

T.E. sem-VI (R-2007) Electrical- EM-III

29/11/16

old Electrical Machines-III Q. P. Code : 583503

(3 Hours)

[Marks : 100]

- NB:** (1) Question No.1 is compulsory
 (2) Attempt any four from the remaining Questions No.2 to No.7.
 (3) Illustrate answers with diagrams wherever necessary.

1. (a) Why short circuit characteristics of an alternator is a straight line while the open circuit characteristics is a curve? 05
 (b) Explain the significance of synchronizing power coefficient. 05
 (c) Explain slip test. 05
 (d) What is the difference between a Stepper motor and Switched reluctance motor? 05
2. (a) Define the following : 10
 (i) Pitch factor
 (ii) distribution factor
 (iii) coil pitch
 (iv) pole pitch
 (v) winding factor
 (b) Explain armature reaction in synchronous generator. 10
3. (a) Explain Blondel's two reaction theory of salient pole machine with a phasor diagram. 10
 (b) A 3-Phase star connected round rotor synchronous generator rated at 10 kVA, 230 V has an armature resistance of 0.5Ω per phase and synchronous reactance of 1.2Ω per phase. Calculate percentage voltage regulation at
 1) 0.8 lagging p.f. 2) 0.8 leading p.f. 10
4. (a) Explain the effect of field current on Alternator connected to infinite bus bar. 10
 (b) A 10 pole, 600 rpm, 50Hz, alternator has the following sinusoidal flux density distribution. $B = \sin \theta + 0.4 \sin 3\theta + 0.2 \sin 5\theta$ wb/m². The alternator has 180 slots with 2 layer 3 turn coils with a coil span of 15 slots. The coils are connected in 60° groups. if the armature diameter is 1.2 m and core length is 0.4 m, calculate the phase and line voltages if the machine winding is star connected. 10

307-1

5. (a) Why synchronous machine is not self-starting? What methods are generally used to start the synchronous motors. 10
(b) Explain Hunting of synchronous motor. What is the purpose of damper windings in synchronous motor? 10
6. (a) Explain V and inverted V curves of a synchronous motor. 10
(b) A 500V, three phase, mesh connected motor has an excitation emf of 600 V. 10
The motor synchronous impedance is $0.4 + j5\Omega$. The windage, friction and iron losses are 1200 W. What is the maximum power output that it can deliver? What is the corresponding line current, power factor and motor efficiency?
7. Write short notes on: (any two) 20
(i) Parallel operation of Alternators
(ii) Explain the drive circuit of a 4 pole stepper motor
(iii) Excitation circles and power circles.

307-1