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 07 method for determination of Voltage Regulation.
 - (b) How servomotor differs from other industrial motor. Ex DC and two phase 07 AC servomotor in brief.
- Q.2 (a) Derive the equation for starting torque of 3-F induction motor. Derive the 07 condition for max. Starting torque and discuss the effect of change in supply on the starting torque.
 - (b) Explain construction and working of Schrage Motor.

OR

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

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? and an armature 07 resistance of 0.25? . 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? 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.
- Q.4 (a) State generator principle. Explain the construction an working simple loop 07 generator.
 - (b) List the speed control method of DC motor and explain the flux control and 07 armature control methods.

OR

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

07

- Q.5 (a) Derive emf equation of a transformer. Prove the core loss is practically same 07 under all load condition.
 - (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 0.9? and 5? respectively and those of the secondary are 0.03? and 0.13? 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.
- **Q.5** (a) List the methods of measurement of slip. Explain any two in details.
 - (b) An 18.65 KW, 4-pole, 50HZ, 3-F induction motor has friction and windage 07 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 grass electromagnetic torque.

07