GUJARAT TECHNOLOGICAL UNIVERSITY
BE- VIth SEMESTER–EXAMINATION – MAY- 2012

Subject code: 162404   **Date: 17/05/2012**
Subject Name: Industrial Drives and control-I
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)** Do as directed   **07**
1. Draw the detailed block diagram indicating all parts of Electrical motor drive.
2. Enlist the function of Power Electronics Modulators in Drive system.
3. List the advantages and disadvantages of electric drive.
(b) Derive the fundamental torque equation indicating dynamics of electric drives.   **07**

Q.2 **(a)** Explain the component of Load torque with necessary diagram and equations.   **07**
(b) Give the comparison between: 1. Static and conventional ward Leonard system   **07**
2. Constant HP and constant torque operation.
OR
(b) Give the comparison between: 1.Armature Controlled and Field Controlled Drive   **07**
2. Simultaneous and Non-simultaneous   mode of Dual Converter.

Q.3 **(a)** Explain the two quadrant operation of Chopper Controlled separately excited DC   **07**
motor with necessary diagram.
(b) Explain the closed loop operation of 1- ø variable speed drive with current limit   **07**
control.
OR
Q.3 **(a)** Explain traction drive using semiconductor converter controlled DC motor.   **07**
(b) Explain the closed loop operation of 1- ø variable speed drive with inner current   **07**
controlled loop.

Q.4 **(a)** Draw the circuit diagram and necessary waveform for Chopper Controlled   **07**
separately excited DC motor drive in first quadrant for a. Continuous Load Current
b. Discontinuous Load.
(b) Write a Technical Note on: PLL Based DC Drive.   **07**
OR
Q.4 **(a)** Draw the voltage and current waveform for 3- ø semi converter DC drives with α   **07**
=60^0,   α =90^0 and α =120^0.
(b) Write a Technical Note on: Servo Motor DC Drive.   **07**

Q.5 **(a)** Draw and explain 25 KV ac traction employing two stage converters feeding four   **07**
separately excited motor with common single phase converter field supply.
(b) A 100 KW, 440 V , 1000 rpm dc motor running at 800 rpm and developing 75 %   **07**
rated torque is controlled by a 3- ø 6 pulse thyristor converter. If the back emf   at
rated speed is 410 V . Determine the triggering angle of the converter. It is fed
with a 3- ø , 415 V 50 HZ ac supply. Comment on the result.
OR
Q.5 **(a)** Draw and Explain Closed Loop Control scheme for control below and above based speed.   **07**
(b) Two 3 – ø full converter are connected anti parallel to form 3 – ø dual converter of   **07**
circulating current type. The input to the dual converter is 3 – ø , 400 V , 50 HZ .
a. Determine the value of inductance needed for a firing angle of α = 60^0
when peak current limited to 20A.
b. Determine the value of peak current when the inductance of the system is
0.0015H and α $_1$ = 60 ^{0} and α2=120^0.

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