S.E./EE/sem-IV/old/EM-I 9/12/2014

(OLD COURSE) **QP Code : 14421**

(3 Hours) **[Total Marks : 100**

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

1. Answer the following questions :– **20**
   (a) Explain hysteresis loss and factors affecting it.
   (b) Derive the condition for maximum efficiency in case of transformer.
   (c) Derive torque equation of d.c.motor.
   (d) Find the value of induced emf and current flowing through coil, if an electromagnet is wound with 900 turns. If it is moved to that magnetic field is changed from 1.2mWb to 0.3mWb in 0.2 sec. The resistance of the coil is 230 ohms.

2. (a) Derive expression for electromagnetic torque for doubly excited system in terms of angular rate of change of self and mutual inductances of stator and rotor winding. **10**
   (b) Explain the Back to Back test of single phase transformers **10**

3. (a) Draw and explain the all characteristics of D.C. Series motor **10**
   (b) Explain saving of copper in auto transformer over two winding transformer. **10**

4. (a) Explain Field's test for dc series motor with neat diagram. **10**
   (b) A shunt generator delivers 50 kW at 250 V when running at 400 r.p.m. The armature and field resistance are 0.02Ω and 50Ω respectively. Calculate the speed of the machine when running as a shunt motor and taking 50 kW input at 250V.Consider 1V per brush for contact drop. **10**

5. (a) Explain Open Circuit and short circuit test of single phase transformers. **10**
   (b) The maximum efficiency of a 100kVA, single phase transformer is 98% and occurs at 80% of full load at 0.8 power factor lagging. If the leakage impedance of the transformer is 5% , Find the voltage regulation at full load. **10**

6. (a) A D.C. machine is tested for Swinburne's test. The machine is rated for 230volts, 50Amp. The load current is 5 Amp. Armature resistance is 1Ω and shunt field resistance is 200Ω. Find full load efficiency if the machine was tested as D.C.Motor. **10**
   (b) Explain the need of parallel operation of transformers and explain the necessary conditions for parallel operation. **10**

7. (a) Explain with neat diagram the process of commutation and list the methods of improve commutation. **10**
   (b) Explain 3 point starter with neat diagram and write advantage of 4 point starter over 3 point starter. **10**
