Code: 1BESC104B / 204B
Credits: 3
L:T:P:S- 3:0:0:0
SEE Hours: 3

Course: Introduction to Electrical Engineering
CIE: 50 Marks
SEE: 50 Marks
Total Marks:100

Prerequisites if any	None
Learning objectives	1. Discuss the fundamentals of different components of power system along with safety aspects. 2. Use fundamental laws to solve electrical circuit parameters in DC and AC circuit and demonstrate the construction, operation and characteristics of DC and AC machines.

Course Outcomes:

On the successful completion of the course, the student will be able to

COs	Course Outcomes	Bloom's level
CO1	Understand the fundamentals of different components of power system along with safety aspects.	Understand
CO2	Analyse AC and DC circuits.	Analyse
CO3	Describe the construction, operation and characteristics of DC and AC machines.	Understand

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11		PSO1	PSO2	PSO3
CO1	3	-	-	-	-	1	-	-	-	-	2		To be mapped by Respective Department		
CO2	3	3	-	-	-	-	-	-	-	-	-				
CO3	3		-	-	-	-	-	-	-	-	-				

Mapping Strength: Strong– 3 Medium – 2 Low – 1

Course Structure

		No. of Lecture Hours	No. of Tutorial Hours	No. of Practical Hours
Module – 1: Introduction to Electrical Engineering				
1.1	Concept of AC and DC	1	0	0
1.2	Generation of power from conventional energy sources	1	0	0
1.3	Generation of power from non-conventional	1	0	0
1.4	Single Line Diagram of Power System	1	0	0
1.5	Concept of power and energy	1	0	0
1.6	Tariff structure for electrical energy consumption	1	0	0
Module – 2: Electric Circuits				
2.1	Faraday's laws. Static and dynamically induced EMF	2	0	0
2.2	Fundamentals of AC and DC waveforms, representation of AC and DC quantities	1	0	0
2.3	Average and RMS values of Sinusoidal wave, Definition of form factor, and peak factor	1	0	0
2.4	Electric circuit analysis using Ohms law and Kirchhoff's laws	2	0	0
2.5	Current and Voltage division rule	1	0	0
2.6	Analysis of single-phase AC circuits with R, L, C, RL, RC and RLC series and parallel configuration, Power factor.	3	0	0
2.7	Numerical on AC circuit	2	0	0
Module – 3: DC Machines and Transformers				
3.1	Construction and working principle of DC Machine	1	0	0
3.2	DC Generator EMF equation. Back emf in DC motor	2	0	0
3.3	Classification of DC motor, DC Motor Characteristics and applications	1	0	0
3.4	Numerical	1	0	0
3.5	Construction and working principle of single phase transformer.	1	0	0
3.6	EMF equation and losses in transformer	1	0	0
3.7	Numerical	1	0	0

Module – 4: Three-phase Induction Machines and Synchronous Machines				
4.1	Advantages of three phase circuits	1	0	0
4.2	Relation between line and phase quantities in STAR and DELTA connected systems (No derivation), Numerical	1	0	0
4.3	Construction and working principle of Synchronous Generator, EMF equation.	1	0	0
4.4	Numerical	1	0	0
4.5	Construction and working principle of three phase Induction Motor	1	0	0
4.6	Slip, slip speed and frequency of rotor EMF	1	0	0
4.7	Numerical	1	0	0
Module – 5: Special Machines, Electrical wiring and safety				
5.1	Construction and working principle of BLDC Motor and Stepper Motor and their applications.	2	0	0
5.2	Introduction to domestic wiring, Fuse, MCB, and Relay.	2	0	0
5.3	Necessity of earthing, difference between earthing and grounding and types of grounding	1	0	0
5.4	Electric shocks, hazards and safety precautions,	1	0	0
5.5	Standards of wiring as per BIS	1	0	0
	Total No. of Lecture Hours	**40**		
	Total No. of Tutorial Hours		**00**	
	Total No. of Practical Hours			**00**

Self-learning topics identified:

1. Need for conservation of energy
2. Methods for improving power factor
3. Necessity of starter in motors
4. Application of three phase induction motor
5. Earth leakage circuit breakers

Textbooks:

1. D. C. Kulshreshtha, ***"Basic Electrical Engineering",*** McGraw Hill, Revised 1st Edition, 2013.
2. D. P. Kothari and I. J. Nagrath, ***"Electrical Engineering",*** Tata McGraw Hill, 4th Edition, 2019.

Reference Books:

1. Vincent Del Toro, ***"Electrical Engineering Fundamentals",*** Prentice Hall Publications, 2nd Edition, 2015.
2. H Cotton, ***"Electrical Technology",*** CBS Publishers & Distributors, 2004.

Online Resources:

1. Structure of Electric Power Systems: https://electrical-engineering-portal.com/electric-power-systems
2. Kirchoff's Laws: https://nptel.ac.in/courses/108/108/108108076/
3. Analysis of single phase AC circuits: http://elearning.vtu.ac.in/econtent/courses/video/BS/ELE1525.html
4. Working of DC machine:http://elearning.vtu.ac.in/econtent/courses/video/BS/15ELE25.html
5. Construction and working principle of transformer: https://nptel.ac.in/courses/108/108/108108076/
6. Three phase star and delta connected systems: http://elearning.vtu.ac.in/econtent/courses/video/BS/ELE1525.html