Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII • EXAMINATION – WINTER 2013

Subject Code:170802 Date: 05/12/2013

Subject Name: Industrial Automation

Time: 10:30 TO 01:00 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)**	Draw and explain block diagram of PLC.	**07**
	(b)	What is automation? Explain generalized automation, production systems and their classification.	**07**
Q.2	**(a)**	Explain following discontinuous controller modes: (i) Two position mode (ii) Multi position mode.	**07**
	(b)	**(1)** A controlling variable is a motor speed that varies from 700-1650 RPM. If the speed is controlled by a 25 to 50V DC signal, calculate (a) The speed produced by an input of 40 V and (b) The speed calculated as a percent of span. **(2)** Define following terms: (i) Error (ii) Cycling (iii) Variable Range.	**04** **03**
		OR	
	(b)	**(1)** A stepper motor has a step angle = 3.6°. (1) How many pulses are required for the motor to rotate through ten complete revolutions? (2) What pulse frequency is required? For the motor to rotate at a speed of 100 rev/min? **(2)** Advantages and disadvantages of automation.	**04** **03**
Q.3	**(a)**	Discuss the characteristics and applications of PI controller.	**07**
	(b)	Explain in detail with suitable diagram, Direct Digital Control.	**07**
		OR	
Q.3	**(a)**	Discuss the characteristics and applications of PD controller.	**07**
	(b)	Explain in detail the input-output module used in PLC.	**07**
Q.4	**(a)**	Briefly draw and explain the block diagram of distributed control system (DCS).	**07**
	(b)	Critically explain each component of supervisory digital control with suitable diagram.	**07**
		OR	
Q.4	**(a)**	What is ladder diagram? Explain the terminologies and its applications.	**07**
	(b)	Explain Timer and Counter instructions with timing diagram for PLC.	**07**
Q.5	**(a)**	Write logic to develop a ladder diagram for temperature measurement and control jig.	**07**
	(b)	Explain in detail the following terminologies with reference to process industry: (i) Self regulation (ii) Control lag (iii) Dead Time (iv) Process Lag.	**07**
		OR	
Q.5	**(a)**	Bring out important aspects of role of Common system components of SCADA.	**07**
	(b)	A liquid-level control system linearly converts a displacement of 2 to 3 m into a 4 to 20 mA control signal. A relay serves as the two-position controller to open and close the inlet valve. The relay closes at 12 mA and opens at 10 mA. Find (a) the relation between displacement level and current, and (b) the neutral zone or displacement gap in meters.	**07**

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