

R09**Code: 9A02505**

B.Tech III Year I Semester (R09) Supplementary Examinations December 2015

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 the effect of harmonics on pitch and distribution factors.
(b) An alternator has 18 slots/ pole and the first coil lies in slots 1 and 16. Calculate the pitch factor for:
(i) Fundamental. (ii) 3rd harmonics. (iii) 5th harmonics. (iv) 7th harmonics.
- 2 (a) Draw and explain the phasor diagram of an alternator at lagging p.f.
(b) A 3-phase, star connected alternator is rated at 1600 kVA, 13500 V. The armature effective resistance & reactance is $1.5 \Omega/\text{ph}$ & $30 \Omega/\text{ph}$ respectively. Calculate percentage regulation for a load of 1280 kW at power factors of: (i) 0.6 lagging. (ii) 0.6 leading.

- 3 A 3-phase, 200 kVA, 1.1 kV, 50 Hz star connected alternator having an effective per phase resistance of 0.62 ohm gave the following results:

Field Current (A)	20	35	50	80	100	120
OC Voltage V_L	692.82	1120	1450	1750	1953	2180
SC Current (A)	0	22	44	66	88	110

Using MMF method, find the voltage regulation at 100 A.

- (a) 0.8 pf lagging.
(b) 0.8 pf leading.
- 4 (a) What is meant by synchronization? How the alternator is synchronized with infinite bus?
(b) A 3-phase alternator with synchronous reactance of 10 ohm per phase and negligible armature resistance is connected to 6.6 kV constant frequency supply and it supplies 100A at unity power factor to the system. If the prime mover input is kept constant and the excitation of the alternator is increased by 20%. What would be the new current and power factor?
- 5 (a) Explain the construction & working principle of synchronous motor.
(b) A 3-phase, 400 V star connected Synchronous motor has effective per phase armature resistance & synchronous reactance of 0.2Ω & 2Ω respectively. It takes 20 A to deliver a certain load. Calculate the excitation EMF induced in the motor if it works with (i) 0.8 pf lagging. (ii) 0.8 pf leading. (iii) UPF.
- 6 (a) What is hunting? Why it is essential to suppress the hunting?
(b) Explain the various starting methods of synchronous motor
- 7 (a) Explain the construction and give the applications of single-phase induction motor.
(b) Describe the constructional features and principle of operation of a shaded pole motor.
- 8 With neat diagram explain the construction and working of:
(a) AC series motor.
(b) Permanent magnet stepper motor.
