

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VII • EXAMINATION – SUMMER 2013

Subject Code: 170802

Date: 24-05-2013

Subject Name: Industrial Automation

Time: 02.30 pm - 05.00 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) Explain ladder diagram elements and its applications. (7)
(b) Explain following terminology with reference to process industry (7)
(i) Self Regulation (ii) Process equation (iii) error (iv) Dead time

- Q-2** (a) Explain PI mode control. (7)
(b)(1) A controller outputs a 4- to 20-mA signal to control motor speed from 140 (4)
to 600 rpm with a linear dependence. Calculate (a) current corresponding
to 310 rpm, and (b) the value of (a) expressed as the percent of output.
(2) Explain two-position mode control. Explain Neutral zone. (3)

OR

- (b) (1) A liquid-level control system linearly converts a displacement of 2 to 3 m (4)
into 4- to 20-mA control signal. A relay serves as the two-position controller
to open or close an 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.
(2) What is floating mode control? Explain Single speed floating mode control. (3)
- Q-3** (a) Explain Continuous Control, Discrete-State Control and Composite Control. (7)
(b) Explain in detail the input-output module used in PLC. (7)

OR

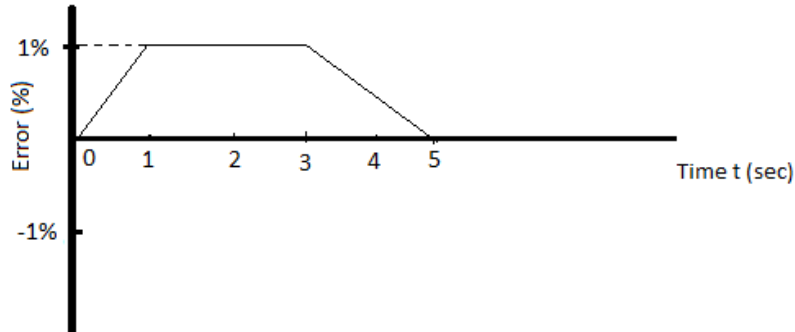
- Q-3** (a) Explain the block diagram of distributed control system. (7)
(b) Explain supervisory digital control with suitable diagram. (7)
- Q-4** (a) Explain generalized Automation and production systems and their (7)
classification.
(b) Explain the block diagram of distributed control system. (7)

OR

- Q-4** (a) Explain Timer – Counter instructions with timing diagram of PLC. (7)

(b) Develop ladder diagram for bottle filling conveyor belt. (7)

Q-5 (a) Suppose the error, Figure [1] is applied to a proportional-derivative (PD) controller with $K_p = 5$, $K_D = 0.5s$, and $P_0 = 20\%$. Draw a graph of the resulting controller output. (7)



(b) Explain PD controller in detail. (7)

OR

Q-5 (a) Discuss importance of Local Area Network for DCS. (7)

(b) Explain common system components of SCADA. (7)
