Total No. of Questions :5] *[Total No. of Printed Pages :4*

Roll No .....

EX - 503

B.E. V Semester

Examination, June 2015

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 questions 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) Name the main parts of a DC machine and state the materials of which each part is made.

   b) What is meant by commutation and linear commutation?

   c) Enumerate and explain a method to overcome the adverse effects of the armature reaction.

   d) Sketch and explain the load characteristics of DC generators.

   OR

   Describe the constructional features and principle of working of Brush less dc motor.

Unit-V

5. a) Explain the principle of operation of synchronous motor.

   b) State the characteristic features of synchronous motor.

   c) Explain V and inverted-V curves of a synchronous motor.

   d) Explain the phenomena of hunting in synchronous motors and the methods adopted to minimize the effect of hunting.

   OR

   Write a short note on hysteresis motor and stepper motor.

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Unit-II

2. a) What is the function of no-volt release and over load release in a starter?
   b) What is the difference between three point and four point starters?
   c) List the various losses that occur in a DC machine and state how they very with load.
   d) A unsaturated 220V shunt motor has a no load speed 800 rpm. At full load it takes an armature current of 100A, running at 750 rpm. Armature and shunt field resistances are 0.1 Ω and 50Ω respectively. If the load torque remains unaltered find the resistance of the field regulator to be included in the field winding to increase its speed on full load to no load speed.

OR

Describe how a Swinburne's test is conducted on DC machines. State its advantages and disadvantages.

Unit-III

3. a) How are synchronous machines classified?
   b) What is the effect of armature reaction on the voltage regulation of an alternator?
   c) Explain the causes of harmonics in the voltage wave of the alternator.
   d) A 50 kVA, 415V, 50Hz, star connected alternator has an effective resistance of 0.2 Ω per phase. A field current of 8A causes an emf of 415V on open circuit and a current of 185A on short circuit. Calculate
      i) Synchronous impedance
      ii) The synchronous reactance
      iii) The full load voltage regulation at 0.8 if logging
      iv) The ¾th full load voltage regulation.

OR

Explain the synchronous impedance method of predetermining the voltage regulation of an alternator. Comment on the merits and limitations of this method.

Unit-IV

4. a) Why it is advisable to adopt the two-reaction method of mmf analysis for salient pole synchronous machine?
   b) Explain the terms direct-axis and quadrature-axis reactances.
   c) What are the factors that govern the sharing of load between two alternators operating in parallel?
   d) A 3-phase, star-connected, 11kV, 12-pole, 50Hz salient pole synchronous machine has reactance of $X_d = 5\Omega$ and $X_q = 3\Omega$. at certain load, the motor draws 20 MW at unity pf. Compute synchronising power per electric degree and corresponding torque.

OR

A 6.6 kV, 1000kVA, 3-phase, Star connected synchronous generator is delivering full load at 0.8 pf lagging. Its synchronous reactance is 20% and resistance negligible. By changing its excitation, the emf is then increased by 20%. Calculate the new current and power factor. The generator is operating on infinite bus-bar.