Con. 5740–13.   LJ–10559

(3 Hours)   [Total Marks : 100

N.B. : (1) Question No. **1** is **compulsory**.
        (2) Attempt any **four** questions out of **remaining** questions.
        (3) Assume **data** if **necessory** and justify **one** same.

1. (a) Derive an expression for torque developed by armature of D.C. machine.   5
    (b) Explain 'Polarity Test' with one help of the connection diagram.   5
    (c) What is eddy current loss and how can this loss be minimized.   5
    (d) Explain the principle of energy conversion and develop the model of an   5
         electromechanical energy conversion device.

2. (a) Starting from energy balance equation obtain expression for electromagnetic torque   10
         for doubly excited system in terms of angular rate of change of self and mutual
         inductance of stator and rotor winding.
    (b) A 500 volt, shunt motor takes 4 Amp. on no load. The armature resistance including   10
         that of brushes is 0·2Ω and field current is 1A. Estimate the output and the efficiency
         when input current is – (a) 20 Amp. (b) 100 Amp.

3. (a) Draw and explain various characteristics of D.C. series and D.C. shunt motor.   10
    (b) Explain Hopkinson's Test with neat diagram.   10

4. (a) Explain Armature Reaction in D.C. machine with neat diagram.   10
    (b) A Fields test on two similar series machines gave the following data :–   10
         Motor   Armature current   = 56 Amp.
                      Voltage across armature   = 590 Volts
                      Voltage across field   = 40 Volts.
         Generator   Armature current   = 44 Amp
                      Voltage across armature   = 400 Volts
                      Voltage across field   = 40 Volts
         Armature resistance (including brushes) of each machine is 0·3 ohm.
         Calculate efficiency of both one machines.

5. (a) Explain the Back to Back test and Explain how one results obtained from test   10
         used to find efficiency of transformer.
    (b) The connected instrument readings obtained from open and short circuit test on   10
         20KVA, 2500/250 Volts, 50 Hz, single phase transformer are.
             O.C. Test (on LV side) = 250 , 1·4 A, 105 W
             S.C. Test (on HV side) = 104 V, 8 A, 320 W
         Compute the equivalent circuit parameters referred to LV side.

6. (a) Explain speed control methods of d.c. shunt motor in detail.   10
    (b) State and explain in detail the conditions to be satisfied for parallel operations   10
         of two single phase transformers.

7. (a) Explain the diferent type of losses in transformer and how these losses can be   20
         minimized ?
    (b) Explain saving of copper in autotransformer over two winding transformer.

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