

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE- SEMESTER-VII (NEW) EXAMINATION – WINTER 2020****Subject Code:2171707****Date:19/01/2021****Subject Name:Industrial Drives and Control****Time:10:30 AM TO 12:30 PM****Total Marks: 56****Instructions:**

1. Attempt any FOUR questions out of EIGHT questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		MARKS
<b>Q.1</b>	(a) Why do we require drive circuit to run the motor?	<b>03</b>
	(b) Explain the effect of DC motor back emf on performance of drive circuit.	<b>04</b>
	(c) With appropriate block diagram, explain cascade control in DC motor closed loop control.	<b>07</b>
<b>Q.2</b>	(a) Discuss the selection criteria for electric motor drive	<b>03</b>
	(b) Explain the electro-mechanical modeling of DC motor drive.	<b>04</b>
	(c) Explain four quadrant operation of DC motor drive using chopper circuit.	<b>07</b>
<b>Q.3</b>	(a) Where do we require chopper based drive?	<b>03</b>
	(b) Draw and explain closed loop control of chopper drive.	<b>04</b>
	(c) Give output voltage waveform of full wave controlled rectifier, driving DC shunt motor, for 30 degree firing angle.	<b>07</b>
<b>Q.4</b>	(a) Draw any appropriate circuit to convert line voltage into chopper input voltage of 100 VDC.	<b>03</b>
	(b) Explain the principle of operation of chopper in brief.	<b>04</b>
	(c) Give output voltage waveform of full wave controlled rectifier, driving DC shunt motor, for 60 degree firing angle.	<b>07</b>
<b>Q.5</b>	(a) Draw basic voltage inverter circuit with resistive load	<b>03</b>
	(b) Draw practical sources for voltage source inverter and current source inverter.	<b>04</b>
	(c) Explain with necessary circuit diagram, the working of modified half bridge Macmurray voltage source inverter	<b>07</b>
<b>Q.6</b>	(a) Explain why power factor is high in induction motor ?	<b>03</b>
	(b) With block diagram explain induction motor speed control with variable speed PWM.	<b>04</b>
	(c) What is the limitation of cyclo converter based induction motor drive ? Suggest and explain any other scalar control method for induction motor.	<b>07</b>
<b>Q.7</b>	(a) Draw torque v/s angular displacement characteristic curve for 3 phase VR step motor	<b>03</b>
	(b) What is micro stepping in step motor? Why is it required?	<b>04</b>
	(c) With necessary circuit diagram and waveforms, explain recovery at high voltage drive for step motor.	<b>07</b>

- Q.8**
- (a) Draw torque v/s angular displacement characteristic curve for 4 phase PM step motor **03**
  - (b) List out essential components of DC servo control **04**
  - (c) With necessary circuit and waveforms, explain zener + resistance type and capacitor suppression drive for step motor. **07**

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