



## C.U.SHAH UNIVERSITY

**FACULTY OF:-** Technology & Engineering

**DEPARTMENT OF:-** Instrumentation & Control Engineering

**SEMESTER:-** III

**COURSE:-** B.Tech

**CODE:-** 4TE03EME1

**NAME –**Electrical Machine

### Teaching & Evaluation Scheme

Subject Code	Name of the Subject	Teaching Scheme (Hours)				Credits	Evaluation Scheme							
		Th	Tu	Pr	Total		Theory				Practical (Marks)			Total
							Sessional Exam		University Exam		Internal		University	
							Marks	Hrs	Marks	Hrs	Pr/Viva	TW	Pr	
4TE03EME1	Electrical Machine	4	0	2	6	5	30	1.5	70	3	30	20	---	150

### Objectives

- To expose the students to the concepts of various types of Electrical Machines and applications of Electrical Machines.

### Prerequisites

- Basic of Electrical Engineering
- Concepts of Electromagnetism
- Concepts of Integration and Differentiation.

### Course outline

Sr. No	Content	Hours
01	<b>D.C.Machines:</b> Constructional features of DC machines; Elementary DC machine; Methods of excitation of DC machines; Equivalent circuit of DC machine; Commutator action; Armature reaction; Interpoles and compensating windings; Magnetization characteristic of a DC machine; Characteristics of a separately excited DC generator; Self excitation; Characteristic of a DC shunt generator; Characteristic of a DC series generator; Characteristic of a DC compound generator; DC motor characteristics; Control of DC motors; Testing and efficiency; Applications	18
02	<b>Transformers:</b> <b>(a) Single Phase Transformer:</b> Working principle, Construction, types, EMF equation, Transformer losses, effect of load, magnetic and resistive leakage, equivalent circuit, transformer testing, regulation of transformer, transformer efficiency, effect of power factor variation on efficiency, auto transformer, conversion of 2 Winding transformer into Auto Transformer, parallel operation of single phase transformers.	16

	<b>(b) Three Phase Transformer:</b> connections, Power supplied by V – V bank, Three – phase to Two-phase conversion, Two – phase to Three – phase conversion, Parallel operation of three – phase transformers, Instrument transformers, Current transformers, Potential transformers, concept of welding transformer, rectifier transformer & high frequency transformer.	
03	<b>Induction Machine:</b> <b>(a) Three Phase Induction Motors</b> Constructional features of poly-phase induction machines; Stator and Rotating Magnetic Field; Torque production; Slip; Equivalent circuit of a Poly phase Induction Machine; equivalent circuit from test data; Three phase induction machine performance; Torque-Slip characteristic; Speed control of Polyphase induction motors, Starting methods for polyphase induction motors; Induction generator, Cogging and crawling. <b>(b) Single-Phase Induction Motors</b> No-load and Blocked-rotor test; Starting methods for single-phase induction motors; Application	18

### Learning Outcomes

- Students will be able to learn the working principle, performance, control and applications of Various Electrical Machines like DC generator, DC Motor, Transformer & Induction Motor
- They will be able to design and conduct performance experiments, as well as to identify, formulate and solve machine related problems.

### Books Recommended

1. A Text Book of Electrical Technology (Vol II.) A.K. Theraja & B. L. Theraja, S. Chand Publication
2. Theory and Performance of Electrical Machines by J. B. Gupta, Kataria Publication
3. Electrical Machines. By Nagarath & Kothari, TMH Publication
4. Performance and Design of A.C. machines by M. G. Say
5. Electrical Machines by Samarjit Singh – Pearson Education.
6. Ashfaq Husain, Electric Machines, Dhanpat Rai and co. publications