

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/
COMMERCIAL PRACTICE, APRIL 2023**

SYNCHRONOUS MACHINES AND 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. Write any two types of armature winding of Synchronous Machines.
2. List the methods to find voltage regulation of alternators.
3. Write any two important characteristics of synchronous motor.
4. Give an idea about synchronous condenser.
5. List down any two starting methods of single phase induction motors. (5 x 2 = 10)

PART – B

Maximum marks : 30

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

1. Derive the EMF equation of alternator.
2. Differentiate between salient pole and non-salient pole type rotor.
3. Explain the method to determine effective resistance of armature with relevant diagram.
4. Derive the equation of power developed by synchronous generator.
5. Draw the power stages in synchronous motor.
6. Draw and explain resistance start single phase induction motor.
7. Describe printed circuit board motors with figure. (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) Draw and explain the constructional details of three phase salient pole alternator (8)

(b) Draw the vector diagrams of an alternator under lagging and leading pf loads. (7)

OR

IV. (a) List down the advantages of providing stationary armature for an alternator. (7)

(b) Find the no-load terminal e.m.f of 4-pole AC generator from the following data.

Flux per pole 0.12W b, conductors per slot 4 two layer winding coil span 150° .

Connection star. Number of slots per pole per phase is 4. (8)

UNIT-II

V. (a) Describe open circuit test and short circuit test of synchronous machine with relevant figures. (8)

(b) A 3-phase star connected alternator is rated 1600 kVA, 13500 V. The armature effective resistance and synchronous reactance are 1.5Ω and 30Ω respectively per phase. Calculate the percentage regulation for a load of 1280 kW at 0.8 leading p.f. (7)

OR

VI. (a) Describe voltage regulation by MMF method with relevant figure. (7)

(b) A 60-KVA, 220 V, 50-Hz, 1 phase alternator has effective armature resistance of 0.016 ohm and an armature leakage reactance of 0.07 ohm. Compute the voltage induced in the armature when the alternator is delivering rated current at a load power factor of (i) Unity (ii)0.7 lagging and (iii)0.7 leading. Draw phasor diagram in each case. (8)

UNIT-III

VII.(a) Illustrate the operation principle of synchronous motor. (8)

(b) Describe different torques in a synchronous motor. (7)

OR

VIII.(a) Explain the concept of V-curve and inverted V-curve in synchronous motor. (8)

(b) Describe the starting methods of synchronous motor. (7)

UNIT-IV

IX. (a) Illustrate capacitor start capacitor run single phase induction motor (8)

(b) Explain the working of hysteresis motor. (7)

OR

X. (a) Explain the working of shaded pole motor with figure. (8)

(b) Describe switched reluctance motor. (7)
