Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE SEM-III Examination-Dec.-2011

Subject code: 130904   **Date: 17/12/2011**
Subject Name: Electrical Machine -I
Time: 2.30 pm -5.00 pm   **Total marks: 70**
Instructions:
   1. **Attempt all questions.**
   2. **Make suitable assumptions wherever necessary.**
   3. **Figures to the right indicate full marks.**

Q.1 **(a)** Explain the internal and external characteristics of D.C. Shunt Generator.   **07**
   (b) A 4-pole, D.C. shunt generator with a shunt field resistance of 100 ohm   **07**
   and armature resistance of 1 ohm has 378 wave connected conductors in
   its armature. The flux per pole is 0.02 Wb. If a load resistance of 10 ohm
   is connected across the armature terminals and the generator is driven at
   1000 r.p.m. , calculate the power absorbed by the load.

Q.2 **(a)** Explain voltage build up process of D.C. Generator. Also derive E.M.F.   **07**
   equation of D.C. Generator.
   (b) Explain the necessity of starter for D.C. Motor. Discuss three point starter   **07**
   for D.C. Motor.
                                    OR
   (b) Derive the Equations for Armature torque and Shaft torque for D.C.   **07**
   Motor

Q.3 **(a)** Draw and explain the vector diagrams when transformer is on ON-Load   **07**
   condition.
   (b) An ideal 25 KVA transformer has 500 turns on the primary winding and   **07**
   40 turns on the secondary winding. The primary is connected to 3000 V,
   50 Hz supply. Calculate (1) primary and secondary currents on full load
   (2) secondary e.m.f. (3) maximum core flux
                                    OR
Q.3 **(a)** Draw and explain the equivalent circuit of single phase transformer.   **07**
   (b) A 10 KVA, 2000/400 V single phase transformer has R1=5 ohm, X1=12   **07**
   Ohm , R2=0.2 Ohm and X2= 0.48 Ohm. Determine the equivalent
   impedance of the transformer referred to (1) primary (2) secondary side

Q.4 **(a)** Explain the principle of Induction Motor. Discuss the construction of   **07**
   three Phase Induction Motor.
   (b) What is Voltage regulation? Discuss Voltage regulation by synchronous   **07**
   impedance method for Alternator.
                                    OR
Q.4 **(a)** Derive the equation of starting torque of three phase Induction Motor.   **07**
   (b) An 8- pole , 50 Hz , 3-phase slip ring Induction Motor has effective rotor   **07**
   resistance of 0.08 Ohm/phase. Stalling speed is 650 r.p.m. How much
   resistance must be inserted in the rotor phase to obtain the maximum
   torque at starting? Ignore the magnetizing current and stator leakage
   impedance.

Q.5 **(a)** Discuss the conditions of parallel operation of synchronous generator. **07**

(b) Explain the basic concept of static speed control of D.C. Machine. Also **07** discuss the Ward Leonard method for D.C. Motor.

OR

Q.5 **(a)** Explain open and short circuit test for single phase transformer. While **07** making short circuit test, Low voltage winding is always short circuited. Why?

(b) Explain torque and slip characteristics of three phase Induction Motor. **07**

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