

Electrical Machines -III

(3 Hours)

(Total Marks : 80)

N.B. :

- 1: Q No 1 is compulsory;
- 2: Attempt any three from the remaining questions.
3. Figure to the right indicate full marks
4. Assume any suitable data if necessary & justify,
5. Answer to the questions should be grouped and written together

- Q1 a Why 3 phase synchronous motor develops torque only at synchronous speed? 20
 b What are the operating characteristic of an alternator connected to infinite bus?
 c Draw the phasor diagram of salient pole synchronous motor for lagging power factor & leading power factor.
 d Explain steady state analysis of Induction machine.
- Q2 a Calculate the RMS value of the induced EMF per phase of a 10 pole 3 phase 50 Hz alternator with 2 slots per pole per phase and 4 conductors per slot in 2 layers. Coil span is 150 degree the flux per pole is 0.12 Wb 08
 b What is a synchronous condenser? Explain with the help of phasor diagram its operation. What are its applications? 06
 c Explain the method of finding regulation of alternator by MMF method. 06
- Q3 a A three phase salient pole synchronous Motor has direct axis synch reactance of 0.95 pu and quadrature axis synchronous reactance of 0.6 pu. Draw the phasor diagram of the motor when operating at full load of 0.8 pf lagging and estimate load angle. 08
 b Write a short note on Blondle two reaction theory. 06
 c Derive the power output equation of synchronous generator and condition for maximum power output 06
- Q4 a A three phase synchronous motor of 8000W, 1100V has synchronous reactance of 8 ohm per phase find the minimum current and the corresponding induced EMF for full load condition. The efficiency of the machine is 0.8. Neglect R_a . 06
 b Explain the effect of increasing load on the operation of synchronous motor excitation being kept constant. 08
 c Explain the effect of armature reaction on alternator for unity & lagging power factor load 06
- Q5 a Two station generators A & B operate in parallel. Station capacity of A is 50 MW and that of B is 25 MW. Full load speed regulation of A is 3% and that of B is 3.5%. Calculate the load shared by A&B if the connected load is 60 MW and no load frequency is 50 Hz. 06
 b Explain excitation circle and power circle of synchronous motor. 08
 c What conditions must be fulfilled before an alternator can be connected to an infinite bus and explain two dark and one bright lamp method. 06
- Q6 Write Notes on (any two) 20
 a Ideal synchronous machine
 b. Starting methods of synchronous motor
 c Slip Test