Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – WINTER • 2014

Subject code: 714502N **Date: 02-12-2014**

Subject Name: Solid State DC Drives

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)**	Find the equivalent moment of inertia and equivalent torque of motor load system referred to shaft with rotational and translation motion.	**07**
	(b)	State and explain various braking methods of dc motors.	**07**
Q.2	**(a)**	Explain the Ward Leonard speed control method of DC motor.	**07**
	(b)	Explain the armature control and flux control of dc motors and also explain constant torque and constant power operation.	**07**
		OR	
	(b)	A 220V, 875rpm, 150A Separately excited dc motor has an armature resistance of 0.06Ý. It is fed from a single phase fully controlled rectifier with ac voltage of 220V, 50Hz.Assuming continuous conduction, calculate (1) Firing angle for rated torque and 750 rpm. (2) Motor speed for Ŭ= 160 degree and rated torque.	**07**
Q.3	**(a)**	Draw circuit diagram, waveform and write the equations for 1-phase half controlled bridge converter separately excited dc motor drive where current of the armature is assumed to be discontinuous.	**07**
	(b)	A 200 V, 10.5 A, 1000 rpm shunt motor has the armature and field resistance of 0.5 and 400q respectively. It drives a load whose torque is constant at rated motor torque. Calculate motor speed if the source voltage drop to 175 V.	**07**
		OR	
Q.3	**(a)**	Give and Explain simulation block diagram of speed control of DC motor with current control loop and current limiting.	**07**
	(b)	Explain with block diagram the control of circulating current in dual converter with simultaneous control	**07**
Q.4	**(a)**	Develop a transfer function of separately excited DC motor with speed control loop.	**07**
	(b)	Explain class C type chopper control DC motor drive.	**07**
		OR	
Q.4	**(a)**	Explain comparison of P, PI, and PID controller.	**07**
	(b)	Draw circuit diagram, waveform and write the equations for 3-phase full controlled rectifier control of separately excited dc motor.	**07**
Q.5	**(a)**	Explain synchronizing firing of circuit, pulse transformer and draw circuit for gate protection.	**07**
	(b)	Explain different types of control strategies for chopper drive.	**07**
		OR	
Q.5	**(a)**	Draw the basic block diagram of electric drive system and explain each block.	**07**
	(b)	Explain Phase Locked Loop (PLL) Control of DC Drives.	**07**

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