

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-IV • EXAMINATION – SUMMER 2013****Subject Code: 142401****Date: 07-06-2013****Subject Name: Electro Mechanical Energy Conversion - I****Time: 10:30am – 01:00pm****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)** Define Voltage Regulation of 3 – F alternator. Explain Synchronous Impedance method for determination of Voltage Regulation. **07**
- (b)** How servomotor differs from other industrial motor. Explain DC and two phase AC servomotor in brief. **07**

- Q.2 (a)** Derive the equation for starting torque of 3-F induction motor. Derive the condition for max. Starting torque and discuss the effect of change in supply on the starting torque. **07**
- (b)** Explain construction and working of Schrage Motor. **07**

OR

- (b)** List the advantages of stationary armature. With neat diagram explain the construction of 3-F alternator. **07**
- Q.3 (a)** List the different parts of DC generator and Explain yoke, pole cores, pole shoes and armature core with neat diagram. **07**
- (b)** A shunt generator has a F.L. current of 196 A at 220 V. The stray losses are 720 W and the shunt field coil resistance is 55 Ω . If it has a F.L. efficiency of 88 %, Find the armature resistance. Also, find the load current corresponding to maximum efficiency. **07**

OR

- Q.3 (a)** Explain the internal and external characteristics of DC Shunt Generator. **07**
- (b)** A 250 V, d.c. shunt motor has shunt field resistance of 250 Ω and an armature resistance of 0.25 Ω . For a given load torque and no additional resistance included in the shunt field circuit, the motor runs at 1500 r.p.m. drawing an armature current of 20A. If a resistance of 250 Ω is inserted in series with the field, the load torque remaining the same, find out the new speed and current. Assume the magnetization curve to be linear. **07**

- Q.4 (a)** State generator principle. Explain the construction and working simple loop generator. **07**
- (b)** List the speed control method of DC motor and explain the flux control and armature control methods. **07**

OR

- Q.4 (a)** Explain iron and copper losses in DC Generator with necessary equations. **07**
- (b)** Draw and explain the characteristics of DC series motor. **07**

- Q.5 (a)** Derive emf equation of a transformer. Prove the core loss is practically same under all load condition. **07**
- (b)** Starting from the ideal transformer, obtain the approximate equivalent circuit of a commercial transformer in which all the constants are and represented on one side. A 1-F transformer has a turn ratio of 6. The resistance and reactance of primary winding are 0.9Ω and 5Ω respectively and those of the secondary are 0.03Ω and 0.13Ω respectively. If 330 V at 50HZ be applied to the high voltage winding with the low-voltage winding short-circuited, find the current in the low-voltage winding and its power factor. Neglect magnetizing current. **07**
- Q.5 (a)** List the methods of measurement of slip. Explain any two in details. **07**
- (b)** An 18.65 KW, 4-pole, 50HZ, 3-F induction motor has friction and windage losses of the output. The full-load slip is 4 %. Compute for full load (a) the rotor cu loss (b) the rotor input (c) the shaft torque (d) the gross electromagnetic torque. **07**
