

SE - sem - IV (old) Electrical - EM - I 15/12/16
 Electrical Machines-I
 Q.P. Code : 543304

(3 Hours)

[Total Marks : 100]

- Note: 1) Question No. 1 is **compulsory**.
 2) Solve **any 4** questions out of the remaining questions
 3) Assume suitable data if necessary.

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1. a) Enumerate three different types of tests of DC machines. 20
 b) What will happen if DC series motor be started on no load?
 c) What are the types of losses in transformer? Explain their significance.
 d) What is the meaning of singly excited and doubly excited magnetic field?
 e) Why transformer is called as static, linear, bilateral device and a constant flux machine?
2. a) Explain the phenomenon of commutation in DC machines and its types. 10
 b) Derive the torque equation of a dc motor and discuss T v/s I_a and N v/s I_a Characteristics of dc series motor. 10
3. a) With neat diagrams explain the phenomenon of armature reaction in a DC machine and explain how this effect can be neutralized. 10
 b) A 7.48 kW, 220 V, 990 rpm shunt motor has a full load efficiency of 88%, the armature resistance is 0.08 ohm and shunt field current is 2 A. If the speed of this motor is reduced to 450 rpm by inserting a resistance in the armature circuit, find the motor output, the armature current, external resistance to be inserted in the armature circuit and overall efficiency. Assume the load torque to remain constant. 10
4. a) Derive the formula for finding the efficiency and regulation of 1- ϕ transformer for lagging pf load 10
 b) A 5 kVA, 200V/400V, 50Hz, 1- ϕ transformer gave following test results: 10
 OC test from LV side: 200V, 1.25 A, 150W
 SC test from HV side: 20V, 12.5A, 175W
 Find i) the efficiency of the transformer at FL, 0.8 pf lagging
 ii) What should be the applied voltage to the LV side when the transformer delivers rated current at 0.7 power factor lagging, at a terminal voltage of 400 V?
5. a) Derive the expression for efficiency and regulation of 1- ϕ transformer. 10
 b) Explain the phasor diagram of 1- ϕ transformer leading power factor load with suitable diagram. 10

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6. a) Derive formula for the torque developed by a doubly excited magnetic field circuit. 10
- b) Explain the operation of a Four point Starter with a neat sketch and its advantages over 3 point starter. 10
7. Write short note on (Any Two) 20
- a) Swinburne's test
- b) Copper saving in 1- ϕ auto transformer.
- c) Determination of losses in 1- ϕ transformer.
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