

## SYLLABUS

### B.Tech 1<sup>ST</sup> YEAR

Course: BASIC ELECTRICAL ENGINEERING

Course Code: 23EE105

Course Code	Category	Hours/ Week			Credits	Maximum Marks		
EE1204ES	Basic Electrical Engineering	L	T	P	3	CIA	SEE	TOTAL
		3	0	0		40	60	100
Contact Classes: 48	Tutorial Classes: 16	Practical Classes: Nil				Total Classes:64		

#### Course Objectives:

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

#### Course Outcomes: Upon graduation:

1. TO **Analyze**, and **solve** electrical circuits using network laws and theorems.
2. To **understand** and **analyze** basic Electric and Magnetic circuits.
3. To **study** the working principles of Electrical Machines.
4. To **introduce** components of Low Voltage Electrical Installations.

## UNIT-I

**D.C. Circuits:** Electrical circuit elements (R, L and C), voltage and current sources, KVL & KCL, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

## 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, voltage and current relations in star and delta connections.

## UNIT-III

**Transformers:** Ideal and practical transformer, Equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

## UNIT-IV

**Electrical Machines:** Construction and Working principle of DC machine, performance characteristics of dc shunt machine. Generation of RMF, Construction and Working of 3-phase Induction motor, Significance of Torque Slip Characteristics, Single phase Induction Motor Construction and Working, Construction and Working Synchronous Generator.

## UNIT-V

**Electrical Installations:** Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption Power factor improvement and battery backup.

### TEXT BOOKS/REFERENCE BOOKS:

1. Basic Electrical Engineering- D.P. Kothari and I.J. Nagrath, 4<sup>th</sup> edition 2019, Tata McGraw Hill.
2. D.C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
3. L.S. Bobrow,  
Fundamentals of Electrical Engineering", Oxford University Press, 2011
4. Electrical and Electronics Technology. Hughes, 10th Edition, Pearson, 2010.
5. Electrical Engineering Fundamentals, Vincent Deltoro, Second Edition, Prentice Hall India, 1989.