

Seat No.: \_\_\_\_\_

Enrolment No. \_\_\_\_\_

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BE SEM-VI Examination-Nov/Dec-2011**

**Subject code: 162404**

**Date: 28/11/2011**

**Subject Name: Industrial Drives & control-I**

**Time: 10.30 am -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) 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) Draw the following characteristics : 07
1. Steady state load torque curve of centrifugal pump, high speed hoist and constant Power Load.
  2. Speed torque of Armature voltage Control of DC Shunt and Series Motor.
  3. Intermittent Periodic duty with starting and braking and Friction Torque and its components.
- (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. Conventional and Static Ward Leonard System
- Q.3 (a) Explain general analysis of 1-  $\Phi$  semi controlled converter of Separately Excited DC Motor 07
- (b) Define Braking and Explain need for electrical braking along with its types in brief. 07
- OR
- Q.3 (a) Explain general analysis of 1-  $\Phi$  Fully controlled converter of Separately Excited DC Motor 07
- (b) Explain the four quadrant operation of electrical hoist. 07
- Q.4 (a) Draw circuit diagram and explain chopper circuit for motoring and regenerative control along with necessary characteristics. 07
- (b) Explain Micro computer control of DC Drives using block Diagram 07
- OR
- Q.4 (a) Explain four quadrant variable speed drive employing a dual converter with non simultaneous control. 07
- (b) Explain Current Limit control and Closed loop speed Control 07

- Q.5 (a) Explain closed loop speed control scheme for control of below and above base speed. 07
- (b) A 230 V, 875 rpm, 150 A separately excited DC Motor has an armature resistance of  $0.04 \Omega$ . It is fed from a 1- $\Phi$  full controlled rectifier with an ac source voltage of 230 V, 50 Hz. Assuming Continuous conduction, Calculate 07
1. Firing angle for Rated Motor Torque and 750 rpm
  2. Firing angle for Rated Motor Torque and (-500) rpm
  3. Comment on the result.

OR

- Q.5 (a) Explain Traction drive employing two stage converter feeding four separately excited motors. 07
- (b) A 230 V, 960 rpm, 200 A Separately Excited DC motor has an armature resistance of  $0.03 \Omega$ . The motor is fed from a chopper which provides both motoring and braking operations. The source voltage is 230 V. Assuming continuous conduction, Determine 07
1. Duty ratio of chopper for motoring operation of rated torque and 800 rpm.
  2. Duty ratio of chopper for braking operation of rated torque and 300 rpm.
  3. Comment on the result.

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