

## Basic Electrical Engineering

EEBT100	Basic Electrical Engineering	2L: 1 T: 0P	3 Credits
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**Course Objective:** The objective of this Course is to provide the students with an introductory and broad treatment of the field of Electrical Engineering.

### Course Contents:

**Module I:** D. C. Circuits covering, Ohm's Law and Kirchhoff's Laws; Analysis of series, parallel and series-parallel circuits excited by independent voltage sources; Power and energy; Electromagnetism covering, Faradays Laws, Lenz's Law, Fleming's Rules, Statically and dynamically induced EMF; Concepts of self-inductance, mutual inductance and coefficient of coupling; Energy stored in magnetic fields;

**Module II:** Single Phase A.C. Circuits covering, Generation of sinusoidal voltage- definition of average value, root mean square value, form factor and peak factor of sinusoidal voltage and current and phasor representation of alternating quantities; Analysis with phasor diagrams of R, L, C, RL, RC and RLC circuits; Real power, reactive power, apparent power and power factor, series, parallel and series- parallel circuits; Three Phase A.C. Circuits covering, Necessity and Advantages of three phase systems, Generation of three phase power, definition of Phase sequence, balanced supply and balanced load; Relationship between line and phase values of balanced star and delta connections; Power in balanced three phase circuits, measurement of power by two wattmeter method;

**Module III:** Transformers covering, Principle of operation and construction of single-phase transformers (core and shell types). EMF equation, losses, efficiency and voltage regulation; Synchronous Generators covering, Principle of operation; Types and constructional features; EMF equation;

**Module IV:** DC Machines covering, working principle of DC machine as a generator and a motor; Types and constructional features; EMF equation of generator, relation between EMF induced and terminal voltage enumerating the brush drop and drop due to armature reaction; DC motor working principle; Back EMF and its significance, torque equation; Types of D.C. motors, characteristics and applications; Necessity of a starter for DC motor;

**Module V:** Three Phase Induction Motors covering; Concept of rotating magnetic field; Principle of operation, types and constructional features; Slip and its significance; Applications of squirrel cage and slip ring motors; Necessity of a starter, star-delta starter.

**Module VI:** Sources of Electrical Power covering, Introduction to Wind, Solar, Fuel cell, Tidal, Geothermal, Hydroelectric, Thermal-steam, diesel, gas, nuclear power plants; Concept of cogeneration, and distributed generation;

**TEXT/REFERENCING BOOKS:**

1. AICTE's Prescribed Textbook: Basic Electrical Engineering, S.K. Sahdev, Khanna Book Publishing Co., 2023.
2. Ritu Sahdev (2022), Basic Electrical Engineering, Khanna Book Publishing.
3. Nagrath I.J. and D. P. Kothari (2001), Basic Electrical Engineering, Tata McGraw Hill.
4. Hayt and Kimberly, Engineering Circuit Analysis, Tata McGraw Hill.
5. Kulshreshtha D.C. (2009), Basic Electrical Engineering, Tata McGraw Hill.
6. Rajendra Prasad (2009), Fundamentals of Electrical Engineering, Prentice Hall, India Hughes, E.

**Alternative NPTEL/SWAYAM Course:**

S. No.	NPTEL Course Name	Instructor	Host Institute
1	Basic Electric Circuits	Prof. Ankush Sharma	IIT Kanpur
2	Basic Electrical Circuits	Prof. Nagendra Krishnapura	IITM
3	Fundamentals Of Electrical Engineering	Prof. Debapriya Das	IIT KGP

**COURSE OUTCOMES:**

The students will learn:

1. To explain strong basics of Electrical Engineering and practical implementation of Electrical fundamentals.
2. To identify different applications of commonly used electrical machinery.

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