Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – SUMMER • 2013

Subject code: 710709N **Date: 17-06-2013**

Subject Name: Electrical Drive

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)**	What is Speed regulation? Explain the concept of Closed-Loop Speed Control technique for separately excited DC motor.	**07**
	(b)	Draw and explain block diagram of an electric drive and significance of each block.	**07**
Q.2	**(a)**	Explain the multi quadrant operation of DC motor for armature current reversal technique	**07**
	(b)	A separately excited DC machine is fed from a 1-phase fully controlled rectifier bridge. Draw the waveforms representing the output voltage and current of the converter (inputs to machine) when the machine is operating in motoring mode.	**07**
		OR	
	(b)	A 220 V, 960 rpm, 14.5 A separately excited dc motor has armature circuit resistance and inductance of 2 ohm and 150mH respectively. It is fed from a single-phase half-controlled rectifier with an ac source of 230 V, 50 Hz. Calculate (i) Motor torque for Ŭ= 60ę and speed = 600 rpm. (ii) Motor speed for Ŭ= 60ę and T = 20 N-m.	**07**
Q.3	**(a)**	Draw and explain the speed-torque curves of a 3-phase fully controlled rectifier drive. Also find the expression for no-load speed.	**07**
	(b)	What is Dual converter? Draw and explain how the circulating current is controlled in dual converter with simultaneous control.	**07**
		OR	
Q.3	**(a)**	Explain the effect of armature current ripple on the performance of DC motor controlled by a rectifier.	**07**
	(b)	Explain semiconductor converter based controlled dynamic braking and composite braking of DC motor.	**07**
Q.4	**(a)**	With neat diagram explain closed-loop slip-speed control for controlling the speed of a VSI fed induction motor. Clearly explain the function of each block used.	**07**
	(b)	Discuss the method of speed control of a slip ring induction motor by injecting a voltage in the rotor circuit	**07**
		OR	
Q.4	**(a)**	Write a brief note on Static Scherbius Drive. Why a transformer is desired in this drive? Comment on the power factor of the drive in this method and hence, mention the criteria for maximizing the power factor.	**07**
	(b)	Draw the speed-torque characteristics of an induction motor when fed by current source. Compare the same with the characteristics when the motor is fed by a voltage source.	**07**

Q.5	**(a)**	What does one mean by coefficient of adhesion in context to traction? Discuss the factors that affect the coefficient of adhesion.	**07**
	(b)	Derive the equation of torque for a wound field salient pole synchronous motor operating from a voltage source of constant frequency. Hence, draw the torque angle characteristics for the same.	**07**

OR

Q.5	**(a)**	Write a brief note on modified Kramer drive.	**07**
	(b)	Write a brief note on braking methods for synchronous motor.	**07**

****