Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER– I (New course)• REMEDIAL EXAMINATION – SUMMER 2015

Subject Code: 2714502 **Date:14 /05/2015**

Subject Name: Solid State DC Drives

Time: 10:30 am to 1:00 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 principle of speed control of DC motor with necessary operating modes? Specify their field of applications.	**07**
	(b)	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**
Q.2	**(a)**	What are the main factors which decide the choice of DC drive for a given application?	**07**
	(b)	What is the effect of back-emf on the firing angle and avg. output voltage? Draw necessary waveforms.	**07**
		OR	
	(b)	Draw circuit diagram, waveform and write the equations for 3-phase semi-controlled rectifier control of separately excited DC motor.	**07**
Q.3	**(a)**	Explain four quadrant operation of DC motor. Also mention constant power and constant power region operation in the characteristic.	**07**
	(b)	Draw equivalent circuit and output voltage waveform of an ideal dual converter. Derive necessary condition of firing angles.	**07**
		OR	
Q.3	**(a)**	Discuss the control design for a two quadrant chopper circuit	**07**
	(b)	Develop a linearized transfer model of DC series motor.	**07**
Q.4	**(a)**	State and explain the important features of various braking methods of DC motors.	**07**
	(b)	Explain the principle of phase control. Obtain the equation of output voltage of phase controlled DC motor drive.	**07**
		OR	
Q.4	**(a)**	Field control is employed for getting speeds higher than rated and armature voltage control is employed for getting speeds less than rated. Why?	**07**
	(b)	Explain the speed control of DC series motor using tap changing transformer and uncontrolled rectifier.	**07**
Q.5	**(a)**	Explain the armature control and flux control of DC motors.	**07**
	(b)	Draw circuit diagram, waveform and write the equations for 3-phase full controlled rectifier control of separately excited DC motor.	**07**
		OR	
Q.5	**(a)**	Explain synchronizing firing of circuit, pulse transformer and draw circuit for gate protection.	**07**
	(b)	With neat schematic block diagram describe the Micro-computer control of 4 quadrant DC drives with flow chart.	**07**

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