Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject code: 714502N **Date: 17-06-2014**

Subject Name: Solid State DC Drives

Time: 02:30 pm - 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.**

Q.1	**(a)**	Explain the armature control and flux control of dc motors and also explain constant torque and constant power operation.	**07**
	(b)	Explain different types of motor duty.	**07**
Q.2	**(a)**	Draw the basic block diagram of electric drive system and explain each block.	**07**
	(b)	Explain four quadrant operation of motor which driving a hoist load.	**07**
		OR	
	(b)	A 200 V, 10.5 A, 2000 rpm shunt motor has the armature and field resistance of 0.5 and 400Ý 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**
Q.3	**(a)**	Draw circuit diagram, waveform and write the equations for 1-phase full controlled bridge converter separately excited dc motor drive where current of the armature is assumed to be discontinuous.	**07**
	(b)	Draw equivalent circuit and output voltage waveform of an ideal dual converter, derive necessary condition of firing angles and list the Disadvantages of dual converter.	**07**
		OR	
Q.3	**(a)**	Draw circuit diagram, waveform and write the equations for 3-phase full controlled rectifier control of separately excited dc motor.	**07**
	(b)	A 220V, 970 rpm, 100A dc separately excited motor has armature resistance of 0.05 Ý. It is braked by plugging from initial speed of 1000 rpm. Calculate (1) Resistance to be placed in armature circuit to limit braking current to twice the full load value (2) Braking torque and (3) Torque when speed has fallen to zero.	**07**
Q.4	**(a)**	Explain Different types of control strategies for chopper Dives.	**07**
	(b)	Explain class D type chopper control DC motor drive.	**07**
		OR	
Q.4	**(a)**	Explain multi phase chopper drive.	**07**
	(b)	What are the main factors which decide the choice of DC drive for a given application? Also Explain Different components of load torque.	**07**
Q.5	**(a)**	Develop a transfer function of separately excited DC motor with speed control loop. Give the limitation of only speed control loop.	**07**
	(b)	Explain Phase Locked Loop (PLL) Control of DC Drives.	**07**
		OR	
Q.5	**(a)**	Explain comparison of P, PI, and PID controller.	**07**
	(b)	Explain close loop control of dc motor with block diagram.	**07**

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