

(3Hours)

[Total Marks: 80]

N.B. 1) Question No. 1 is compulsory

2) Attempt any three from the remaining Questions No. 2 to No. 6.

3) Illustrate answers with diagrams wherever necessary.

4) Assumption made should be clearly stated.

- Q 1. Solve any four**
- a) State the difference between salient pole alternator and cylindrical rotor alternator **05**
 - b) Draw the phasor diagram for unity, lagging and leading power factor of cylindrical rotor type alternator. **05**
 - c) Explain the concept of infinite bus bar. **05**
 - d) Write a short note on “Hunting and its causes and effects”. **05**
 - e) Write note on: Steady state analysis of synchronous machine. **05**
- Q 2.**
- a) Define voltage regulation. State different method to find voltage regulation. Explain ZPF method in detail. **10**
 - b) A 3-Phase, 10 KVA, 400V, 50Hz, star connected alternator supplies the rated load at 0.8 power factor lagging. If the armature resistance is 0.5 ohms and synchronous reactance is 10 ohms, find the torque angle and voltage regulation. **10**
- Q 3.**
- a) Explain Slip test to calculate X_d and X_q . **10**
 - b) Two station generators A and B operates in parallel. Station capacity of A is 50 MW and that of B is 25 MW. Full-load speed regulation of station A is 3% and Full-load speed regulation of station B is 3.5%. Calculate the load sharing if the connected load is 50 MW. No-load frequency is 50 Hz. **10**
- Q 4.**
- a) Explain Blondel’s two reaction theory **10**
 - b) Explain the significance of synchronizing power Co-efficient and derive the equation for synchronizing power and synchronizing torque Co-efficient. **10**
- Q 5.**
- a) A 1000 KVA, 11000 V, 3 phase star connected synchronous motor has an armature resistance and reactance per phase of 3.5 ohms and 40 ohms respectively. Determine the induced e.m.f. when fully loaded at a) unity power factor b) 0.8 power factor lagging. **10**
 - b) Explain the v-curves and inverted v-curves of synchronous motor. **10**
- Q 6.** Solve any two. **20**
- a) Explain the various starting methods of synchronous motor.
 - b) Explain the parallel operation of alternator.
 - c) Derive the basic machine relation in dq0 Variables.