

OR

A 2 MVA, 3 phase, 8 pole alternator runs at 750 rpm in parallel with other machines on 6000 V busbars. Find the synchronizing power on full load at Pf 0.8 lag per mechanical degree of displacement and the corresponding synchronizing torque. The synchronous reactance of the machine is 6Ω per phase.

Unit - V

5. a) State two important applications of synchronous motor.
- b) Explain Hunting in synchronous motor. How it is minimized?
- c) Differentiate between Reluctance and Hysteresis motor.
- d) Draw approximate equivalent circuits for alternator under transient, Subtransient and steady state conditions. Define reactances and time constants under these conditions. Also write the expression for symmetrical short circuit armature current.

OR

What are V and inverted V curves? Explain how these curves are plotted in Laboratory.

Roll No

EX-503

B.E. V Semester

Examination, December 2016

Electrical Machine - II

Time : Three Hours

Maximum Marks : 70

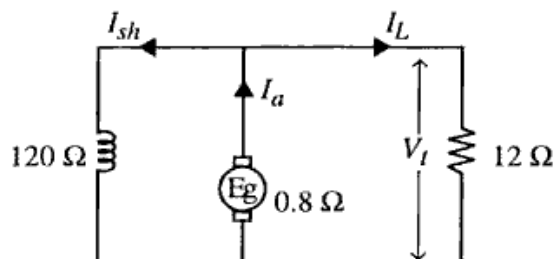
- Note:** i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.
ii) All parts of each question are to be attempted at one place.
iii) All questions carry equal marks, out of which part A and B (Max. 50 words) carry 2 marks, part C (Max. 100 words) carry 3 marks, part D (Max. 400 words) carry 7 marks.
iv) Except numericals, Derivation, Design and Drawing etc.

Unit - I

1. a) Explain the function of a commutator in a DC machine for motoring and generating action.
- b) What conditions must be fulfilled for voltage build up in a self excited DC shunt generator?
- c) What is armature reaction? What are its effects?
- d) A 4 pole wave connected armature has 40 slots with 12 conductors per slot generates a voltage of 500 V. Determine the speed if flux per pole is 50 mwb. Derive the emf equation used here.

OR

A six pole DC shunt generator has field resistance $120\ \Omega$, armature resistance $= 0.8\ \Omega$, Number of conductors $= 350$ (wave connected), flux/pole $= 0.02\ \text{wb}$ load resistance across the terminals $= 12\ \Omega$, armature rotates at 1000 rpm. Calculate the power absorbed by the load.



Unit - II

2. a) What is the necessary of starter in a DC motor?
- b) What is the application of DC series motor? Why a DC series motor should never be started at no load?
- c) What are the inbuilt protective devices in a DC motor 3 point starter? Explain their function.
- d) Derive the torque equation of a DC motor.

OR

A DC shunt motor having armature resistance of $0.24\ \Omega$ takes an armature current of 80 A at 300 V. The machine has 8 poles and 800 lap connected conductors. The flux per pole is $0.042\ \text{wb}$. Calculate the speed and gross torque developed by the armature.

Unit - III

3. a) Compare Hydrogenerator with turbogenerator.
- b) Explain various means by which generated emf in a 3 ph. alternator is made sinusoidal.
- c) Explain why short circuit characteristic is a straight line where as open circuit characteristic is a curve.
- d) A 4 pole, 3 ph, 50 Hz star connected alternator has 60 slots with 2 conductors per slot and two layer type armature winding. Coils are short pitched in such a way that if one coil side lies, in slot number 1, the other lies in slot number 13. Determine useful flux per pole required to generate a line voltage of 6000 Volts.

OR

A 550 V, 55 kVA, single phase alternator has an effective resistance of $0.2\ \Omega$. A field current of 10 Amp. produces an alternating current of 200 A on short circuit and an emf of 450 V on open circuit, calculate the synchronous reactance and voltage regulation at full load with 0.8 pf lagging.

Unit - IV

4. a) State the conditions necessary for parallel operation of alternators.
- b) Explain in brief the significance of Short Circuit Ratio (SCR).
- c) Define synchronizing power co-efficient. State its units. What is its significance?
- d) Explain in brief how slip test is performed to determine X_d and X_q of a salient synchronous machine.