R15

B.Tech II Year I Semester (R15) Regular Examinations November/December 2016
ELECTRICAL MACHINES – I
(Electrical and Electronics Engineering)

Time: 3 hours   Max. Marks: 70

PART – A
(Compulsory Question)
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1   Answer the following: (10 X 02 = 20 Marks)
   (a) Define co-energy.
   (b) What is the energy conversion medium in a singly-excited magnetic field system?
   (c) Differentiate lap winding and wave winding of a DC machine armature.
   (d) Define armature reaction.
   (e) State the critical field resistance and critical speed.
   (f) What are the causes of failure to excite self-excited generator?
   (g) Define Back emf in a DC motor.
   (h) What is meant by Flux control method?
   (i) What are the disadvantages of brake test?
   (j) State merits and demerits of Swinburne's test.

PART – B
(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 (a) Draw and explain the general block diagram of an electromechanical energy conversion system.
   (b) Derive the magnetic force and torque from energy.
OR
3   Discuss the multiple excited magnetic field system in electromechanical energy conversion systems. Also obtain the expression for field energy in the system.

UNIT – II

4 (a) With neat sketch, explain the construction and principle of operation of DC generator.
   (b) A wave connected armature winding has 19 solts with 54 conductors per slot. If the flux per pole is 0.025 Wb and number of poles is 8, find the speed at which the generator should be run to give 513 V. Find the speed if the armature is lap connected.
OR
5 (a) A wave wound 4-pole DC generator with 480 armature conductors supplies a current of 144 A. The brushes are given an actual lead of 10 degrees. Calculate the demagnetizing and cross magnetizing amp turns per pole.
   (b) Explain how commutation is improved by use of interlopes.

UNIT – III

6   Discuss clearly the load characteristics of DC shunt, series and compound generator.
OR
7   A 4 Pole, lap wound 750 r.p.m. DC shunt generator has an armature resistance of 0.4Ω and field resistance of 200Ω. The armature has 720 conductors and the flux per pole is 30 mWb. If the load resistance is 15 Ω. Determine the terminal voltage.

UNIT – IV

8 (a) What is the need of starter? With neat diagram, explain the four point starter.
   (b) Explain different methods of speed control of DC shunt motor.
OR
9   A 220 volts DC Shunt motor on no-load runs at a speed of 1000 RPM and draw a current of 6 Amperes. The armature and shunt field resistances are 0.3 ohm and 110 ohms respectively. Calculate the back EMF induced and speed, when loaded and drawing a current of 50 Amperes.

UNIT – V

10   What are the losses in DC machines? Derive the expression for maximum efficiency of DC machines.
OR
11   With the help of neat circuit diagram, explain Hopkinson's test and derive the relations for efficiency also state the merits and demerits of this method.
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