

GUJARAT TECHNOLOGICAL UNIVERSITY
B. E. - SEMESTER – VI • EXAMINATION – WINTER 2012

Subject code: 162404**Date: 05/01/2013****Subject Name: Industrial Drives & Control-I****Time: 02.30 pm - 05.00 pm****Total Marks: 70****Instructions:**

1. Attempt any five questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Notations used have usual meaning.

- Q.1** (a) Draw and explain basic block diagram of Electric Drive system. **07**
(b) Explain speed-Torque characteristics of separately excited DC motor. For what type of application separately excited DC motor is used? **07**

- Q.2** (a) Explain constant torque and constant horse power operation of DC motor. **07**
(b) The speed of a 10 hp, 230 V, 1200 rpm separately excited dc motor is controlled by a single phase full converter. The rated motor armature current is 38 A, and the armature resistance is $R_a = 0.3 \text{ ohm}$. The ac supply voltage is 260 V. the motor voltage constant is $K_a \Phi = 0.182 \text{ V/rpm}$. Assume that sufficient inductance is present in the armature circuit to make the motor current continuous and ripple free. For firing angle of $\alpha = 30^\circ$ and rated motor current, calculate: **07**
(i) The motor torque.
(ii) The speed of motor.

OR

- (b) Discuss types of Duty cycle for motor operation. **07**

- Q.3** (a) Explain closed loop operation of DC motor with block diagram. **07**
(b) Explain speed control of separately excited DC motor with fully controlled converter. **07**

OR

- Q.3** (a) Explain working principle of single phase dual converter without circulating current mode. **07**
(b) Discuss multi-quadrant operation of chopper circuit with neat diagram. **07**

- Q.4** (a) Explain phase locked loop based DC drive. **07**
(b) Explain permanent magnet motor drive. **07**

OR

- Q.4** (a) Discuss the effect of free wheeling diode on converter operation. **07**
Q.4 (b) Explain speed control of dc motor in first quadrant with chopper circuit. **07**

- Q.5** (a) Explain regenerative braking in separately excited DC motor fed through chopper circuit. **07**
(b) Discuss the discontinuous armature current operation of DC motor. **07**

OR

- Q.5** (a) Discuss Dynamic Braking of separately excited DC motor fed through controlled converter. **07**
(b) Explain PI controller in brief. **07**
