Exam.Code:0934
Sub. Code: 6761

2062

B.E. (Electrical and Electronics Engineering)

Fourth Semester

PC-EE-401: Electrical Machine - 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 Part.*

x-x-x

1. (a) Derive emf equation of an alternator.
   (b) What are V-curves and inverted V-curves of 3-Φ synchronous motors?
   (c) Why synchronizing motor cannot run at seed other than synchronous speed?
   (d) Define and explain synchronizing torque coefficient.
   (e) What is SCR? Write its significance.

   (5*2)

PART-A

2. (a) Explain the procedure to determine voltage regulation of a synchronous machine using ZPF method.

   (b) A 550 V, 55 kVA, 1-Φ alternator has an effective resistance of 0.2 Ω. A field current of 10A produces an armature current of 200 A on short circuit and an emf of 450 V on open circuit. Calculate synchronous reactance and voltage regulation at full load with 0.8 pf lagging.

   (5, 5)

3. A 6600 V, Y-connected, 3-Φ non-salient pole synchronous generator has following open circuit characteristics:

Phase voltage (V)	2600	3500	4130	4600	5000	550
Field current (A)	100	150	200	250	300	400

   Full load current on short circuit is obtained with excitation of 175A. Using ampere-turn method, determine full load regulation when power factor is 0.9 lagging. The resistance drop is negligible and reactive drop is 10% on full load.

   (10)

4. (a) Explain two reaction theory as applicable to salient pole synchronous machines.

   (b) What is synchronous condenser? Explain its operation with the help of phasor diagram. Write its applications.

   (5, 5)

P.T.O.

PART-B

5. Two, 50 MVA, 3-Φ alternators operate in parallel. Settings of governors are such that rise in speed from full load to no load is 2% in one machine and 3% in other, the speed-load characteristics being straight lines in both cases. If each machine is fully loaded, when total load is 100 MW, what would be the load on each machine when total load is 60 MW? (10)

6. (a) What is infinite bus? State characteristics of infinite bus. What are operating characteristics an alternator connected to infinite bus?

   (b) State and prove constant-flux-linkage theorem.

   (5, 5)

7. (a) Explain working of reluctance motors. Also, explain its torque-speed characteristics.

   (b) Explain operation and working of variable reluctance stepper motor.

   (5, 5)

x-x-x