

Electrical Engineering
Subject Code : ELE303

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3 2

Full Marks 100 (T) + 50(Pr)

Objectives:

This is a foundation course to understand the basic principles and behavior of electrical circuits, electrical power apparatus and utilization of electrical energy.

1. Electrical Engg Fundamentals (5 hours)

Introduction to electrical circuits: Electric field, electric current, potential and potential difference, electric power, basic circuit components, ohm's law.

Sources and its types, Ideal and practical sources, Source Conversion, independent and dependent sources, Energy Stored in Inductor and Capacitor, series, parallel and series and parallel circuit.

2. DC Networks & Theorems: (15 hours)

Laws and Theorems applicable to DC networks (KCL & KVL, Node voltage & Mesh current analysis, Star-Delta and Delta-Star conversion, Superposition theorem, Thevenin & Norton theorem & Maximum power Transfer theorem), Simple problems.

3. AC Fundamentals (6 hours)

Single-Phase AC Circuits: Single-phase EMF Generation, Average and Effective value of periodic ac signals, Peak factor & Form factor, Phasor and Complex representation of sinusoids, Power factor, complex power.

Three-Phase AC Circuits: Comparison between single-phase and three-phase systems, three phase EMF Generation, Line and Phase quantities in star and delta networks,

4. Magnetic circuits (6 hours)

Introduction to Magnetic Circuits: Introduction to Electromagnetism, Faradays laws of Electromagnetic Inductions, B-H curve, Permeability, Reluctance, Solution of magnetic circuits, Hysteresis and Eddy current loss.

5. Single Phase A.C. Circuits (5 hours)

A.C. Circuits containing resistance only, A.C. Circuits containing inductance only, A.C. Circuits containing Capacitance only, R-L Series circuits, R-C series circuits, R-L-C Series circuits, Simple Numerical problems.

6. Parallel A.C. Circuits- (5 hours)

R-L,R-CandR-L-C circuits. Admittance, susceptance, solution by admittance method, phasor diagram, Parallel resonance, quality factor. Comparison of Series and parallel Circuits

Electrical Engineering Lab :-
Subject Code : ELE310

List of Experiments:

1. Verification of Ohm's laws
2. Verification Kirchoffs laws
3. Verification of superposition Theorem.
4. Verifications of Thevenin's and Norton's theorem.
5. Verifications of Maximum power transfer theorem.
6. Connection and measurement of power consumption of various lamps.
7. Measurement of resonant frequency of Tank Circuits.
8. V-I Characteristics of incandescent lamps and time fusing current characteristics of a fuse.
9. Calculation of current, voltage and power in series R-L-C circuit excited by single phase AC supply and calculation of power factor.
10. Verifying B-H Curve of an Electromagnet.

Text/reference books:

1. Rizzoni, Principles and Applications of Electrical Engineering., McGrawHill
2. Hughes, "Electrical & Electronic Technology", Ninth Edition Pearson Education.
3. V.D.Toro, "Basic Electrical Engineering", Prentice-Hall of India.
4. B.L.Theraja, A.K.Theraja, "A textbook of Electrical Technology" S.Chand. Ltd.
5. Rajendra Prasad, "Fundamentals of Electrical Engineering", PHI,
6. 6.D P kothari and I J Nagratha "Basic electrical engineering" 2nd ed, TMH.
7. N.N.ParkerSmith, "Problems in Electrical Engineering", CBS Publisher