Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) EXAMINATION – WINTER 2022

Subject Code:3151109 Date:04-01-2023

Subject Name:Industrial Automation

Time:10:30 AM TO 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.**
4. **Simple and non-programmable scientific calculators are allowed.**

Q.1	**(a)**	What do you mean by (I) Smart Sensors (II) MODBUS and (III) PROFI-BUS?	**03**
	(b)	What is automation? Explain different type of automation systems. List its advantages and disadvantages.	**04**
	(c)	Described with neat sketches, the construction and working principle of magnetic flow meter. Also discuss its advantages and disadvantages.	**07**
Q.2	**(a)**	Explain basic principle of Servo.	**03**
	(b)	What do you mean by SCADA system? Explain basic SCADA architecture and typical features.	**04**
	(c)	List different types of speed-measuring devices. Explain with neat sketches the construction and working of any two of them.	**07**
		OR	
	(c)	What is sensor and actuator? Explain use of Solenoid as an electrical actuator.	**07**
Q.3	**(a)**	List the advantages of DCS.	**03**
	(b)	How pH measurement is done?	**04**
	(c)	The process system have two switches PB1 and PB2, two lights Red light-R and Green light-G, one relay CR1. Draw PLC ladder logic diagram to perform following process: • PB1 pressed: Red Light ON, Relay Energized and Latched, Red Light continued to remain ON after releasing PB1. • PB1 pressed: Red Light ON, Relay Energized and Latched, Red Light continued to remain ON after releasing PB1.	**07**
		OR	
Q.3	**(a)**	List the features of DCS.	**03**
	(b)	Explain working principle of displacement sensor. Also explain Optical displacement sensors.	**04**
	(c)	Develop PLC ladder logic diagram for a motor control circuit has two start and stop buttons. When any start button is pressed, motor runs. By sealing, it continues to run when the start button is released. Any one of stop button stops the motor when pressed. The system seals on when the start is released.	**07**
Q.4	**(a)**	List standard interfaces and compare RS232 & RS485 interface.	**03**
	(b)	Explain block diagram, construction and working of PLC.	**04**
	(c)	A process fan P is to run only when all of the following conditions are met. • Input 1 is off. • Input 2 is on or input 3 is on, or both 2 and 3 are on.	**07**

- Inputs 5 and 6 both are on.
- One or more of inputs 7, 8, or 9 is on.

OR

Q.4	**(a)**	Explain in brief the supervisory tasks performed by DCS.	**03**
	(b)	Why isolation is required in I/O bus? Explain I/O bus isolation using opto-coupler.	**04**
	(c)	Develop PLC ladder logic diagram for the following conveyor motor system: When Start button pressed: • RUN (Green light) indication lamp will be activated • Motor starts • Box at one end of conveyer belt starts moving • Proximity sensor will detect when the box arrives at other end • Motor stops • RUN (Green light) indication lamp will be de-activated An Emergency Stop push button will be used to stop the motor at any time.	**07**
Q.5	**(a)**	Enlist the basic configuration of Industrial Robot.	**03**
	(b)	What is IoT? List advantages of IoT in industry.	**04**
	(c)	With a neat sketch, explain the construction and working of a distributed control system in process control industries.	**07**

OR

Q.5	**(a)**	What do you mean by welding Robot?	**03**
	(b)	Explain the role of augmented reality in the age of Industry 4.0.	**04**
	(c)	Discuss in brief about the various types of information display that can be achieved using DCS for efficient monitoring of plant parameters.	**07**

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