

R07

Code: R7310205

B.Tech III Year I Semester (R07) Supplementary Examinations December 2015

ELECTRICAL MACHINES – III
(Electrical and Electronics Engineering)
(For 2008 regular admitted batch only)

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, 1000 kVA, 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) Derive the condition for maximum output of a synchronous generator connected to infinite bus-bars and working at constant excitation.
(b) A 3-phase, 11 kV, 5 MVA, Y-connected alternator has a synchronous impedance of $(1+j20)$ ohm per phase. Its excitation is such that the generated line e.m.f is 14 kV. If the alternator is connected to infinite bus-bars, determine the maximum output at the given excitation.
- 5 (a) What are the applications of synchronous motor?
(b) A 2,000 V, 3-phase star connected synchronous motor has an effective resistance and synchronous reactance of 0.2 ohms and 2.2 ohms respectively. The input is 800 kW at normal voltage and the induced line e.m.f is 2500 V. Calculate the line current and power factor.
- 6 A 1000 HP, 6.0 kV, 3- Φ , star connected synchronous motor has a synchronous impedance of $1.5+j16$ /ph. It is excited to develop an open circuit EMF of 5 kV. Draw the locus diagram of current for loads up to 1250 HP, with constant excitation. Determine the maximum value of power factor.
- 7 Explain the constructional features and principle operation of a single phase induction motor.
- 8 With neat diagram explain the construction and working of universal motor. Explain its operation with neat vector diagram.
