

T.E (Electrical) Sem-VI
CBGS26/11/18
1/1

Time: 3 Hrs

Marks: 80

Instructions:

- Question No: 1 is compulsory.
- Answer any three from the remaining five questions.
- Figures to the right indicate full marks.
- Assume any suitable data wherever required but justify the same.
- Answers to questions should be grouped and written together.

- Q1** a) Derive active and reactive power equation of Salient pole synchronous machine. What is the significance of reluctance power? **10**
- b) By using excitation circle and power circle explain development of V curves and O curves **10**
- Q2** a) Explain Steady state analysis of synchronous machine **10**
- b) How armature reaction influences the field distribution of alternator. Illustrate the effect under different power factor **10**
- Q3** a) Explain Blondel's two reaction theory **10**
- b) A three phase, 50Hz, 2 pole star connected alternator has 54 slots with 4 conductors per slot. The pitch of the coil is one slot less than the pole pitch. If the machines give 3300 V between lines on open circuit with sinusoidal flux distribution determine the useful flux per pole **10**
- Q4** a) A 220 V, 50 Hz 6 pole star connected alternator with ohmic resistance of 0.06Ω / phase, gave the following data for O.C and S.C characteristics **12**

| | | | | | | | | | | | | |
|---------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-------|-----|-----|-----|
| Field current If(amp) | 0.2 | 0.4 | 0.6 | 0.8 | 1.0 | 1.2 | 1.4 | 1.8 | 2.2 | 2.6 | 3.0 | 3.4 |
| O.C.voltage Ef (volts) | 29 | 58 | 87 | 116 | 146 | 172 | 194 | 232 | 261.5 | 284 | 300 | 310 |
| S.C.current Isc (amp) | | | | | | 40 | | | --- | --- | --- | --- |

Find % voltage regulation at full load current of 40 amp at 0.8-p.f. lagging by EMF method and MMF method

- b) Explain with phasor diagram why short circuit characteristics of a generator is a straight line. **8**
- Q5** a) Derive the expression for active and reactive power of salient pole synchronous machine. Also plot P- δ curve. **10**
- b) Explain the need and operation of synchronous condenser **10**
- Q6** Write short notes on any two **20**
- a) Synchronizing power and synchronizing torque
- b) Synchronous motor starting methods
- c) Parallel operation