SE / ELECTRICAL / SEM IV / CRGS

EM - I

03/12/2014

QP Code : 12467

[3 Hours] [Total Marks :80

N.B. : (1) Question No. **1** is **compulsory**.
  (2) Attempt any **three** questions from **remaining**.
  (3) **Figures** to the **right** indicate **full** marks.

1. (i) Explain in brief, the electromechanical energy conversion. 5
   (ii) Explain the Hysteresis and Eddy current losses. 5
   (iii) Explain the significance of commutator and brushes in DC machine. 5
   (iv) Derive the emf equation of single phase Transformer. 5

2. (a) Derive the expression for torque developed in singly excited system. 10
   (b) Explain the process of commutation in detail and mention the method to improve the commutation process. 10

3. (a) Derive the expression for calculating demagnetising ampere turns per pole and cross magnetising ampere turns per pole. 10
   (b) Draw and explain the schematic of doubly excited system. 10

4. (a) Explain the different Electrical braking methods for separately excited DC motor. 10
   (b) A 200V shunt motor having armature resistance of $0.4\,\Omega$ and shunt field resistance $100\,\Omega$ drives a load at 500 rpm taking 27 Amps. It is desired to run the motor at 700 rpm. Assuming the load torque constant, find the value of resistance to be added in field circuit. 10

5. (a) Derive the expression for copper saving in auto-transformer. 10
   (b) Two 1- phase transformer with equal voltage ratios having impedances of $(0.819 + j\,2.503)\,\Omega$ and $(0.8 + j2.31)\,\Omega$ with respect to the secondary. If they operated in parallel, how they will share a total load of 2000 kw at p.f. 0.8 lagging? 10

6 (a) In Hopkinson's Test on two identical DC shunt machines, gave following results. 10
      Input voltage = 500V
      Input current = 15Amps
      output current of generator = 120Amps
      Field current of generator = 4 Amps
      Field current of motor = 3 Amps
      Armature resistance = $0.06\,\Omega$
      Find the efficiency of motor and generator.
   (b) Draw and explain the back to back test conducted on two identical Transformers. 10

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