

**B.E. ELECTRICAL AND ELECTRONICS ENGINEERING****Choice Based Credit System (CBCS) applicable for 2024 Scheme**

SEMESTER – I/II

**INTRODUCTION TO ELECTRICAL ENGINEERING (3:0:0)3**

(Effective from the academic year 2024-25)

Course Code	<b>BESC14B/BESC24B</b>	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Total Number of Contact Hours	40	Exam Hours	3

**Course Objectives:**

This course will enable students to:

1. To explain the sources of electric energy and its generation.
2. To explain the behavior of circuit elements in single-phase circuits.
3. To explain the construction and operation of transformers, DC generators and motors and induction motors.
4. To introduce concepts of circuit protecting devices and earthing.
5. To explain electric power generation, transmission and distribution, electricity billing, equipment and personal safety measures.

**Preamble:** Significance and Scope of the Electrical Engineering, Importance of the Course in Economic growth of Nation, Impact of the course on Societal Problems/ Sustainable Solutions/ National Economy, Career Perspective, Innovations (Current), Research status/trends.

**Module - 1**

**Introduction:** Conventional and non-conventional energy resources; General structure of electrical power systems using single line diagram approach.

**Power Generation:** Hydel, Nuclear, Solar & wind power generation (Block Diagram approach).

**DC Circuits:**

Ohm's Law and its limitations. KCL & KVL, series, parallel, series-parallel circuits. Simple Numerical.

**Module - 2****A.C. Fundamentals:**

Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor. (only definitions)

Voltage and current relationship with phasor diagrams in R, L, and C circuits. Concept of Impedance. Analysis of R-L, R-C, R-L-C Series circuits. Active power, reactive power and apparent power. Concept of power factor. (Simple Numerical).

**(08 Hours)****(08 Hours)**

<b>Module - 3</b>	<b>Module - 4</b>	<b>Module - 5</b>
<p><b>DC Machines:</b></p> <p><b>DC Generator:</b> Principle of operation, constructional details, induced emf expression, types of generators. Relation between induced emf and terminal voltage. Simple numerical.</p> <p><b>DC Motor:</b> Principle of operation, back emf and its significance. Torque equation, types of motors, characteristics and applications. Simple numerical.</p> <p style="text-align: right;"><b>(08 Hours)</b></p>	<p><b>Transformers:</b> Necessity of transformer, principle of operation, Types and construction of single-phase transformers, EMF equation, losses, variation of losses with respect to load. Efficiency and simple numerical.</p> <p><b>Three-phase induction Motors:</b> Concept of rotating magnetic field, Principle of operation, constructional features of motor, types – squirrel cage and wound rotor. Slip and its significance, simple numerical.</p> <p style="text-align: right;"><b>(08 Hours)</b></p>	<p><b>Domestic Wiring:</b> Requirements, Types of wiring: casing, capping. Two-way and three-way control of load.</p> <p><b>Equipment Safety Measures:</b> Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits.</p> <p><b>Personal Safety Measures:</b> Electric Shock, Earthing and its types, Safety Precautions to avoid shock.</p> <p><b>Electricity Bill:</b> Power rating of household appliances including air conditioners, PCs, laptops, printers, etc. Definition of “unit” used for consumption of electrical energy, calculation of electricity bill for domestic consumers.</p> <p style="text-align: right;"><b>(08 Hours)</b></p>

**Course Outcomes:**

The students will be able to:

- CO1: Understand the concepts of various energy sources and power generation.
- CO2: Apply the basic electrical laws to solve DC circuits.
- CO3: Apply the basic electrical laws to solve AC circuits...
- CO4: Explain the working of various electric machines.
- CO5: Explain the concepts of domestic wiring, circuit protective devices and personal safety measures.

**Textbooks:**

- 1. Basic Electrical Engineering by D C Kulshreshtha, Tata McGraw Hill, First Edition 2019.
- 2. A text book of Electrical Technology by B.L. Theraja, S Chand and Company, reprint edition 2014

**References:**

- 1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Tata McGraw Hill 4th edition, 2019.
- 2. Principles of Electrical Engineering & Electronics by V. K. Mehta, Rohit Mehta, S. Chand and Company Publications, 2nd edition, 2015.