Category	Engineering Science Course				
Course title	Basic Electrical Engineering (Theory & Lab.)				
Scheme and Credits	L	T	P	Credits	Semester –I/II
	3	1	2	5	
Pre-requisites (if any): Nil					

Course code: BTEE-101-18
Course Title: Basic Electrical Engineering (4 credits) [L: 3; T:1; P : 0]
Internal Marks: 40 **External Marks**: 60 **Total Marks**: 100
Course Outcomes: At the end of this course, students will

CO 1	Have the knowledge of DC circuits, AC Circuits, basic magnetic circuits, working principles of electrical machines, and components of low voltage electrical installations
CO 2	Be able to analyze DC circuits, AC Circuits
CO 3	Understand the basic magnetic circuits and apply it to the working of electrical machines
CO 4	Be introduced to types of wiring, batteries, and LT switchgear.

Detailed contents:

Module 1: DC Circuits (9 hours)

Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff's current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin's and Norton's Theorems. Time-domain analysis of first-order RL and RC circuits.

Module 2: AC Circuits (9 hours)

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. Three- phase balanced circuits, voltage and current relations in star and delta connections.

Module 3: Electrical Machines (16 hours)

Magnetic materials, BH characteristics, ideal and practical transformers, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections. Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motors. Construction and working of synchronous generators.

Module 4: Electrical Installations (7 hours)

Components of LT Switchgear: Switch Fuse Unit (SFU), Miniature Circuit Breaker (MCB), Earth Leakage Circuit Breaker (ELCB), MCCB, Contactors, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

Suggested Text / Reference Books

D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010. T.K. Nagsarkar and M.S. Sukhija, "Basic Electrical Engineering", Oxford University Press D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989. B. L. Theraja, "Electrical Technology", S Chand Publishing
J. B. Gupta, "Basic Electrical Engineering", S.K. Kataria & Sons