Exam.Code:0934
Sub. Code: 6977

1079

B.E. (Electrical and Electronics Engineering)
Fourth Semester
EE-401: Electric Machinery - II

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Unit.

x-x-x

I. Attempt the following:-

a) Why does the armature current increase with the increase in the load on a synchronous motor even when there is no change in its field excitation?

b) How does the slip vary as a function of thrust in a LIM?

c) Is a hysteresis motor a synchronous motor? Justify your response.

d) What is the basic difference between a PM and a variable reluctance stepper motor?

e) What is a fractional pitch winding? What are its advantages and shortcomings? (5x2)

UNIT – I

II. a) Explain the V and inverted V curves of a synchronous machine.

b) A 6 pole three phase alternator has 72 slots. Determine its pitch factor, its distribution factor and the winding factor. (6,4)

III. a) Two star connected three phase synchronous generators supply a load of 416 kW at a terminal voltage of 3 kV and at a lagging pf of 0.8. The synchronous impedance of generator A is (0.5 +j5) ohm/phase and that of B is (0.2 +j10) ohm/phase. The field excitation and mechanical power input of gen A are so adjusted that is delivers half the power at unity pf. Determine:

i) the current and pf
ii) the per-phase generated voltage
iii) the power angle of each generator.

b) Explain the power angle characteristics of an alternator. (6,4)

IV. a) A LIM drives a conveyer belt at a speed of 20 km/hr with a slip of 20% at 50 Hz and develops a thrust of 200 N. Calculate

i) Pole pitch of the motor
ii) Power developed by the motor
iii) Amount of copper losses in the secondary side.

P.T.O.

b) Explain the principle of operation of a brushless DC motor. Also state its advantages and limitations over a brushed DC motor.

UNIT – II

V. a) Determine the magnetic flux of a 120 V, 1 hp, PM motor operating at a speed of 1500 rpm. The motor constant is 85, armature resistance is 0.7 ohm, and the rotational losses are 50 W.

b) A 100 hp, 90% efficient, synchronous motor delivers the full load at 0.707 pf leading. What is the power input to the motor? What is its kVA requirement? Draw its power triangle. (6,4)

VI. a) A factory load of 400 kW, 0.6 pf lagging includes an induction motor delivering 50 hp at an efficiency of 80% and 0.866 pf lagging. When the induction motor is replaced by a synchronous motor of the same hp and efficiency, the pf becomes 0.8 lagging. Determine the kVA rating and the pf of the motor.

b) Explain the.OCC and SCC of a synchronous machine. (6,4)

VII. a) Two three-phase, star connected synchronous generators operate in parallel to supply a lighting load of 480 kW and a motor load of 240 kW at 0.8 pf lagging. The mechanical input and the field excitation of one generator are adjusted so that it supplies 240 kW at 0.9 pf lagging. Calculate the load and the pf of the other generator.

b) Explain the principle of operation of a stepper motor. Also explain its various types using suitable diagrams. (5,5)

x-x-x