# BASIC ELECTRICAL ENGINEERING

## (Engineering Science Elective)

**Course Code: 15EE1153**

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**Pre requisites:**

Physics

**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 solves AC networks.

**CO 3** Explain the working of DC machines and transformers.

**CO 4** Explain the working of Alternators and induction motors.

**CO 5** Understand basic measuring instruments and electrical safety.

**UNIT-I: (10 Lectures)**

**INTRODUCTION TO ELECTRICAL DC CIRCUITS AND THEOREMS:**

Introduction, Basic definitions, Circuits elements, Ohm's law, Nodes, Branches & Loops, Kirchoff's laws, series resistors and voltage division, parallel resistors and current division(simple problems). Star- Delta conversion, source transformation, superposition, Thevenin's, Norton's, Maximum Power transfer theorems (simple problems).

**UNIT- II: (10 Lectures)**

**MAGNETIC CIRCUITS AND AC CIRCUITS:**

Magnetic field due to Electric current, force on current carrying conductor, comparison of electric and magnetic circuits, Electro Magnetic Induction- Faraday's laws, self and mutual inductance.,

Inductors in series, sinusoids, Phasors, Voltage current relationship in circuit elements, Impedance and Admittance, Average and RMS values, series ac circuits.

## UNIT-III: (10 Lectures)

### DC MACHINES AND TRANSFORMERS

#### DC MACHINES:

Construction, emf equation, types of dc machine, Torque developed in a motor, motor characteristics, speed control, losses and efficiency (simple problems), (elementary treatment only).

#### TRANSFORMERS:

Working Principle, construction, ideal transformer, emf equation, phasor diagram on no-load, voltage regulation, efficiency (simple problems), Auto transformer (elementary treatment only).

## UNIT-IV: (10 Lectures)

### AC MACHINES

#### ALTERNATORS:

Construction induced EMF, voltage regulation by Synchronous Impedance Method (simple problems).

#### INDUCTION MOTOR:

Construction, principle of operation, slip, rotor frequency, torque equation (simple problems) (Elementary treatment only).

## UNIT-V: (10 Lectures)

### ELECTRICAL INSTRUMENTS AND ELECTRICAL SAFETY

Classification of Instruments, Principles of operation, Essential requirements in indicating instruments, Permanent Magnet Moving Coil (PMMC) instruments, Moving Iron instruments (elementary treatment only). Fuses and circuit breakers, Earthling, Electric shock.

## TEXT BOOKS:

1. Dr. K. Uma Rao, *"Basic Electrical Engineering"*, 1st Edition, Pearson, 2011.

## REFERENCES:

1. Charles k Alexander, Mathew N.O. Sadiku, *"Fundamentals of Electric circuits"*, 4th Edition McGraw-Hill Companies, 2009.
2. Hughes, I Mckenzie Smith, *"Electrical & Electronic Technologyî* , 10th Edition, Pearson, 2010.
3. D.P. Kothari & I.J. Nagrath, *"Theory and Problems of basic Electrical Engineering"*, 1st Edition, PHI Publications, 2010.