



## **C.U.SHAH UNIVERSITY**

**FACULTY OF:-**Technology & Engineering  
**DEPARTMENT OF:-**Electrical Engineering  
**BRANCH:** Electrical & Electronics Engineering  
**SEMESTER:-** IV  
**COURSE:-** B.Tech  
**CODE:-** 4TE04AEM1  
**NAME –** Advance Electrical Machine

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### **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	
4TE04AEM1	Advance 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
- Fundamentals of Electrical Machines
- Concepts of Electromagnetism
- Concepts of Integration and Differentiation

### **Course Outline**

Sr. No.	Course Contents	Hours
1	<b>Three phase Transformer</b> Introduction, Construction, The vector groups of transformer connection, General remarks on 3-phase connection, tertiary winding, Scott connection, parallel operation,. Testing of transformers, Sumpner's test - efficiency - transients in transformers - voltage regulation - off load and on load tap changers. Concept of Welding transformer, Rectifier transformer & High frequency transformer.	06

2	<b>Poly phase Induction Motor</b> Equivalent Circuit, Blocked Rotor Test, No load Test, Dynamic Performance, Circle Diagram ,Performance Calculation, Testing of induction motor as per IS-325, Unbalanced Operation of Poly phase Induction Motor, Positive negative and zero sequence response, single phasing operation on non sinusoidal voltage, methods of starting, double squirrel cage motors, equivalent circuit of double squirrel cage motor , speed control of induction motors, advantage, disadvantage, and application of induction motors.	06
3	<b>Single Phase Induction Motor</b> Types of single phase motor, revolving field theory, starting and running performance of single phase IM, Split Phase Motors, Capacitor Type Motor, Shaded Pole Induction Motor, Self Starting Synchronous Reluctance Motor, .	10
4	<b>Synchronous Motor</b> Construction, Principle of Operation, Starting of synchronous motors, Motor on load with constant excitation and different excitation, Equivalent circuit, Power developed by a synchronous motor, Effect of Excitation on Armature Current and Power Factor, Construction of V curves, Speed Control of Synchronous Motor, Synchronous motor application	11
5	<b>Introduction To Special Machines</b> Universal motor: construction and working, stepper motor: construction and working, reluctance motor: general working & construction, hysteresis motors: Construction . PMDC motors: Construction, principle of operation, performance analysis, Brushless DC motors: Construction, principle of operation.	11
6	<b>Alternator</b> Basic concepts, Elementary Machines, 3-phase generators, generated emf., distribution & Pitch factor, voltage regulation by synchronous impedance and MMF method, Conditions of Parallel operation of synchronous generator.	08

### Learning Outcomes

- Performance & characteristics of poly phase & single phase induction motor.
- Constructional details, principle of operation, & application of various motor.
- Different types of transformer connection & its application and types of windings in dc machine.

### Books Recommended

1. Electrical Technology Vol II, B. L. Theraja, S. Chand Publications
2. Performance and Design of A.C. machines by M. G. Say
3. Electrical Machines by P. S. Bhimbra
4. Electrical Machines by J. B. Gupta, Kataria Publications
5. Electrical Machines by Samarjit Singh – Pearson Education
6. Electrical Machines. By Nagarath & Kothari, TMH Publications