

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/
COMMERCIAL PRACTICE, APRIL - 2025**

SYNCHRONOUS MACHINES & FHP MOTORS

[Maximum marks: 100]

[Time: 3 Hours]

PART – A

Maximum marks: 10

I. (Answer *all* the questions in one or two sentences. Each question carries 2 marks)

1. List two types of rotor construction in alternators.
2. Write the equation for chording factor of an armature winding.
3. Write the equation for efficiency of an alternator.
4. List any two applications of synchronous motor.
5. List the two types of servomotor. (5 x 2 = 10)

PART – B

Maximum marks: 30

II. (Answer any *five* of the following questions. Each question carries 6 marks)

1. Explain the phasor diagram of an alternator under lagging load.
2. Describe the conditions for synchronising of three phase alternators.
3. Draw the circuit diagram for determining Open circuit characteristics of an alternator.
4. Explain the power stages in a synchronous motor.
5. Distinguish between three phase synchronous motor and induction motor.
6. Explain the working of a shaded pole motor with the help of a sketch.
7. Explain the working of stepper motors with the help of a diagram. (5 x 6= 30)

PART – C

Maximum marks: 60

(Answer *one full* question from each unit. Each full question carries 15 marks)

UNIT – I

- III.** (a) Derive the EMF equation of an alternator with distribution factor and chording factor. (8)
- (b) Determine the rms value of line voltage of an 8 pole, 50 Hz, star connected three phase alternator with 96 slots and 2 conductors per slot. The flux per pole is 0.3Wb and the coil span is 150 degrees. (7)

OR

- IV.** (a) Explain the advantages of stationary armature over rotating armature. (8)
- (b) Explain with neat sketch the construction and working of a three phase alternator. (7)

UNIT – II

- V.** (a) Explain the method to determine voltage regulation of alternator by MMF method. (8)
- (b) Explain with circuit diagram the method of determining short circuit characteristics of a three phase alternator. (7)

OR

- VI.** (a) Describe the method for determining voltage regulation of alternator by ZPF method. (8)
- (b) A 300kVA, 3000V, 50Hz, three phase star connected alternator has a per phase effective resistance of 0.6 ohm. A field current of 8A produces a short circuit current of 80A and an open circuit line voltage of 1000V. Calculate the percentage regulation at full load upf load. (7)

UNIT – III

- VII.** (a) Explain the various starting methods of a three phase synchronous motor. (8)
- (b) Describe the V and inverted V curve of a synchronous motor. (7)

OR

- VIII.** (a) Explain the different torques in a three phase synchronous motor. (8)
- (b) Describe with vector diagram the working of a synchronous condenser. (7)

UNIT – IV

- IX.** (a) Explain the construction and operation of a single phase capacitor start induction run motor. (8)
- (b) Describe the construction and operation of a switched reluctance motor. (7)

OR

- X.** (a) Explain the construction and working of a repulsion motor. (8)
- (b) Describe the construction and operation of a universal motor. (7)
