

ES-101A	Basic Electrical Engineering					
Lecture	Tutorial	Practical	Major Test	Minor Test	Total	Time
4	1	-	75	25	100	3 Hour
Purpose	To familiarize the students with the basics of Electrical Engineering.					
Course Outcomes (CO)						
CO 1	Classify and understand the steady state circuit analysis subject to DC.					
CO 2	Execute various mathematical techniques related to AC quantities.					
CO 3	Illustrate the steady state circuit response subject to AC.					
CO 4	Analyze the balanced three phase system.					
CO 5	Understand the concept of single phase transformer.					
CO 6	Illustrate the basics of various electrical machines & electrical installation.					

Unit-I

D.C. circuits: Ohm's Law, junction, node, circuit elements classification: Linear & nonlinear, active & passive, lumped & distributed, unilateral & bilateral with examples. KVL, KCL, Loop and node-voltage analysis of resistive circuit. Star-Delta transformation for resistors.

Network Theorems: Superposition, Thevenin's, Norton's and Maximum power transfer theorems in a resistive network.

Unit-II

AC Fundamentals: Mathematical representation of various wave functions. Sinusoidal periodic signal, instantaneous and peak values, polar & rectangular form of representation of impedances and phasor quantities. Addition & subtraction of two or more phasor sinusoidal quantities using component resolution method. RMS and average values of various waveforms.

A.C. Circuits: Behavior of various components fed by A.C. source (steady state response of pure R, pure L, pure C, RL, RC, RLC series with waveforms of instantaneous voltage, current & power on simultaneous time axis scale and corresponding phasor diagrams), power factor, active, reactive & apparent power. Frequency response of Series & Parallel RLC ckt. Including resonance, Q factor, cut-off frequency & bandwidth. Generation of alternating emf.

Unit-III

Balanced Three Phase Systems: Generation of alternating 3-phase emf 3-phase balanced circuits, voltage and current relations in star and delta connections. Measurement of 3-phase power by two wattmeter method for various types of star & delta connected balanced loads.

Single Phase Transformer (qualitative analysis only): Concept of magnetic circuits. Relation between MMF & Reluctance. Hysteresis & Eddy current phenomenon. Principle, construction & emf equation

Phasor diagram at ideal, no load and on load conditions. Losses & Efficiency, regulation. OC & SC test, equivalent circuit, concept of auto transformer.

Unit-IV

Electrical Machines (qualitative analysis only): Construction and working of dc machine with commutator action, speed control of dc shunt motor. Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Basics of Single-phase induction motor, capacitor start capacitor run Single-phase induction motor working. Basic construction and working of synchronous generator and motor.

Electrical Installations (LT Switchgear): Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing.

Books Suggested by University:

- Basic Electrical Engg: A complete Solution by Vijay Kumar Garg, Wiley India Ltd.
- Electrical Engg. Fundamentals by Rajendra Prasad, PHI Pub.
- Basic Electrical Engg. by S.K. Sahdev, Pearson Education
- Electrical Engg. Fundamentals: by Bobrow, Oxford Univ. Press
- Basic Electrical Engg. By Del Toro.
- Saxena & Dasgupta: Fundamentals of Electrical Engg (Cambridge University Press).

Books referred by Faculty:

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- Basic Electrical Engg. by J.B Gupta, Kataria & Sons.
- Electrical Engg. Fundamentals: by Bobrow, Oxford Univ. Press