Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER I (NEW) – • EXAMINATION – SUMMER 2016

Subject Code: 2714502 **Date:18/05/2016**

Subject Name: Solid State DC Drives

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.**

Q.1	**(a)**	What are the main factors which decide the choice of DC drive for a given application?	**07**
	(b)	Explain ward Leonard method for speed control of DC motor.	**07**
Q.2	**(a)**	Explain constant torque and constant horse power operation for DC drive.	**07**
	(b)	Draw circuit diagram, waveform and write the equations for 3-phase full controlled rectifier control of separately excited DC motor.	**07**
		OR	
	(b)	Explain the speed control of DC series motor using tap changing transformer and uncontrolled rectifier.	**07**
Q.3	**(a)**	For type-A DC chopper with RLE load and continuous load current condition shows that per unit ripple current is maximum, when duty cycle is 0.5. Also draw the necessary waveforms and circuit diagram.	**07**
	(b)	Explain the principle of phase control. Obtain the equation of output voltage of phase controlled DC motor drive.	**07**
		OR	
Q.3	**(a)**	Explain the operation of DC motor in forward motoring and reverse braking with proper type of chopper. Explain both quadrant operations with appropriate wave forms?	**07**
	(b)	Explain current source with three phase controlled converter.	**07**
Q.4	**(a)**	Discuss the control design for a two quadrant chopper circuit.	**07**
	(b)	Explain the concept of 'Dual Converter'. Using circuit diagram, briefly explain the working of any one type of dual converter. Derive necessary condition of firing angles and list the disadvantages of dual converter.	**07**
		OR	
Q.4	**(a)**	Draw circuit diagram, waveform and write the equations for 1-phase full controlled converter, separately excited DC motor drive where current of the armature is assumed to be discontinuous mode.	**07**
	(b)	Develop a linearized transfer model of DC series motor.	**07**
Q.5	**(a)**	What is the difference between dynamic braking and regenerative braking? Write down the expressions for the average output voltage for step down and step up chopper.	**07**
	(b)	Why PLL is better for speed control of DC motor? Explain basic PLL operation.	**07**
		OR	
Q.5	**(a)**	Explain the modeling of separately excited DC motor with speed control loop. Give the limitation of only speed control loop.	**07**
	(b)	With neat schematic block diagram describe the Micro-computer control of 4 quadrant DC drives with flow chart.	**07**

****