

Total No. of Questions : 4]

SEAT No. :

PE34

[Total No. of Pages : 2

[6579]-335

**T.E. (Electrical Engineering) (Insem)
ELECTRICAL MACHINES-II
(2019 Pattern) (Semester - I) (303143)**

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates:

- 1) Solve Q.1 or Q.2 and Q.3 or Q.4.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Assume suitable data, if necessary.
- 5) Use of non-programmable calculator is allowed.

Q1) a) Compare the salient pole rotor construction with non salient pole rotor construction in case of synchronous machine. (any 7 points) **[7]**

- b) A 3-ph, 6 pole, 1000 rpm star connected alternator has double layer armature winding with 72 coils, each coil has 40 turns & coil span is 150° Elect. The flux per pole is 16 mWb. Calculate **[8]**
- i) emf generated per phase &
 - ii) terminal voltage EL.

OR

Q2) a) What is armature reaction in case of 3 phase synchronous machine? Elaborate its effect at zero leading power factor with the help of neat waveform and phasor diagram. **[7]**

- b) Draw the phasor diagram of salient pole alternator at lagging power factor & based on it, write the formula for direct axis current (I_d), quadrature axis current (I_q), excitation emf (E_f) and voltage regulation. **[8]**

Q3) a) Sketch the OCC and SCC of alternator & write down the steps to determination of voltage regulation of 3-ph alternator at lagging power factor by MMF method analytically. Assume $R_a = 0$. **[7]**

- b) A 1000 kVA, 3000V, 3 ph, 50 Hz, star connected alternator has armature resistance of 0.25Ω . The field current of 65 A produces armature current of 200A and no load line emf of 1040V. Calculate full load voltage regulation at 0.8 p.f. **[8]**

OR

P.T.O.

Q4) a) Plot OCC & SCC. Define Short Circuit Ratio in case of 3-ph alternator? Derive the relation between SCR & X_d pu. [7]

b) A 3-ph, 415V, 50Hz star connected alternator is tested by Potier method, from Potier triangle, $I_a X_L$ drop is 30V & field current of 0.46 A is required to overcome the effect of armature reaction. The OCC is as given below. Assume $R_a = 0\Omega$. [8]

Field current I_f (A)	0.4	0.8	1.2	1.4	1.71	2.0
OC emf/ph (V)	164	224	254	258	278	285

Based on above information, find voltage regulation of alternator at p.f = 0.8 lagging.

* * *