OR

The excitation of a 415V, mesh connected synchronous motor is such that the induced emf is 520V. The impedance per phase is (0.5 + j 4.0) ohms. If the friction and iron losses are constant at 1000 Watts, calculate h.p. output, line current, power factor and efficiency for maximum power output.

5. a) Why a synchronous motor does not have starting torque?

   b) What are the important features of a hysteresis synchronous motor?

   c) Describe the principle of operation of a switched reluctance motor. What are the differences between this motor and synchronous reluctance motor?

   d) A 37.5kW, 415V, Three-phase star-connected synchronous motor has synchronous impedance of (0.2+ j 3.0) Ω per phase. Its induced emf is 650V. If the mechanical and core losses total 1.5kW, calculate line current and power factor at full load. Also determine the output power, line current, power factor and efficiency for maximum power developed. The motor has a field copper loss of 0.75kW.

OR

Explain the phenomena of hunting in synchronous motor and the methods adopted to minimize the effect of hunting.

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Roll No .....

EX-503

B.E. V Semester

Examination, June 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.

1. a) Explain the principle of operation of dc machine.

   b) Derive the emf equation of a dc generator.

   c) Explain the phenomenon of commutation in dc machine. State the methods adopted for minimizing the sparking at the brushes.

   d) A dc series generator having a combined armature and field resistance of 0.4Ω is running at 1000 rpm and delivering 5.5kW at a terminal voltage of 110 Volt. If the speed is raised to 1500 rpm and the load is adjusted to 10kW. Find the new current and terminal voltage Assume the machine to be working on the straight portion of the characteristics.

OR

Describe the principle and working operation of cross field dc machines with appropriate neat circuit diagrams and characteristics.

2. a) Explain how shunt motor behaves as constant speed motor and the series motor as a variable speed motor.

   b) Compare the torque-speed characteristics of different dc motors and hence enumerate the field application of one of them.

   c) What is the difference between 3-point and 4-point starters? What are the additional features incorporated in a 4-point starter?

   d) The input to a 220V, dc shunt motor is 11kW. Calculate

      i) The torque developed

      ii) Efficiency

      iii) The speed at this load

      The particulars of the motor are as follows:

      No load current = 5A, No load speed = 1150 rpm

      Armature resistance = 0.5Ω, shunt field resistance = 110Ω.

OR

The results of a Hopkinson's test on two similar dc machines are as follows. Line voltage 220V, Motor armature current 23A, Motor field current 0.3A, Generator armature current 20A, Generator field current 0.4A, Armature resistance of each machine 0.5Ω. Calculate the efficiency of each machine.

3. a) What are the different types of windings used in alternators?

   b) Draw the Phasor diagram of a Three-phase alternator under load conditions.

   c) Explain the phenomenon of armature reaction in an alternator with the help of suitable diagrams.

   d) What do you mean by voltage regulation of an alternator? How does it differ from that of transformer? Describe some method for determining voltage regulation of an alternator.

OR

Find the regulation by zero-power factor method of 5000kVA, 6600V, Three-phase, 50Hz star connected alternator at full load, unity power factor having the following test data :

i)	Field current in amperes	32	50	75	100	140
ii)	Open circuit terminal Voltage in voltz.	3100	4900	6600	7500	8300
iii)	Full load current zpf test Line p.d. in voltz	0	1850	4250	5800	7000

Neglect armature resistance.

4. a) Explain the working of a synchronous motor.

   b) What do you understand from the V-curves of synchronous machine?

   c) Explain the purpose of using damper windings in synchronous machines.

   d) Explain how subtransient, transient and steady state reactances and time constants can be determined from the short circuit oscillogram and equivalent circuits.