

Time: 3 hrs.

Total Marks:80

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

(2) Attempt any three from the remaining questions

(3) Assumptions made should be clearly stated.

(4) Figure to the right indicates full Marks.

- | | | |
|-----|---|----------|
| Q1 | Attempt any four | 20 Marks |
| a. | State the advantages of keeping armature stationary in synchronous machine. | 5 |
| b. | Elaborate classification of synchronous machine on the basis of rotor construction. | 5 |
| c. | What is Armature Reaction? Explain the effect of Armature reaction on the terminal voltage of Alternator at unity power factor load. | 5 |
| d. | "Synchronous Motor is not self starting" Justify the statement | 5 |
| e. | Draw P-d curve for salient pole alternator with active power equation. | 5 |
| Q2. | | |
| a. | Derive the expression for EMF induced in alternator. | 10 |
| b. | A 3-phase, 50 Hz alternator is running at 600 rpm has a 2-layer winding, 12 turns/coil, 4 slots/pole/phase, and coil-pitch of 10 slots. Let us find the induced EMF per phase if the flux/pole is 0.035 webers. | 10 |
| Q3. | | |
| a. | Illustrate MMF method with advantages and limitations. | 10 |
| b. | Derive the expression for pitch factor and distribution factor and derive formula for K_p and K_d . | 10 |
| Q4. | | |
| a. | Two station alternators A and B operate in parallel. The Station capacity of A is 30 MW and that of B is 60 MW. The full-load speed regulation of station A is 4% and full-load speed regulation of B is 4.5%. Calculate the load sharing if the connected load is 60 MW. No-load frequency is 50 Hz. | 10 |
| b. | State and explain conditions for satisfactory synchronisation with grid. | 10 |

Q5.

- a. Elaborate 'V' and 'inverted V' curve in synchronous motor. 10
- b. State various starting methods of synchronous motor and explain any one in brief

Q6

- a. Explain steady state analysis 3 phase synchronous machine. 10
- b. Elaborate slip test on synchronous machine and comment on direct and quadrature axis reactance. 10
