

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V • EXAMINATION – SUMMER 2013****Subject Code: 151704****Date: 23-05-2013****Subject Name: Industrial Control Systems****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) Differentiate between open-loop and closed-loop system, taking the example of an oven. **07**

(b) What are the areas in which mathematical modelling is used in process control? Explain the whole procedure with any suitable example. **07**

Q.2 (a) Which are the programming languages used for PLC? Draw and explain a ladder diagram program for any one industrial application/process. **07**

(b) Explain and Classify the Controller tuning concept. Explain Ziegler-Nichols tuning method in detail. **07**

OR

(b) Explain Cascade control of any physical system with your choice. Make the analysis for the same. Comments on results. **07**

Q.3 (a) Make comparison of feed forward control and feedback control on various aspects. Based on suitable example, Justify that the stability of feedback system is not disturbed by addition of feed forward control. **07**

(b) Explain the architecture of DCS, with block diagram and function of it. **07**

OR

Q.3 (a) Discuss the term SCADA .Explain hardware elements of its in detail. **07**

(b) Discuss the on off controller with use of Schmitt trigger. How does Schmitt trigger help in reducing the effect of noise on switching? **07**

Q.4 (a) Explain the control valve characteristics, with help of relevant diagram. **07**

(b) How the location of an instrument interpreted in P & I Diagram? Explain the role of functional identification & loop identification. **07**

OR

Q.4 (a) Explain digital PID algorithm in detail. Classify and compare it also. **07**

(b) List out the selection criteria for control valves and explain in brief. **07**

Q.5 (a) Make comparison of various controller configurations with sketches. **07**

(b) Consider the error voltage E_p is given by the following relation: **07**

$$E_p = t \% (0 - 1 \text{ sec}), E_p = 1 \% (1 - 3 \text{ sec}), E_p = (-0.5 t + 2.5) \% (0 - 1 \text{ sec}).$$

Find the controller output for a three- mode controller which produce an output with $K_p = 5$, $K_i = 0.5 \text{ sec}^{-1}$, $K_d = 0.5 \text{ sec}$ and $P_0 = 50 \%$. Draw the respective curve/waveform for each case.

OR

Q.5 (a) Explain the self- operating controller with the help of an example **07**

(b) In what ways PLCs are different from general purpose computer? Give suitable justification for the same also. **07**
