**NETWORK ANALYSIS AND SIMULATION LABORATORY**

(ECE & allied branches)

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| **Course Category:** | Professional Core | | **Credits:** | 1.5 |
| **Course Type:** | Practical | | **Lecture – Tutorial – Practical:** | 0-0-3 |
| **Pre-requisite:** | Not required | | **Sessional Evaluation:**  **Univ.Exam Evaluation:**  **Total Marks:** | 30  70  100 |
| **Course Objectives** | * To gain hands on experience in verifying Kirchoff’s laws and network theorems * To analyse transient behaviour of circuits * To study resonance characteristics * To determine 2-port network parameters: | | | |
| **Course Outcomes** | After completing the course, the student will be able to | | | |
| **CO1** | Verify Kirchoff’s laws and network theorems. | | |
| **CO2** | Measure time constants of RL & RC circuits. | | |
| **CO3** | Analyze behaviour of RLC circuit for different cases. | | |
| **CO4** | Design resonant circuit for given specifications. | | |
| **CO5** | Characterize and model the network in terms of all network parameters. | | |
| **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.  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 Telligent’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 Millimetres, 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 | | | |
| **Text Books &**  **References** | **Reference Books:**   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. | | | |

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| Contribution of Course Outcomes towards achievement of Program Outcomes (3-High, 2-Medium, 1-Low) | | | | | | | | | | | | | | |
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
| CO1 | 3 | 3 | 2 | - | 2 | - | - | - | 2 | 2 | - | - | - | - |
| CO2 | 3 | 3 | 2 | - | 2 | - | - | - | 2 | 2 | - | - | - | - |
| CO3 | 3 | 3 | 3 | - | 2 | - | - | - | 2 | 2 | - | - | - | - |
| CO4 | 3 | 3 | 2 | - | 2 | - | - | - | 2 | 2 | - | - | - | - |
| CO5 | 3 | 3 | 2 | - | 2 | - | - | - | 2 | 2 | - | - | - | - |