

Course Learning Objectives (CLOs):

The student is expected to learn the concepts of dc circuits, magnetic circuits, fundamentals of single phase and poly phase ac systems including power factor improvement measures. They are required to understand the meaning of balanced and unbalanced supply system and different electrical loads. Further, they need to know the power apparatus viz. transformer, generator, motor etc. and be able to determine the performance and use for different applications. They are required to know the sources of energy, power flow, to develop wiring scheme, protection of the equipment and personnel safety.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs(1,12)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Recite the electric and magnetic circuit basic laws and solve the numericals.	1		
CO-2	Describe AC fundamentals and analyze the single phase series and parallel circuits with numericals and also know significance of PF.	1		
CO-3	Analyze the three phase circuits with numericals.	1	2	
CO-4	Exhibit the knowledge of single phase transformers and three phase Synchronous generator with numericals.	1	2	
CO-5	Exhibit the knowledge of three phase Induction Motors with numericals and recite types of energy sources, supply systems, domestic wiring with protective features.	1	2	6,7

POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Mapping Level	3.0	2.0				1.0	1.0					

Contents:

Unit I

D. C. Circuits: Review of basics, series-parallel network reduction and mesh analysis (maximum three loops), Relevant Numericals. **03 Hrs.**

Magnetic Circuits: Electromagnetic induction-laws and applications, dynamically and statically induced emf. Electromagnets-series magnetic circuit with and without air gap (leakage and fringing can be mentioned & while solving problems it can be neglected). Lifting power of a magnet, Relevant Numericals. **04 Hrs.**

Unit II

Single phase AC Circuits: Review of AC fundamentals– definitions of RMS and Average Values, form factor, phasor algebra, j-operator, Concept of active, reactive & apparent power. Analysis of circuits with different loads such as R-L, R-L-C connected in Séries and Parallel. Power factor improvement using parallel capacitor, Relevant Numericals. **08 Hrs.**

Unit III

Three phase Circuits: Three phase supply system-3 wire and 4 wire, Necessity and advantages of three phase systems, Meaning of Phase sequence. Balanced supply and load. Relationship between line and phase values for balanced star and delta connections. Power in balanced three-phase circuits, Relevant Numericals.

07 Hrs.

Unit IV

Single phase transformer: Principle, types & construction, expression for induced Emf, transformation ratio, losses and efficiency, condition for maximum efficiency (excluding derivation), voltage regulation (no derivation). Applications, Relevant Numericals. **05 Hrs.**

Synchronous Generator: Principle of operation, types & constructional features, EMF equation (excluding derivation of K_d and K_p), illustrative examples, synchronization- necessity, conditions and areas of applications, Relevant Numericals. **04 Hrs.**

Unit V

Three Phase Induction Motors: Concept of rotating magnetic field, principle of

operation, types, construction and working, applications of squirrel cage and slip ring motors, Motor starters- necessity & types and star delta starter, Relevant Numericals. **04 Hrs.**

Miscellaneous Topics: Sources of energy- conventional and renewable energy sources, Single line diagram of power flow from generation to consumer premises, load calculation of domestic installation and wiring diagram, Fuses-need, types & selection, MCB, Earthing-need and types-pipe and plate earthing, Batteries: types, rating and applications, Study of UPS with schematic diagram. **04 Hrs.**

Reference Books:

- 1) E. Hughes - Electrical Technology, 8th Edition, Pearson, 2006.
- 2) B. L. Theraja - Fundamentals of Electrical & Electronics Engineering, S Chand, 2006.
- 3) R.L. Chakrasali–Basic Electrical Engineering, Prism Books Pvt. Ltd, Bangalore
- 4) B.H. Khan – Non Conventional Energy Sources, TMH publishing, 2006.