Seat No.: _____ Enrolment No._____

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 Ra=0.3 ohm. The ac supply voltage is 260 V. the motor voltage constant is $K_a\Phi$ = 0.182 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 α = 30° and rated motor current, calculate: (i) The motor torque. (ii) The speed of motor.	**07**
		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 breaking 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**

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