

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN POWER ELECTRONICS

Semester: 4

Subject Name : ELECTRICAL NETWORK AND CIRCUITS

Sr.No	Course content
1.	BASIC CIRCUITS ELEMENTS & ENERGY SOURCES 1.1 Circuit elements. 1.2 Classification of circuit elements. 1.3 Passive elements. 1.4 Energy sources: Voltage source, Current source.
2.	NETWORK CLASSIFICATION 2.1 Type of network. 2.2 Two port network. 2.3 Types of impedances. 2.4 Star and Delta network.
3.	ANALYSIS OF NETWORK BY KIRCHOFF'S LAWS , NODE & MESH ANALYSIS 3.1 KCL and Current division. 3.2 KVL Voltage division. 3.3 Nodal and Mesh analysis.
4.	TRANSIENTS 4.1 Charge of currents through an inductance and voltage across a capacitance. 4.2 Response of single circuit elements 4.3 Initial conditions before & after switching. 4.4 Independent & dependent initial values after switching, Zero & non-zero initial values 4.5 Initial & final condition in elements — Resistor, Inductor, Capacitor. 4.6 Transients in DC series R-L and R-C circuit. 4.7 Transients in AC series R-L and R-C circuit.
5.	RESONANCE & COUPLED CIRCUIT 5.1 Quality factor. 5.2 Series and parallel resonance. 5.3 Self inductance, Mutual inductance, Coupled circuits, Co-efficient of coupling, Series connection of coupled coils, Dot conversion in coupled coils 5.4 Electrical equivalents of magnetically coupled circuit.

6.	NETWORK THEOREM FOR AC AND DC CIRCUIT AND THEIR APPLICATION 6.1 Superposition theorem. 6.2 Thevenin's theorem. 6.3 Norton's theorem. 6.4 Maximum power transfer theorem. 6.5 Millman's theorem. 6.6 Reciprocity theorem.
7.	TWO PORT NETWORK ANALYSIS 7.1 Network configuration. 7.2 Recurrent network. 7.3 Z-parameter. 7.4 Y-parameter.

LIST OF LABORATORY EXPERIMENTS:

(Minimum 10 Experiments should be performed)

1. To verify line & phase for star and delta connected load.
2. To measure & verify voltage in voltage divider circuit.
3. To measure & verify current in current divider circuit.
4. To observe response of inductor & capacitor to AC circuit & DC circuit.
5. To obtain response in RLC series circuit.
6. To obtain response in RLC parallel circuit.
7. To obtain resonance in RLC series circuit.
8. To obtain resonance in RLC parallel circuit.
9. To determine currents & power factor in R-L, R-C & R-L-C series circuit
10. To determine currents & power factor in R-L, R-C & R-L-C parallel circuit.
11. To verify Superposition theorem for AC and DC circuit.
12. To verify Thevenin's theorem for AC and DC circuit.
13. To verify Norton's theorem for AC and DC circuit.
14. To verify Maximum power transfer theorem for AC and DC circuit.

Reference Books:

1. Circuit Theory (Analysis & Synthesis) - By A. Chakrabarti.
2. Electrical Technology Volume-1. (Basic Electrical Engineering) - By J. B. Gupta.
3. Network Analysis and Synthesis - U.A. Patel.
4. Network Analysis.-By M. E. Van Valkenburg.