

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/
MANAGEMENT/COMMERCIAL PRACTICE — APRIL, 2018

SYNCHRONOUS MACHINES AND FHP MOTORS

[Time : 3 hours

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

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

1. What are the advantages of fractional pitched stator winding ?
2. Why damper winding provided in the rotor of salient pole type alternator ?
3. List the methods to find the regulation of alternators.
4. What is synchronous condenser ?
5. List out different types of stepper motor.

(5×2 = 10)

PART — B

(Maximum marks : 30)

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

1. Derive emf equation of alternator.
2. Explain the synchronous impedance method for finding the regulation of alternator.
3. Explain the conditions for proper synchronization of alternators.
4. Explain why synchronous motors are not self starting. List the methods of starting synchronous motors.
5. Draw the power stages of synchronous motor.
6. Explain the construction and working of capacitor start and capacitor run induction motor.
7. Explain the working of stepper motor.

(5×6 = 30)

PART — C

(Maximum marks : 60)

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

UNIT — I

- III (a) Calculate the line value of induced emf of a 10 pole three phase star connected alternator with 60 slots and 4 conductors per slot. The coil span is 150 degree and flux per pole is 0.12Wb sinusoidally distributed. 8
- (b) Draw and explain the constructional details of a three phase alternator. 7

OR

- IV (a) Write down the advantages of stationary armature over rotating armature in alternator. 7
- (b) A three phase 16 pole alternator has star connected winding with 144 slots and 10 conductors per slot. The flux per pole 30mWb sinusoidally distributed. The speed of the alternator is 375 rpm. The coils are short chorded by one slot. Find the phase and line values of emf generated. 8

UNIT — II

- V (a) Why terminal voltage of alternator is lower than generated emf ? Explain. 8
- (b) Find the regulation of a single phase alternator 550V 55KVA has an effective armature resistance of 0.25 ohm. A field current of 10A produces an armature current of 200A on short circuit and an emf of 500V on open circuit. Calculate (i) Synchronous impedance and reactance (ii) full load regulation at 0.8 pf lag. 7

OR

- VI (a) What are the necessary condition for parallel operation of alternators ? 3
- (b) List out the methods to find the regulation of alternator. 3
- (c) A 100KVA, 3000V, 50Hz, three phase star connected alternator has an effective armature resistance of 0.2 ohm. A field current of 40A produces a short circuit current of 200A and an open circuit voltage of 1040V. Calculate the percentage regulation at full load and 0.8 pf lagging. 9

UNIT — III

- VII (a) With the help of vector diagrams explain synchronous motor on load. 8
- (b) Explain in detail the power developed in a synchronous motor. 7

OR

- VIII (a) Discuss the concept of V-curve and inverted V-curve in synchronous machine. 8
- (b) Discuss about the different types of torques in a synchronous motor. 7

UNIT — IV

- IX (a) Explain the construction and working of universal motor. 8
- (b) Briefly explain the operation of repulsion motor. 7

OR

- X (a) Explain the working of permanent capacitor motor with the help of circuit diagram and vector diagram. 8
- (b) Write short note on printed circuit motor. 7