

N.B. (1) Question No. 1 is compulsory.

(2) Attempt any **three** questions from remaining.

(3) **Figures on right** indicate full marks.

1. (a) Write the parameters that can be calculated by using open circuit and short circuit test in transformer. 20
- (b) List the advantages of Hopkinson's test.
- (c) What are the various losses in transformer ?
- (d) State the methods to minimize armature reaction.
  
2. (a) Explain different electrical braking methods for separately excited D.C. motor. 10
- (b) Derive the expression for electromagnetic torque for doubly excited system in terms of angular rate of change of self and mutual inductance of stator and rotor winding. 10
  
3. (a) Compare the two winding transformer with auto transformer and derive the expression of copper saving in autotransformer. 10
- (b) The Hopkinson's test on two shunt gave the following result for full load :- 10
  - (i) Line voltage = 250v
  - (ii) Current taken from supply system excluding field current = 50amp
  - (iii) Motor armature current = 380 amp
  - (iv) field currents 5 amp and 4.2 amp.

Calculate efficiency of the machine working as an generator and motor assume armature resistance of each machine is  $0.02 \Omega$ .
  
4. (a) Two single phase transformer rated at 500 KVA and 450 KVA respectively are connected in parallel to supply a load of 1000 KVA at 0.8 p.f. lagging. The per unit resistance and per unit reactance of first transformer are 2.5% and 6% respectively and second transformer 1.6% and 7% respectively. 10
- Calculate the KVA load and power factor at which each transformer operates.
- (b) Explain the characteristics of DC shunt and series motor. 10

5. (a) A 4KVA, 200/400V, 50 Hz single phase transformer gave the following test results 10
- O.C. test : 200V, 0.7A, 60w (L.V. side)
- S.C. test : 9V, 6A, 21.6W (H.V. side)
- Calculate (i) The efficiency and voltage regulation at full load 0.8 pf. lagging  
(ii) The efficiency at half load at unity power factor.
- (b) Draw phase diagram for single phase transformer for lagging and leading power factor. 10
6. (a) Explain the armature reaction in D.C. machine. 10
- (b) Explain 3 point starter and also explain advantages of 4 point starter over it. 10
-