BASIC ELECTRICAL ENGINEERING

Course Code: 13EE1142

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Pre requisites: Basic Electrical Laws.

Course Outcomes:

At the end of the course the students will be able to:

CO 1 Analyze the properties of basic electrical elements and apply network theorems to electrical circuits.

CO 2 Analyze magnetic field circuits and solve AC networks.

CO 3 Explain the working of DC machines and transformers.

CO 4 Explain the working of synchronous and induction machines.

CO 5 Use basic measuring instruments based on their working principles.

UNIT-I (12 Lectures)

INTRODUCTION TO DC CIRCUITS AND THEOREMS:

Introduction, SI units, charge & current, voltage, power & energy, circuit elements. Ohm's law, Nodes, Branches & Loops, Kirchoff's laws, series resistors and voltage division, parallel resistors and current division(simple problems).

Wye–Delta transformation, source transformation, super position, Thevenin's, Norton's, Maximum power transfer theorems (simple problems).

UNIT-II (12 Lectures)

MAGNETIC CIRCUITS AND AC CIRCUITS

Magnetic field due to Electric current, force on current carrying conductor, Electro Magnetic Induction, Direction of Induced EMF's, EMF induced in a coil, comparison of electric, magnetic circuits, self and mutual inductance.

Introduction, Capacitors, series and parallel capacitors, Inductors, series, parallel inductors, sinusoids, Phasors, phasor relationships for circuit elements, impedance, admittance, instantaneous and average power, RMS values, apparent power, power factor, complex power.

UNIT-III (12 Lectures)

TRANSFORMERS AND DC MACHINES

TRANSFORMERS: Working Principle, construction, types, rating, induced EMF, ideal transformer, magnetizing and core loss current, voltage regulation, efficiency (simple problems), Auto transformer (elementary treatment only).

DC MACHINES: Constructional features, emf and torque, DC machine excitation, characteristics of DC motors and speed control, losses, efficiency (simple problems), (elementary treatment only).

UNIT-IV (12 Lectures)

AC MACHINES

SYNCHRONOUS MACHINE : Constructional details, EMF equation, determination of synchronous reactance, voltage regulation (simple problems), Principle of operation of a synchronous motor.

INDUCTION MOTOR: Constructional details, principle of operation, slip, rotor frequency, torque equation (simple problems) (Elementary treatment only).

UNIT-V (12 Lectures)

BASIC INSTRUMENTS:

Introduction, classification of Instruments, operating Principles, Basic requirements for measurement, Moving Coil Permanent Magnet (PMMC) instruments, Moving Iron of Ammeters and Voltmeters (elementary treatment only).

TEXT BOOKS :

1. Charles k Alexander, Mathew N.O. Sadiku, *"Fundamentals of Electric circuits"*, 4th Edition McGraw-Hill Companies, 2009.

2. D.P. Kothari & I.J. Nagrath , *"Theory and Problems of basic Electrical Engineering"*, 1st Edition, PHI publications, 2010.

REFERENCES:

1. Hughes by I Mckenzie Smith, *"Electrical & Electronic Technology"*, 10th Edition, Pearson Education,2010.