

Code: 9A02505

B.Tech III Year I Semester (R09) Supplementary Examinations June 2017

ELECTRICAL MACHINES – III
(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Explain various winding factors. Explain the effects of each of them.
(b) A part of an alternator winding consists 6 coils in series, each coil having an e.m.f of 10 V r.m.s induced in it. The coils are placed in successive slots and between each slot and the next, there is an electrical phase displacement of 30 degree. Find the e.m.f of the 6 coils in series?
- 2 (a) Explain the factors affecting synchronous reactance of alternator.
(b) The SC, OC & DC test data for a star connected 25 kVA, 240 V, 60 Hz, alternator are (between two terminals):
 $V_{OC} = 240 \text{ V}$, $I_{SC} = 60.2 \text{ A}$ - - - - For same field current
 $V_{DC} = 120.6 \text{ V}$, $I_{DC} = 50.4 \text{ A}$
Determine: Synchronous reactance.
- 3 Explain the 'Zero power factor' method of finding voltage regulation of an alternator?
- 4 A 5 MVA, 10 kV, 1500 r.p.m, 3-phase, 50 Hz alternator is running in parallel with other machines. Its synchronous reactance is 20%. Find synchronizing power and synchronizing torque per degree mechanical displacement, for no load and full load, 0.8 p.f lagging
- 5 (a) Explain with the help of phasor diagrams, how a lightly loaded synchronous motor can be made to draw current either lagging and leading power factor by varying the excitation?
(b) A 3-phase 3300 V, star connected synchronous motor has synchronous reactance of 5 ohm per phase. The input to the motor is 1000 kW at normal voltage and the induced emf is 4000 V. Calculate the line current, power factor and mechanical power output. Take stray losses are equal to 20 kW and neglect armature resistance.
- 6 (a) What is hunting? Why it is essential to suppress the hunting?
(b) Explain the construction of damper winding.
- 7 Explain the equivalent circuit of single phase induction motor and give the all necessary equations.
- 8 (a) Explain the construction and working principles of universal motor. List out its merits and demerits.
(b) Compare variable reluctance stepper motor and permanent magnet stepper motor
