Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI • EXAMINATION – WINTER 2013

Subject Code: 162404 Date: 06-12-2013

Subject Name: Industrial Drives and Control-I

Time: 02:30 pm to 05:00 pm Total Marks: 70

Instructions:

1. **Attempt all 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 block diagram of DC drive system and explain it.	**07**
	(b)	Explain speed control of separately excited DC motor with field control method. Discuss its application.	**07**
Q.2	**(a)**	Discuss the working of single phase semi-converter with R-L load. Draw appropriate wave forms.	**07**
	(b)	The DC series motor of 20 h.p., 220V, and 1000 rpm is controlled by a single phase semi-converter. The combined field and armature circuit resistance is 0.2 ohm. Assume Motor constant is K=0.03 N-m/Amp^2 and ripple free motor current. The converter is supplied with 250 Vac. Determine the (1) motor current (2) motor torque at rated speed for a firing angle of 30°.	**07**
		OR	
	(b)	Obtain an expression for output voltage and current of the boost chopper circuit.	**07**
Q.3	**(a)**	Explain operation of DC motor in two quadrants with phase controlled converter.	**07**
	(b)	Discuss closed loop operation of DC motor with current limit control.	**07**
		OR	
Q.3	**(a)**	Explain class A chopper circuit for DC motor control. Draw relevant waveforms.	**07**
	(b)	Compare control of DC motor based on phase control converter and chopper.	**07**
Q.4	**(a)**	Explain PI controller with suitable example.	**07**
	(b)	Discuss half wave controlled converter with relevant waveforms.	**07**
		OR	
Q.4	**(a)**	Explain chopper based implementation of braking for DC motor.	**07**
	(b)	Write a brief note on selection of motor power rating with illustration.	**07**
Q.5	**(a)**	Write a brief note on constant torque and constant horse power operation of DC motor.	**07**
	(b)	Explain multi-phase chopper circuit with waveforms.	**07**
		OR	
Q.5	**(a)**	Explain control of DC motor with phase locked loop.	**07**
	(b)	Discuss the permanent magnet motor drive.	**07**

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