

BASIC ELECTRICAL ENGINEERING [As per Choice Based Credit System (CBCS) scheme] SEMESTER - I/II			
Course Code	18ELE13/18ELE23	CIA Marks	40
Number of Lecture Hours/Week	2L +1T	SEE Marks	60
Total Number of Lecture Hours	40 (08 Hours per Module)	Exam Hours	03
Credits - 03			
Each module is designed for about 6 hours. Around 10 hours is earmarked for tutorial. (Total Hours for each module: 8)			
Module-1			
D.C.Circuits: Ohm's Law and Kirchhoff's Laws, analysis of series, parallel and series- parallel circuits excited by independent voltage sources. Power and Energy. Illustrative Examples.			
A.C. Fundamentals: Generation of sinusoidal voltage, frequency of generated voltage, definition and numerical values of average value, root mean square value, form factor and peak factor of sinusoidally varying voltage and current, phasor representation of alternating quantities.			
Module-2			
A.C.Circuits: Analysis with phasor diagram, of circuits with R, L, C, R-L, RC, R-L-C for series and parallel configurations. Real power, reactive power, apparent power and power factor. Illustrative Examples. Three-phase balanced circuits, voltage and current relations in star and delta connections. Measurement of three phase power using two wattmeter method.			
Module-3			
Single Phase Transformers: Faradays Laws, self and mutually induced emfs and coefficient of coupling, Necessity of transformer, Principle of operation, Basic parts of transformers. Emf equation, losses, variation in losses with respect to load, efficiency, Condition for maximum efficiency, Illustrative problems on Emf equation and efficiency.			
Module-4			
D.C. Machines: Dynamically induced Emf, Fleming's right hand rule. Force on current carrying conductor placed in a magnetic field, Fleming's left hand rule. Basic parts of d.c. machines. DC Generators: Principle of operation, Expression for induced Emf. DC motors: Principle of operation, Back Emf, Torque equation, Types of dc motors, Characteristic of dc motors (shunt and series motors only) and Applications. Three Phase Synchronous Generators: Basic parts, Principle of operation, Synchronous speed, Frequency of generated voltage, Emf equation. Concept of			

winding factor (excluding the derivation of distribution and pitch factors). Illustrative examples on Emf equation.

Module-5

Three Phase Induction Motors: Generation of rotating magnetic field, Construction and working of a three-phase induction motor, Slip and its significance. Necessity of a starter, starting of motor using stars-delta starter. Illustrative examples on slip calculation.

Domestic Wiring: Service mains, meter board and distribution board. Brief discussion on concealed conduit wiring. Two-way and three-way control. Elementary discussion on Circuit protective devices: fuse and Miniature Circuit Breaker (MCB's). Electric shock, precautions against shock. Earthing: Pipe and Plate earthing.

Course Outcomes

- To understand and analyse D.C and A.C electric circuits.
- To understand the concepts of electromagnetic induction.
- To study the construction and working principle of transformers.
- To study the construction and working principle of d.c.machines.
- To study the construction and working principle of induction motors.
- To introduce the concepts of electrical wiring.

Question paper pattern:

- 1. The question paper will have ten questions. Each question is set for 20 marks.
- 2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub questions), should have a mix of topics under that module.
- 3. The students have to answer 5 full questions, selecting one full question from each module.

Text Books:

- 1. Basic Electrical Engineering, D C Kulshreshtha, Tata McGraw Hill, Revised First Edition.
- 2. Electrical Technology, E. Hughes International Students 9th Edition, Pearson, 2005.
- 3. Principles of Electrical Engineering & Electronics, V.K. Mehta, Rohit Mehta, S.Chand, Publications

Reference Books:

1. Fundamentals of Electrical Engineering and Electronic, B. L. Theraja, S. Chand & Company Ltd, Reprint Edition 2013.
2. Electrical Engineering Fundamentals, Vincent Del Toro, Pearson, 2nd Edition, 2015
3. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Tata McGraw Hill, 2010.
4. Fundamentals of Electrical Engineering, L. S. Bobrow, Oxford University Press, 2011.