

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/
COMMERCIAL PRACTICE, APRIL - 2024**

SYNCHRONOUS MACHINE AND FHP MOTORS

[Maximum marks: 75]

[Time: 3 Hours]

PART A

I. Answer all the following questions in one word or one sentence. Each question carries 1 mark

(9 x 1 = 9 Marks)

		Module outcome	Cognitive level
1	List any two types of armature windings.	M1.01	R
2	Recall the classification of alternators based on rotor construction.	M1.01	R
3	As the speed of an alternator increases, the frequency (a) Increases (b) Decreases (c) Remains constant (d) May increases or decreases depending on the power factor	M1.02	U
4	Recall any two methods of finding the voltage regulation of alternators.	M2.01	R
5	Define Synchronizing power.	M2.04	R
6	Identify the incorrect statement about synchronous motor (1) It has a starting torque (2) Its speed varies from no load to full load (3) It can operate at lagging, leading and zero power factors (a) 1,2,3 (b) Only 2 (c) Only 3 (d) 1 & 2	M3.01	U
7	An under excited synchronous motor works at Power factor (a) Lagging (b) Leading (c) Unity (d) None of the above	M3.02	U
8	List any two Starting methods of single-phase induction motors.	M4.01	R
9	Mention any two application of stepper motor.	M4.03	R

PART B

II. Answer any eight questions from the following. Each question carries 3 marks.

(8 x 3 = 24 Marks)

		Module outcome	Cognitive level
1	Recall any three advantages of stationary armature over rotating armature in alternator.	M1.01	R
2	Calculate the distribution factor for 36 slots, 4 pole, single layer three phase winding.	M1.02	A
3	Identify any three conditions for proper synchronization of alternators.	M2.03	U
4	Show the power flow diagram of synchronous generator.	M2.02	R
5	List any three methods to eliminate hunting in synchronous motor.	M3.03	R

6	Recall the different types of torque in synchronous motors.	M3.03	R
7	Give any three comparisons between synchronous and induction motors.	M3.04	R
8	Explain double field revolving theory in single phase induction motor.	M4.01	U
9	Explain briefly the operation of repulsion motor.	M4.02	U
10	List any three applications of Fractional horse power motors.	M4.04	R

PART C

Answer all questions. Each question carries seven marks

(6 x 7 = 42 Marks)

		Module outcome	Cognitive level
III	With the help of a neat sketch explain the constructional details of an alternator.	M1.01	U
	OR		
IV	Derive emf equation of an alternator.	M1.02	U
V	Summarize the following terms (1) Synchronizing current (2) Synchronizing torque	M2.02	U
	OR		
VI	A three-phase, star-connected, 10 kVA, 230V alternator has an armature resistance of 0.8 Ω per phase and a synchronous reactance of 1.5 Ω per phase. Calculate the percent voltage regulation at full load and power factor of 0.6 lagging.	M2.01	A
VII	Explain the concept of V and inverted V Curve of synchronous motor.	M3.02	U
	OR		
VIII	Illustrate the operation of synchronous condenser using vector diagram.	M3.04	U
IX	Outline the operation of shaded pole motor.	M4.01	U
	OR		
X	Explain the working of switched reluctance motor.	M4.03	U
XI	Illustrate the effect of power factors on armature reaction.	M1.03	U
	OR		
XII	Explain the reasons for alternators rated in kVA and not in kW.	M1.01	U
XIII	A 100 KVA 3000V 50Hz three phase star connected alternator has effective armature resistance of 0.2ohm, a field current of 40A produces a short circuit current of 200A and open circuit EMF of 1040 V (between lines). Calculate the percentage regulation at full load 0.8pf leading.	M2.01	A
	OR		
XIV	Explain the method to find voltage regulation by Ampere Turn method (MMF method).	M2.01	U
