

SEMESTER –I/II

SUBJECT: Introduction to Electrical Engineering

Subject Code	23ESC14B/24B	CIE Marks	50
Hours /Week	3:0:0	SEE Marks	50
Total Hours	40	Examination Hours	03
No. of Credits:3			

Course Learning Objectives:

CLO 1	Analysis of DC circuits.
CLO 2	Analysis of single phase AC circuits.
CLO 3	Explain the three phase circuit and three phase Synchronous Generators .
CLO 4	Understand the principle of operation, construction of single-phase transformer and three phase Induction motor.
CLO 5	Understand the importance of Green energy systems, Electric vehicles and necessity of earthing

Contents	No. of Hours / RBT Levels
Module – 1: DC Circuits: Basics concepts, Ohm's law, Kirchhoff's laws, analysis of series, parallel and series parallel circuits excited by independent voltage sources only. Power and energy in resistor. Analysis of Two loop circuits by Loop or mesh current method. (Two loop circuits only)	8/L3
Module – 2: Single Phase AC Circuits Basics Terminology: Generation of sinusoidal voltage, frequency of generated voltage, average value, root mean square value, form and peak factors. Analysis of Circuits: Voltage and current relationship, with phasor diagrams, in R, L, C, R-L, R-C and R-L-C series circuits. Concept of apparent, real, and reactive powers. Significance of power factor.	8/L4
Module – 3: Three Phase AC Circuits and Synchronous Generator Three Phase AC Circuits: Advantages of three phase systems, Generation of three phase voltages, meaning of phase sequence, Relationship between line and phase quantities for balanced star and delta connections for balanced loads. Synchronous Generator: Principle of operation and construction of Synchronous Generator, types and EMF equation (Excluding the derivation and Calculation of winding factors).	8/L2
Module – 4: Single-phase Transformer and Three Phase Induction Motor Single-phase Transformer: Principle of operation and construction, types, EMF equation, losses and efficiency calculations (Condition for maximum efficiency excluded). Three phase Induction Motor: Principle of operation and construction, types, concept of rotating magnetic field, slip and significance of slip, Advantages and applications. (Numerical problems on slip calculations only)	8/L2
Module – 5: Green Energy Sources and Electric vehicles Green Energy Sources: Solar and Wind energy generation systems. Introduction to Electric vehicles: Overview and block diagram approach to electric vehicles. Earthing: Necessity of Earthing and Types of Earthing.	8/L2

Text Books				
1.	Basic Electrical Engineering	Kulshreshtha. D.C	Tata McGrawHill	2012
Reference Books				
1.	Basic Electrical Engineering	V. K. Mehta, Rohit Mehta	S Chand	2017
2.	Fundamentals of Electrical and Electronics Engineering	Samarjit Ghosh	PHI Learning	2007
3.	Hughes Electrical and Electronic Technology	John Hiley, Keith Brown, Ian Mckenzie Smith	Pearson Education	Tenth Edition Revised 2020
4.	Basic Electrical and Electronics Engineering	S. K. Bhattacharya	Pearson Education	2011
5.	A Text Book of Electrical Technology – Volume 1 (Basic Electrical Engineering) in SI system of units BL Theraja	BL. Theraja AK. Theraja	S. Chand	1999
6.	Electrical Engineering Fundamentals	Vincent Deltoro	Pearson	2015
7.	Non -Conventional Energy Resources	Sobh Nath Singh	Pearson Education	2017

COs	Statement	Bloom's Cognitive level	POs/PSOs
CO1	Apply fundamental laws to DC circuits.	Apply	PO1, PO2, PO12
CO2	Analyze the behaviour of single phase AC circuits.	Analyze	PO1, PO2, PO12
CO3	Explain three phase AC circuits and synchronous generator.	Understand	PO1, PO2, PO12
CO4	Explain the constructional features, working of single phase transformer and three phase induction motor.	Understand	PO1, PO2, PO12
CO5	Discuss the working of green energy systems, electric vehicles and types of earthing.	Understand	PO1, PO2, PO12

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	2	-	-	-	-	-	-	-	-	-	2	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	2	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	2	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	2	-	-	-
CO5	3	-	-	-	-	-	-	-	-	-	-	2	-	-	-