BASIC ELECTRICAL ENGINEERING

Common to ECE, CSE, IT, CSE(AI&ML) & CSE(DS) Branches

21EE103ES/21EE203ES **L T P C**

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Course Objectives:

1.To introduce the concepts of electrical circuits and its components
2.To understand magnetic circuits, DC circuits and AC single phase & three phase circuits
3.To study and understand the different types of DC/AC machines and Transformers.
4.To import the knowledge of various electrical installations.

Course Outcomes:

CO 1: To analyze and solve electrical circuits using network laws and theorems.

CO 2: To understand and analyze basic Electric and Magnetic circuits

CO 3: To study the working principles of Electrical Machines
CO 4: To introduce components of Low Voltage Electrical Installations

UNIT-I: D.C. Circuits

Electrical circuit elements (R, L and C), Ohm's Law, Kirchoff's laws, Network reduction of R, L and C series and parallel networks, Active elements (Dependant and independent sources), Analysis of electrical circuits with R, L and C elements for DC excitation, Superposition, Thevenin and Norton Theorems (DC Excitation), Time-domain analysis of RL, RC and RLC circuits (DC Excitation).

UNIT-II: A.C. Circuits

Representation of sinusoidal waveforms, Peak and RMS values, Phasor representation, Real power, Reactive power, Apparent power, Power factor, Analysis of single-phase AC circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), Resonance in series R-L- C circuit, Three-phase balanced circuits, Star-Delta transformation, Analysis of star and delta connections, Three phase power measurement, Problems

UNIT-III: DC Machines & Transformers

Dynamically and statically induced EMF, Fleming's Right hand rule, Fleming's Left hand rule, DC Generator-construction and working, Generated EMF, DC Motor- construction and working, Back EMF, Torque equation, Performance characteristics, Losses and efficiency, Transformers- Principle of operation, Constructional details, EMF equation, Losses and efficiency(Open circuit& Short circuit tests), Problems.

UNIT-IV: AC Machines

Generation of Rotating Magnetic Fields, Three-phase Induction Motor - Construction and working, Its applications, Single-phase induction motor- Construction and working, Its applications, Synchronous Generators- Construction and working, No-Load characteristics, Its applications.

UNIT-V: Electrical Installations

Components of LT Switchgear: Basic operation and applications of Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing, Batteries - Important Characteristics for Batteries.

TEXTBOOKS:

1. Basic Electrical Engineering - D.P. Kothari and I.J. Nagrath, 3rd edition 2010, Tata McGrawHill.

2. D.C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.

3. Electrical Engineering Fundamentals, Vincent Deltoro, Second Edition, Prentice Hall India,1989.

REFERENCES:

1.L.S. Bobrow, Fundamentals of Electrical Engineering", Oxford University Press, 2011

2. Electrical and Electronics Technology, E. Hughes, 10th Edition, Pearson, 2010