

<p align="center"><b>B.E. ELECTRICAL AND ELECTRONICS ENGINEERING</b></p> <p align="center"><b>Choice Based Credit System (CBCS) applicable for 2024 Scheme</b></p> <p align="center"><b>SEMESTER – I/II</b></p>			
<p align="center"><b>INTRODUCTION TO ELECTRICAL ENGINEERING (3:0:0)3</b></p> <p align="center">(Effective from the academic year 2024-25)</p>			
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
<p><b>Course Objectives:</b></p> <p>This course will enable students to:</p> <ol style="list-style-type: none"> <li>1. To explain the sources of electric energy and its generation.</li> <li>2. To explain the behavior of circuit elements in single-phase circuits.</li> <li>3. To explain the construction and operation of transformers, DC generators and motors and induction motors.</li> <li>4. To introduce concepts of circuit protecting devices and earthing.</li> <li>5. To explain electric power generation, transmission and distribution, electricity billing, equipment and personal safety measures.</li> </ol>			
<p><b>Preamble:</b> 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.</p>			
<p align="center"><b>Module – 1</b></p>			
<p><b>Introduction:</b> Conventional and non-conventional energy resources; General structure of electrical power systems using single line diagram approach.</p> <p><b>Power Generation:</b> Hydel, Nuclear, Solar &amp; wind power generation (Block Diagram approach).</p> <p><b>DC Circuits:</b></p> <p>Ohm's Law and its limitations. KCL &amp; KVL, series, parallel, series-parallel circuits. Simple Numerical.</p> <p align="right"><b>(08 Hours)</b></p>			
<p align="center"><b>Module – 2</b></p>			
<p><b>A.C. Fundamentals:</b></p> <p>Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor. (only definitions)</p> <p>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).</p> <p align="right"><b>(08 Hours)</b></p>			

<b>Module – 3</b>	
<b>DC Machines:</b>	
<b>DC Generator:</b> Principle of operation, constructional details, induced emf expression, types of generators. Relation between induced emf and terminal voltage. Simple numerical.	
<b>DC Motor:</b> Principle of operation, back emf and its significance. Torque equation, types of motors, characteristics and applications. Simple numerical.	<b>(08 Hours)</b>
<b>Module – 4</b>	
<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.	
<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.	<b>(08 Hours)</b>
<b>Module – 5</b>	
<b>Domestic Wiring:</b> Requirements, Types of wiring: casing, capping. Two-way and three-way control of load.	
<b>Equipment Safety Measures:</b> Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits.	
<b>Personal Safety Measures:</b> Electric Shock, Earthing and its types, Safety Precautions to avoid shock.	
<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.	<b>(08 Hours)</b>
<b>Course Outcomes:</b> 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.	
<b>Textbooks:</b>	
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	
<b>References:</b>	
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.	