Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER – VI EXAMINATION – WINTER 2015

Subject Code:162404 **Date:14 /12/ 2015**

Subject Name:Industrial Drives & Control-I

Time:2:30pm to 5:00pm **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 do you mean by Electrical Drive? Explain its working and feature of its all parts along with block diagram.	**07**
	(b)	Explain the fundamental torque equation indicating dynamics of Electrical Drives.	**07**
Q.2	**(a)**	Define Stability of motor load combination. Explain criteria for steady state stability for using three possible combination of speed and torque curve of motor and load.	**07**
	(b)	Explain the comparison between : 1. Circulating Current and Non circulating Current mode of Dual Converter 2. Constant Torque and Constant HP Operation	**07**
		OR	
	(b)	Explain the comparison between : 1. Active and Passive Load 2. In phase and phase shifted operation mode of multiphase chopper	**07**
Q.3	**(a)**	Explain general analysis of 1- Φ semi controlled converter of Separately Excited DC Motor	**07**
	(b)	Draw circuit diagram and explain chopper circuit for motoring and regenerative control along with necessary characteristics.	**07**
		OR	
Q.3	**(a)**	Explain general analysis of 1- Φ Fully controlled converter of Separately Excited DC Motor	**07**
	(b)	Explain the armature current and field current reversible drive using dual converter.	**07**
Q.4	**(a)**	The speed of a 100 hp, 600V, 1800rpm, separately excited dc motor is controlled by 3- ϕ full converter, the converter is operated from 3- ϕ, 480 V, 60 Hz supply, the rated armature current of motor is 165 A. The motor parameter are R_a =0.0874 Ω, L_a= 6.5 mH and $K_a \phi$ = 0.33V/rpm. The converter and ac supply are considered the identical. Calculate no load speeds at firing angle $\alpha = 0^0$ and $\alpha = 30^0$. Assuming that at no load, the armature current is 10 % of rated current and continuous.	**07**
	(b)	Explain Micro computer control of DC Drives using block Diagram	**07**
		OR	
Q.4	**(a)**	A 230 V, 960 rpm and 200 A separately excited dc motor has R_a = 0.02 Ω. Motor is operated in dynamic braking with chopper control with a braking resistance of 2 Ω. Calculate duty ration of chopper of a motor speed of 600 rpm and braking torque of twice the rated value.	**07**
Q.4	**(b)**	Draw and explain the PLL system for speed control DC motor under varying load.	**07**
Q.5	**(a)**	Explain closed loop speed control scheme for control of below and above base speed.	**07**
	(b)	Draw and explain the block diagram and working of Servo Motor Drives.	**07**
		OR	
Q.5	**(a)**	Draw and explain the block diagram and working of Permanent Magnet DC motor Drives.	**07**
	(b)	Explain Traction drive employing two stage converter feeding four separately excited motors.	**07**

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