel Resonance circuit. |
| CO6 | Find two port parameters of a twin-T network and study its frequency response. |
| **Course Content:** | The following experiments need to be performed using both Hardware and simulation Software.  The experiments need to be simulated using software and the same need to be verified using the hardware.  **List of Experiments**   1. Study of components of a circuit and Verification of KCL and KVL. 2. Verification of mesh and nodal analysis for AC circuits 3. Verification of Superposition, Thevenin’s & Norton theorems for AC circuits 4. Verification of maximum power transfer theorem for AC circuits 5. Verification of Tellegen’s theorem for two networks of the same topology. 6. Study of DC transients in RL, RC and RLC circuits 7. To study frequency response of various 1st order RL & RC networks. 8. To study the transient and steady state response of a 2nd order circuit by varying its various parameters and studying their effects on responses 9. Find the Q Factor and Bandwidth of a Series and Parallel Resonance circuit. 10. Determination of open circuit (Z) and short circuit (Y) parameters 11. Determination of Hybrid (H) and Transmission (ABCD) parameters 12. To measure two port parameters of a twin-T network and study its frequency response.  Hardware Requirements: Regulated Power supplies, Analog/Digital Function Generators, Digital Multimeters, Decade Resistance Boxes/Rheostats, Decade Capacitance Boxes, Ammeters (Analog or Digital), Voltmeters (Analog or Digital), Active & Passive Electronic Components.  **Software requirements:**  Multisim/ Pspice/Equivalent simulation software tool, Computer Systems with required specifications. | |
| References: | References:  1. Network Analysis – ME Van Valkenburg, Prentice Hall of India, revised 3rd Edition, 2019. 2. Engineering Circuit Analysis by William H. Hayt, Jack Kemmerly, Jamie Phillips, Steven M. Durbin, 9th Edition 2020. | |