

BASIC ELECTRICAL ENGINEERING

I B. Tech. - II Semester
Course Code: A3EE50

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COURSE OVERVIEW:

This is a basic course for all Engineering students of first year. The objective is to make them familiar with basic principles of Electrical Engineering. The course addresses the underlying concepts & methods behind Electrical Engineering. The course is present a problem oriented introductory knowledge of the Fundamentals of Electrical Engineering and to focus on the study of basic electrical parameters, basic principles, different types of electrical circuit and methods to solve electrical circuit.

COURSE OBJECTIVES:

1. To teach fundamentals of Electric Circuits, their components and the mathematical Tools used to represent and analyze Electrical circuits.
2. To inculcate fundamentals of Ohm's law, Kirchhoff's laws and be able to solve for currents, voltages and power in complex circuits.
3. Explain to loop current and node voltage equations for arbitrary DC, AC networks including resistors, capacitors, and inductors, dependent and independent sources.
4. Familiarize various two port network parameters and their relations and develop the design and analysis of basic DC and AC circuits with network topologies.

COURSE OUTCOMES:

- At the end of the course students will be able to
1. To identify basic electrical concepts, including electric charge, current, potential, electrical Power and energy.
 2. To distinguish the relationship of voltage and current in resistors, capacitors, inductors, and mutual Inductors.
 3. To differentiate circuits with ideal, independent, and controlled voltage and current sources and able to apply Kirchhoff's voltage and current laws to the analysis of electric circuits.
 4. To apply concepts of electric network topology, nodes, branches, and loops to solve circuit problems, including the use of computer simulation.
 5. To use basic laws and techniques to develop a working knowledge of the methods of analysis used.
 6. To Interpret solve series and parallel magnetic circuits.
 7. To design various two port network parameters and relations between them.

SYLLABUS

UNIT I

Electrical Circuits: Basic definitions-Ohm's Law – Kirchhoff's Laws – simple problems. Types of elements and sources. Resistive networks, inductive networks and capacitive networks. Series, parallel and compound circuits.

UNIT II

Network theorems: Mesh and Nodal analysis, star to delta and delta to star transformations, Thevenin's, Norton's, superposition and maximum power transfer theorem.

UNIT III

Measuring Instruments: Basic principle of indicating instruments, different torques in an instrument. Working principle and construction of Permanent magnet moving coil and moving iron instruments.

Transformers

Construction and working principle of transformer. EMF equation, losses and efficiency, simple problems.

UNIT IV

DC Motor & Generator: Principle and operation of DC Motor, Construction of DC machine. Types of DC motor, losses and Torque equation. DC generator construction, working principle and its EMF equation. Types of dc generators, efficiency of dc generator, problems on Emf equation. Applications.

UNIT V

AC Machines: Principle and operation of 3-phase alternator. Construction of Alternator. Emf equation of Alternator- Pitch factor and Distribution factor.
Principle and operation of 3-phase induction motor, slip, Torque-Equation, Torque-slip characteristics. Problems on Torque equation. Applications of induction motors.

TEXT BOOKS

1. Basic Electrical Engineering by M.S. Naidu and S. Kamakshaiah TMH
2. Mehta V K, —Principles of Electrical Engineering, S. Chand & Company

REFERENCE BOOKS

1. Nagsarkar T K and Sukhija M S, —Basics of Electrical Engineering, Oxford press. Basic concepts of Electrical Engineering, P.S. Subramanyam, BS Publications.