

Code: R7310205

III B. Tech I Semester (R07) Supplementary Examinations, May 2012

ELECTRICAL MACHINES - III
(Electrical & Electronics Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Explain the constructional details of round rotor machine with neat diagram.
(b) Explain the effect of harmonics on pitch and distribution factor.
- 2 Define voltage regulation of an alternator. Obtain it by using experimental procedure.
- 3 (a) Explain clearly what is meant by synchronous impedance of an alternator and how it can be determined experimentally.
(b) The open circuit and short circuit test results for 3 – phase star connected, 1000kVA, 1905 V, 50 Hz alternator are:

Open circuit terminal voltage (V_{oc}) line, volts	760	1500	1700	1905	2300	2600
Short circuit current (I_{sc}), Amp.	-	220	-	335	-	-
Field current (I_f), Amp.	10	20	25	30	40	50

The armature reactance per phase is 0.2 ohms. Draw the open circuit and short circuit characteristics and find the regulation on full load 0.8 lagging p.f. by amp – turn method.

- 4 (a) What is synchronizing power of an alternator? Derive an expression for the synchronizing power between the two alternators connected in parallel.
(b) Two 3- Φ star connected alternators supply a load of 3000KW at 0.8 pf lagging and share the load equally. The excitation of second machine is so adjusted that it supplies 150 A at a lagging pf. The synchronous impedance is $0.4+j12$ and $0.5+j10$ Ω . Find current, power factor, induced emf and load angle of each machine. The terminal voltage is 6.6 KV.
- 5 (a) An industrial load of 4 MW is supplied at 11 kV, the power factor being 0.8 lagging. A synchronous motor is required to meet an additional load of 1103.25 kW and at the same time to raise the resultant power factor to 0.95 lagging. Determine the kVA capacity of the motor and the power factor at which it must operate. The efficiency of motor is 80 %.
(b) Explain the various power stages of synchronous motor. What are the various losses taking place in synchronous motor?
- 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 Show that a single phase winding when excited by a single phase supply produce two equal and opposite revolving fields.
- 8 (a) Draw and explain the torque speed curve of a reluctance motor.
(b) An ac series motor without compensating winding has a reactance of 30 Ω at 50 Hz and a resistance of 0.6 Ω . At 450 V dc the current is 80 A and speed is 800 rpm. Find the speed & p.f. when operating on 450 V ac at (i) 60 Hz (ii) 40 Hz and taking the same current.
