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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/ COMMERCIAL PRACTICE – NOVEMBER – 2022

SYNCHRONOUS MACHINES & FHP MOTORS

(Maximum Marks : 100) (Time : 3 hours)

PART – A
(Maximum Marks : 10)

Marks

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

1. State the advantages of short pitched coil.
2. Classify alternators based on rotor construction.
3. List different methods for determination of voltage regulation of alternators.
4. What is synchronous condenser?
5. Write any two applications of servo motor. (5x2=10)

PART –B
(Maximum Marks : 30)

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

1. Derive an expression for distribution factor in alternator.
2. Explain EMF method of determination of voltage regulation in alternators.
3. Two alternators running parallel supply the following loads (i) lighting load of 500 KW (ii) 1000 KW at 0.9 lagging (iii) 800KW at 0.8 lagging (iv) 500 KW at 0.9 leading. One alternator is supplying 1500 KW at 0.95 lagging. Calculate the KW output and p.f. of second machine.
4. Explain different methods of starting of synchronous motor.
5. Draw the power flow diagram and derive an expression for the mechanical power developed in synchronous motor.
6. Explain the construction and working of shaded pole motor.

7. Explain the construction and working of universal motor.

(5x6=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 alternator. (8)

(b) A 3 phase, 50 Hz, 10 pole star connected alternator runs at 600 rpm has 120 slots with 8 conductors per slot and the conductors are connected in series. Determine the phase and line values of induced emf if the flux per pole is 56m Wb. Assume full pitched coil. (7)

OR

IV. (a) What is armature reaction in alternators. Explain the effects of armature reaction at (a) zero p.f lagging, (b) zero p.f leading, (c) u.p.f (8)

(b) Draw the vector diagrams of loaded alternator for the following pf (i) Lagging p.f (ii) leading p.f and explain each terms. (7)

UNIT – II

V. (a) Explain the method of finding the voltage regulation of alternator by zpf method. (8)

(b) A 1200 KVA, 3300 V, 50 Hz, 3 phase star connected alternator has armature resistance 0.25 ohm per phase. A field current of 40 A produces a short circuit current of 200 A and an open circuit emf of 1100 V line voltage. Calculate the percentage regulation on full load 0.8 p.f lagging. (7)

OR

VI. (a) What are the conditions for proper synchronization of three phase alternators. Explain two bright and one dark lamp method of synchronisation of alternators. (8)

(b) Derive an expression for synchronising power and synchronising torque in alternators. (7)

UNIT –III

VII. (a) Illustrate the effect of change in excitation on armature current and pf of synchronous motor with help of vector diagrams. (8)

(b) Explain different types of torques acting in synchronous motor. (7)

OR

VIII. (a) Describe the principle of operation of synchronous motor. (8)

(b) Explain the field of applications of synchronous motor. (7)

UNIT – IV

IX. (a) Explain the construction and working of double value capacitor run motor. (8)

(b) Describe construction working and field of applications of printed circuit board motor. (7)

OR

X. (a) Explain the construction and working of a variable reluctance stepper motor. (8)

(b) Explain the field of applications of stepper motors. (7)

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