

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 : **07**
1. Circulating Current and Non circulating Current mode of Dual Converter
 2. Constant Torque and Constant HP Operation
- OR**
- (b)** Explain the comparison between : **07**
1. Active and Passive Load
 2. In phase and phase shifted operation mode of multiphase chopper
- 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 $R_a = 0.0874 \Omega$, $L_a = 6.5$ mH and $K_a \phi = 0.33$ V/rpm. The converter and ac supply are considered the identical. Calculate no load speeds at firing angle $\alpha = 0^\circ$ and $\alpha = 30^\circ$. 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 $R_a = 0.02 \Omega$. 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**
