



## C.U.SHAH UNIVERSITY – Wadhwan City

**FACULTY OF:** -Technology and Engineering (Diploma Engineering)

**DEPARTMENT OF:** -Electrical Engineering

**SEMESTER:** - IV

**CODE:** -2TE04EMC1

**NAME** – Electrical Machine -II (EMC)

### Teaching & Evaluation Scheme:-

Subject Code	Subject Name	Teaching Scheme (Hours)				Credits	Evaluation Scheme							
		Th	Tu	Pr	Total		Theory				Practical (Marks)			Total Marks
							Sessional Exam		University Exam		Internal		University	
							Marks	Hours	Marks	Hours	Pr	TW	Pr	
2TE04EMC1	Electrical Machine -II (EMC)	4	0	4	8	6	30	1.5	70	3	30	20	-----	150

### Objectives:-

- The Course Contents Give Full Knowledge to Learn Operating Principles, Performance and Testing of Various Types of Electrical Machines.
- This Course Will Enable the Students to Develop Skills to Operate AC Machines and Special Machines in Power, Commercial and Industrial Sector.

**Prerequisites:** - Basic Knowledge of Electrical Circuit & Mathematics & Importance of Electricity.

### Course Outlines:-

Sr. No.	Course Contents	No Of Hours
1	<b>Single Phase Induction Motor :-</b> Classification of Single Phase Induction Motor, Double Revolving Field Theory and Cross-Filed Theory, Making Single Phase Induction Motor Self Starting, Equivalent Circuit, Construction, Characteristics and application of Various Types of Single Phase Induction Motors, Resistance Start, Capacitor Start & Induction Run, Capacitor Start & Capacitor Run, Shaded Pole Motor, Industrial Applications	9
2	<b>Induction Motor :-</b> Production of Rotating Magnetic Field by Two Phase and Three-Phase Supply, Types of Induction Motor, Construction of Slip Ring and Squirrel Cage Motors, Working Principle, Slip, Torque, Gross Torque and Shaft Torque, Starting Torque, Maximum Torque, Full Load Torque, Relation Between Starting, Maximum and Full Load Torque, Torque-Slip Characteristics, Effect Of Rotor Resistance, Power Stages and Efficiency, Equivalent Circuit, Approximate and Exact Phasor Diagram, No-Load and Blocked Rotor Tests, Circle Diagram, Methods of Starting Induction Motor, Speed Control of Induction Motors, Rotor Resistance Control, Stator Voltage Control, Frequency Control, Pole Changing Method, Cascade Control, Cogging and Crawling, Double Cage Induction Motor, Characteristic, Applications.	18
3	<b>Alternator :-</b> Constructional Features, Working Principle, Types of Alternator, Damper Winding, Types of Armature Winding, Winding Factors, EMF Equation, Idea of Leakage Reactance	10

	(Cylindrical Rotor) , Synchronous Reactance, Synchronous Impedance, Armature Reaction, Vector and Phasor Diagram at Different Power Factors (Cylindrical Rotor), Voltage Regulation, Open Circuit and Short Circuit Tests, Different Methods of Voltage Regulation, Parallel Operation of Three Phase Alternators, Synchronizing of Alternators with infinite Busbar , Methods of Synchronizing of Alternators.	
4	<b>Synchronous Motors</b> Construction and Working Principle, Methods of Starting, Power Developed by Synchronous Motor, Phasor Diagram at Different Load (Cylindrical Rotor), Power Equation, Power Angle Characteristics, Effect of Change in Excitation, V - Curves and Inverted V- Curves, Break Test Comparison of Induction Motor and Synchronous Motor, Application of Synchronous Motor.	9
5	<b>Special Machines</b> Basic Principles, Operation, Characteristics and Applications of Following Motors - Linear Induction Motor, Stepper Motor, A.C. Commutator Motors, Scharge Motor, Repulsion Motor, Brush Less D.C. Motor, Universal Motor.	8

### List of Experiments:-

- To Perform No Load Test and Blocked Rotor Test on Three Phase Induction Motor and Construct its Circle Diagram and Find out its Various Performance Parameters.
- To Make Connections of DOL Starter / Star-Delta Starter / Auto Transformer / Rotor Rheostat Starter for Appropriate Three Phase Induction Motor.
- To Perform Speed Control of Squirrel Cage Induction Motor by
  1. By Changing the Supply Voltage.
  2. By Changing the Applied Frequency.
- To Perform Speed Control of Slip-Ring Induction Motor by
  1. Rotor Rheostat Control.
  2. By Injecting an EMF from Rotor Side.
  3. By Operating Two Motors in Cascade Connection.
- To Perform Direct Loading Test on Alternator and find out Voltage Regulation of it.
- To find out Voltage Regulation of Alternator by Synchronous Impedance Method for :
  1. Unity Power Factor.
  2. Lagging Power Factor.
  3. Leading Power Factor.
- To find out Voltage Regulation of Alternator by Ampere Turn Method for :
  1. Unity Power Factor.
  2. Lagging Power Factor.
  3. Leading Power Factor.
- To Perform Synchronizing of Alternator With Bus Bar.
- To List & Explain Various Starting Methods of Synchronous Motor & Applying One of Them to Start the Synchronous Motor.
- To Construct V-Curves of Synchronous Motor at Different Load Conditions.
- Testing of Circuit of Capacitor Start Capacitor Run Single Phase Motor (Ceiling Fan).
- To Study the Construction & Operation of Scharge Motor

### Learning Outcomes:-

- Application & Importance of Electrical Machines..
- Various Testing Method of Electrical Machines.
- Calculation of Different Losses And Efficiency Of Machines
- Knowledge of Different Electrical Machine.
- Knowledge of Protective Equipments & Safety Norms.

**Books Recommended:-**

- Electrical Technology **J.B.Gupta** ,S.K.Katariya & Sons
- A Text Book of Electrical Technology, **B.L.Theraja & A.K.Theraja**, S.Chand & Company Ltd.
- A Hand Book of Electrical Engineering, **S.L.Bhatiya**, Khanna Publication