Code: R7210206

R07

II B.Tech I Semester (R07) Supplementary May 2012 Examinations
ELECTRICAL MACHINES - I
(Electrical & Electronics Engineering)

Time: 3 hours **Max. Marks: 80**

Answer any FIVE questions
All questions carry equal marks

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1. (a) Distinguish between singly excited and multi excited magnetic field systems.
   (b) Define field energy and co-energy. Give the significance of co-energy. Give the significance of co-energy in the derivation of torque or force in an electro mechanical energy conversion device.

2. (a) Derive the emf equation of a DC Generator.
   (b) A lap-wound DC shunt generator having 80 slots with 10 conductors per slot generates at no load an emf of 400 V, when running at 1000 rpm. At what speed should it be rotated to generate a voltage of 220 V on open circuit?

3. (a) What is the purpose of compensating winding? Explain in detail.
   (b) Explain the effects of armature reaction in DC generators.

4. Explain how will you determine critical speed of a DC machine with a neat circuit diagram.

5. (a) Discuss the need for parallel operation of generators. Explain the load sharing of DC shunt generators operating in parallel.
   (b) Sketch and explain the load characteristics of DC generators, also give their fields of application.

6. (a) Explain the significance of back emf in a DC motors.
   (b) Discuss armature reaction and commutation in DC motors. Explain their effects on the performance of the motor and give remedies to their effects.

7. (a) What are the different speed control methods of DC shunt motor? Explain each method and enumerate advantages and disadvantages.
   (b) A 500 V, DC shunt motor running at 700 rpm takes an armature current of 50 A. Effective armature resistance is 0.4 ohms. What resistance must be placed in series with the armature to reduce the speed to 600 rpm, the torque remaining constant?

8. (a) Explain the various losses that occur in a DC machine and also derive the condition for maximum efficiency.
   (b) A 10 kW, 250 V, DC shunt generator has total no-load rotational loss of 400 W. The (armature circuit including brushes) and shunt field resistance are 0.5 ohm and 250 ohm respectively. Calculate the shaft power input and the efficiency at rated load. Also calculate the maximum efficiency and the corresponding power output.

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