SEMESTER – I

BRANCH	Subject Title	Subject Code
B.Sc. (Electronics – MINOR/GENERIC ELECTIVE COURSE)	ELECTRONICS	ELM2/EL

Course Learning Outcomes (CLO)

On completion of this course, learners will be able to:
CLO1: Study circuits in a systematic manner suitable for analysis and design.
CLO2: Understands how to formulate circuit analysis problems in a mathematically tractable way with an emphasis on solving linear systems of equations.
CLO3: Analyze the electric circuit using network theorems.
CLO4: Determine Sinusoidal steady state response.
CLOS: Understand the two-port network parameters with an ability to find out two-port network parameters & overall response for interconnection of two-port networks.

CONTENT

Unit - 1.

Basic Circuit Concepts: Voltage and Current Sources, Resistors: Fixed and Variable resistors, Construction and Characteristics, Color coding of resistors, resistors in series and parallel. Inductors: Fixed and Variable inductors, Self and mutual inductance, Faraday's law and Lenz's law of electromagnetic induction, Energy stored in an inductor, Inductance in series and parallel, Testing of resistance and inductance using multimeter.

Capacitors: Principles of capacitance, Parallel plate capacitor, Permittivity, Definition of Dielectric Constant, Dielectric strength, Energy stored in a capacitor, Air, Paper, Mica, Teflon, Ceramic, Plastic and Electrolytic capacitor, Construction and application, capacitors in series and parallel, factors governing the value of capacitors, testing of capacitors using multimeter.

Unit - 2

Circuit Analysis : Kirchhoff's Current Law (KCL), Kirchhoff's Voltage Law (KVL), Node Analysis, Mesh Analysis, Star-Delta Conversion.

DC Transient Analysis: RC Circuit- Charging and discharging with initial charge, RL Circuit with Initial Current, Time Constant. RL and RC Circuits With Sources, DC Response of Series RLC Circuits.

Unit - 3

AC Circuit Analysis : Sinusoidal Voltage and Current, Definition of Instantaneous, Peak. Peak to Peak, Root Mean Square and Average Values. Voltage-Current relationship in Resistor, Inductor and Capacitor, Phasor, Complex Impedance, Power in AC Circuits: Instantaneous Power, Average Power, Reactive Power, Power Factor. Sinusoidal Circuit Analysis for RL, RC and RLC Circuits. Resonance in Series and Parallel RLC Circuits, Frequency Response of Series and Parallel RLC Circuits, Quality (Q) Factor and Bandwidth. Passive Filters: Low Pass, High Pass, Band Pass and Band Stop.

Unit - 4

Network Theorems*: Principal of Duality, Superposition Theorem. Thevenin's Theorem, Norton's Theorem, Reciprocity Theorem, Millman's Theorem, Maximum Power Transfer Theorem. AC circuit analysis using Network theorems.

Two Port Networks: Impedance (2) Parameters, Admittance (Y) Parameters, Transmission (ABCD) Parameters.

Practicals

1. Familiarization with

a) Resistance in series, parallel and series- Parallel.

b) Capacitors & Inductors in series & Parallel.

c) Multimeter-Checking of components.

d) Voltage sources in series, parallel and series- Parallel

e) Voltage and Current dividers

2. Measurement of Amplitude, Frequency & Phase difference using CRO

3. Verification of Kirchoff's Law

4. Verification of Norton's theorem.

5. Verification of Thevenin's Theorem.

6 Verification of Superposition Theorem

7. Verification of the Maximum Power Transfer Theorem

8 RC Circuits: Time Constant, Differentiator, Integrator

9 Designing of a Low Pass RC Filter and study of its Frequency Response

10. Designing of a High Pass RC Filter and study of its Frequency Response

11. Study of the Frequency Response of a Series LCR Circuit and determination of its (a) Resonant Frequency

(b) Impedance at Resonance (c) Quality Factor Q

(d) Band Width