Community College of Skill Development

Lesson Plan: ELECTRICAL MACHINE-II

Program: B.VOC ELECTRICAL **Semester: IIIrd** **Course Code: ELV-205-V**
Credits: 3

Course Objectives: The objective of this course is to equip students with a thorough understanding of various types of electric machines, including induction motors, synchronous machines, DC generators, and special-purpose machines. Students will learn the principles of operation, constructional features, performance characteristics, and practical applications of these machines. Additionally, students will gain hands-on experience in testing, controlling, and analysing the performance of these machines under various conditions.

Course Outcomes: After the successful completion of the course, students will be able to:

CO1: Understand and explain the construction, operation, and performance characteristics of 3-phase induction motors, including the significance of slip and torque-slip relationships.

CO2: Analyse and evaluate the operation of synchronous machines, including excitation methods, voltage regulation, and the conditions for parallel operation.

CO3: Apply the principles of DC generators to explain their construction, magnetic circuit, winding types, and commutation methods.

CO4: Investigate and compare the construction and working principles of special-purpose machines such as linear induction motors, stepper motors, and Schrage motors, and understand their applications.

Equipment required in Classroom/ Laboratory/ Workshop

i. Whiteboard

Assessment Scheme

S.No.	Criteria	Marks
1	End Term Examination	75
2	Internal Evaluation Scheme	25
2a	Class Tests	15
2a (i)	Class Test-I	7.5
2a (ii)	Class Test-II	7.5
2(b)	Teacher Assessment (Continuous Evaluation)	10
2b (i)	Attendance	5
2b (ii)	Assignment / Presentation	5

Lecture No.	Topic Covered	Pedagogy	Date of Implementation	Course Outcomes Covered	Faculty Sign
1	Introduction to 3-phase Induction Motors – Types and Applications	Whiteboard	30-7-25	CO1	VINOD
2	Constructional features of Squirrel Cage & Slip Ring Induction Motors	Whiteboard	7-8-25	CO1	VINOD
3	Principle of Operation and Concept of Slip	Whiteboard	7-8-25	CO1	VINOD
4	Significance of Slip, Locking of Rotor and Stator Fields	Whiteboard	13-8-25	CO1	VINOD
5	Rotor Resistance, Inductance, EMF and Current	Whiteboard	14-8-25	CO1	VINOD
6	Relationship between Copper Loss and Motor Slip	Whiteboard	14-8-25	CO1	VINOD
7	Power Flow Diagram of 3-Phase Induction Motor	Whiteboard	20-8-25	CO1	VINOD
8	Factors Determining Torque, Torque-Slip Characteristics	Whiteboard	21-8-25	CO1	VINOD
9	Effect of Rotor Resistance on Torque-Slip Relationship	Whiteboard	21-8-25	CO1	VINOD
10	Starting of Induction	Whiteboard	28-8-25	CO1	VINOD

	Motors – DOL Starter				
11	Starting of Induction Motors – Star-Delta & Auto-Transformer Starter	Whiteboard	28-8-25	CO1	VINOD
12	Causes of Low Power Factor in Induction Motors	Whiteboard	3-9-25	CO1	VINOD
13	Testing of 3-phase Induction Motor – No-load and Blocked Rotor Tests	Whiteboard	4-9-25	CO1	VINOD
14	Speed Control of Induction Motors	Whiteboard	4-9-25	CO1	VINOD
15	Constructional Features, Excitation System – Brushless & Commutator Type	Whiteboard	10-9-25	CO2	VINOD
16	Generation of 3-phase EMF, Rotating Magnetic Field	Whiteboard	11-9-25	CO2	VINOD
17	Distribution Factor and Coil Span Factor	Whiteboard	11-9-25	CO2	VINOD
18	EMF Equation of Alternator	Whiteboard	17-9-25	CO2	VINOD
19	Armature Reaction at Different Power Factors	Whiteboard	18-9-25	CO2	VINOD
20	Voltage Regulation by Synchronous Impedance Method	Whiteboard	18-9-25	CO2	VINOD
21	Need & Conditions for Parallel Operation of Alternators	Whiteboard	8-10-25	CO2	VINOD
22	Synchronizing an Alternator with Bus Bars (Synchroscope Method)	Whiteboard	9-10-25	CO2	VINOD
23	Operation of Synchronous Machine as Motor – Principle & Starting Methods	Whiteboard	9-10-25	CO2	VINOD
24	Effect of Excitation on Synchronous Motor	Whiteboard	15-10-25	CO2	VINOD
25	Hunting in Synchronous Motor – Cause and Prevention	Whiteboard	16-10-25	CO2	VINOD
26	Rating, Cooling & Applications of Synchronous Machines	Whiteboard	16-10-25	CO2	VINOD
27	Introduction to DC Machines – Construction & Magnetic Circuit	Whiteboard	29-10-25	CO3	VINOD

28	Basic Principle of DC Generator	Whiteboard	30-10-25	CO3	VINOD
29	Armature Windings – Lap and Wave Windings	Whiteboard	30-10-25	CO3	VINOD
30	Commutation in DC Generator	Whiteboard	6-10-25	CO3	VINOD
31	Methods to Improve Commutation	Whiteboard	6-10-25	CO3	VINOD
32	Characteristics of DC Generators – Types and Curves	Whiteboard	6-10-25	CO3	VINOD
33	Performance and Applications of DC Generators	Whiteboard	12-10-25	CO3	VINOD
34	Introduction to Special Purpose Machines	Whiteboard	12-10-25	CO4	VINOD
35	Construction & Working of Linear Induction Motor	Whiteboard	13-10-25	CO4	VINOD
36	Construction & Working of Stepper Motor	Whiteboard	13-10-25	CO4	VINOD
37	Construction & Working of Schrage Motor	Whiteboard	26-10-25	CO4	VINOD
38	Introduction to PMDC & Brushless DC Motors	Whiteboard	27-10-25	CO4	VINOD
39	Testing and Applications of Special Machines	Whiteboard	27-10-25	CO4	VINOD
40	Revision & Comprehensive Test for All Units			CO4	VINOD

Text Books:

1. P. S. Bimbhra; *Electrical Machines-I*, Khanna Book Publishing, 2019.

Reference Books:

Ashfaq Husain; *Electric Machines*.

P. S. Bimbhra; *Electrical Machines-I*, Khanna Book Publishing, 2019.

D. P. Kothari and I. J. Nagrath; *Electric Machine*, The McGraw Hill Companies, Third Edition