Basic Electrical Engineering

Course Objectives:

To provide the fundamental concept of DC, AC & 3-phase electrical circuits.

1. General Electric System(6 hours)
    a. Constituent parts of an electrical system (source, load, communication & control)
    b. Current flow in a circuit
    c. Electromotive force and potential difference
    d. Electrical units
    e. Ohm's law
    f. Resistors, resistivity
    g. Temperature rise & temperature coefficient of resistance
    h. Voltage & current sources

- 2. DC circuits(4 hours)
    a. Series circuits
    b. Parallel networks
    c. Krichhhof's laws
    d. Power and energy

- 3. Network Theorems(12 hours)
    a. Application of Krichhof's laws in network solution
        i. Nodal Analysis
        ii. Mesh analysis
    b. Star-delta & delta-star transformation
    c. Superposition theorem
    d. Thevnin's theorem
    e. Nortan's theorem
    f. Maximum power transfer theorem
    g. Reciprocity theorem

- 4. Inductance & Capacitance in ElectricCcircuits(4 hours)
    a. General concept of capacitance
        i. Charge & voltage
        ii. Capacitors in series and parallel
    b. General concept of inductance
        i. Inductive & non-inductive circuits
        ii. Inductance in series & parallel

- 5. Alternating Quantities(2 hours)
    a. AC systems
    b. Wave form, terms & definitions
    c. Average and RMS values of current & voltage
    d. Phasor representation

6. Single-phase AC Circuits(6 hours)
    a. AC in resistive circuits
    b. Current & voltage in an inductive circuits
    c. Current and voltage in an capacitive circuits
    d. Concept of complex impedance and admittance
    e. AC series and parallel circuit
    f. RL, RC and RLC circuit analysis & phasor representation

7. Power in AC Circuits(4 hours)
    a. Power in resistive circuits
    b. Power in inductive and capacitive circuits
    c. Power in circuit with resistance and reactance
    d. Active and reactive power
    e. Power factor, its practical importance
    f. Improvement of power factor
    g. Measurement of power in a single-phase AC circuits

8. Three-Phase Circuit Analysis(6 hours)
    a. Basic concept & advantage of Three-phase circuit
    b. Phasor representation of star & delta connection
    c. Phase and line quantities
    d. Voltage & current computation in 3-phase balance & unbalance circuits
    e. Real and reactive power computation
    f. Measurements of power & power factor in 3-phase system

Practical:

1. Measurement of Voltage, current& power in DC circuit : Verification of Ohm's Law Temperature effects in Resistance
2. Krichoff's Voltage & current Law : Evaluate power from V & I, Note loading effects of meter
3. Measurement amplitude, frequency and time with oscilloscope : Calculate & verify average and RMS value, Examine phase relation in RL & RC circuit
4. Measurements of alternating quantities : R, RL,RC circuits with AC excitation, AC power, power factor, VARs, phasor diagrams
5. Three-phase AC circuits : Measure currents and voltages in three-phase balanced AC circuits, Prove Y-Δ transformation, Exercise on phasor diagrams for three-phase circuits
6. Measurement of Voltage, current& power in a three-phase circuit : Two-wattmeter method of power measurement in R, RL and RC three phase circuits, Watts ratio curve

References:

1. J.R Cogdell, " Foundations of Electrical Engineering", printice Hall, Englewood Chiffs, New Jersy, 1990.
2. I.M Smith," Haughes Electrical Technology", Addison-Wesley, ISR Rprint,2000

Evaluation Scheme:

The questions will cover all the chapters in the syllabus. The evaluation scheme will be as indicated in the table below:

Chapter	Hours	Marks Distribution*
1	6	10
2	4	5
3	12	25
4	4	5
5	2	15
6	6	
7	4	10
8	6	10
Total		80

***Note: There may be minor deviation in marks distribution.**