

GUJARAT TECHNOLOGICAL UNIVERSITY**B.E. Sem-IV Examination June- 2010****Subject code: 142401****Subject Name: Electro Mechanical Energy Conversion – 1****Date: 17 / 06 /2010****Time: 10.30 am – 01.00 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 necessity of DC motor Starter and Explain the Three Point Starter with neat sketch. **07**
- (b) List the method of speed control of DC motor and Explain the Armature voltage control method in details. **07**

- Q.2** (a) Derive the emf equation of 1- Ø Transformer. **07**
- (b) Explain the different losses occur in the Transformer. **07**

OR

- (b) Explain parallel operation of Transformer. **07**

- Q.3** (a) Explain the construction and principal of operation of Induction Motor. **07**
- (b) In a 6 pole, 3-Ø, 50 Hz motor with star connected rotor, the rotor resistance per phase is 0.3Ω the reactance at standstill is 1.5Ω per phase and emf between the slip rings on open circuits is 175 V. Determine 1. Slip at a speed of 950 r.p.m. 2. Rotor emf per phase 3. Rotor current frequency at a speed of 950 r.p.m. **07**

OR

- Q.3** (a) Explain the torque-slip and torque-speed characteristics of 3-Ø induction motor and discuss the effect of rotor resistance on it. **07**
- (b) A 440 V, 3-Ø, 50 Hz, 4 pole, Y connected induction motor has a full load speed of 1425 rpm. The rotor has an impedance of $(0.4 + j4)$ ohm and rotor/stator turn ratio of 0.8. Calculate 1. Full load torque 2. Rotor current 3. Full load rotor Cu loss. **07**

- Q.4** (a) Explain the construction of an alternator in details. **07**
- (b) Find the value of k_d for an alternator with 9 slots per pole for the following cases: 1. One winding in all the slots 2. One winding using only the first 2/3 of the slots/pole **07**

OR

- Q.4** (a) Derive the equation for induced emf in an alternator. **07**
- (b) Define voltage regulation in an alternator and explain the synchronous impedance method for determining voltage regulation. **07**

- Q.5** (a) Write short note on : Stepper Motor **07**
- (b) Explain the construction and torque speed characteristics of DC servo motor. **07**

OR

- Q.5** (a) Explain the characteristics of Separately Excited DC generator. **07**
- (b) Draw circuit diagrams of different types of d. c. generators. Write current and voltage equations for each. **07**
