Code: 9A02505

B.Tech III Year I Semester (R09) Supplementary Examinations June 2016

ELECTRICAL MACHINES – III

(Electrical and Electronics Engineering)

Time: 3 hours   Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
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1 (a) Explain the construction and working principle of alternators with a neat diagram.
   (b) A 4 pole, 3-phase, 50 Hz, star connected alternator has 60 slots with 4 conductors per slot. Coils are short pitched by 3 slots. If the phase spread is 60°, find the line voltage induced for a flux per pole of 0.0943 Wb, distributed sinusoidally in space. All the turns in phase are in series.

2 (a) Explain the sources of harmonics. What are the various effects of harmonics on generated emf in an alternator?
   (b) Determine the breadth and pitch factors for a 3-phase winding with 2 slots per pole per phase. The coil span is 5 slot-pitches. If the flux density wave of the fundamental and a 24% third harmonic, calculate the percentage increase in the phase voltage due to the harmonic.

3 (a) Explain the AT method of finding voltage regulation.
   (b) A 70 MVA, 13.8 kV, 3-phase star connected salient pole alternator having X_d = 1.83 ohm and X_q = 1.2 ohm delivers at 0.8 p.f lagging. Neglecting the armature resistance, calculate: (i) The excitation voltage. (ii) The voltage regulation.

4 (a) Explain all the necessary conditions for successful parallel operation of alternators.
   (b) A 22 MVA, 3-phase, star connected, 4-pole, 750 r.p.m alternator is operating on 6000 V bus bars, Xs is 6 Ω/ph. Find synchronizing power torque for full load 0.8 power factor lagging.

5 (a) Explain the construction and working principle of synchronous motor.
   (b) A 400 V, 3-phase synchronous motor takes 52.5 A at a power factor 0.8 leading. Calculate the power supplied and induced e.m.f. The impedance per phase is (0.25+j3.2) ohm.

6 (a) Explain the construction of damper winding. Clearly show the location of damper winding.
   (b) With neat diagram & explanation, show how damper winding prevents oscillations.

7   Explain the various types of single-phase induction motor.

8 (a) Explain why single phase induction motors are not self starting motors.
   (b) With suitable diagrams, explain the construction and working principle of AC series motor.

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