N22 – 03740

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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE, NOVEMBER – 2022

ADVANCED PROCESS CONTROL

[Maximum Marks: **100**]   [Time: **3** Hours]

PART-A
[Maximum Marks: **10**]

I.   (Answer *all* questions in one or two sentences. Each question carries *2* marks)

1. Define single variable process control.

2. Define signal conditioning.

3. List any of the four methods of PLC programming.

4. Define inflection point.

5. What is fuzzification?   (5 x 2 = 10)

PART-B
[Maximum Marks: **30**]

II.   (Answer *any five* of the following questions.   Each question carries *6* marks)

1. Explain ratio control system with an example.

2. Describe alarm systems in process control.

3. What are the features of DCS?

4. What are the different operating modes of PLC?

5. List the selection criteria for PLC

6. Illustrate the difference between traditional instrument and virtual instrument.

7. List the advantages of LabView.

(5 x 6 = 30)

PART-C
[Maximum Marks: **60**]
(Answer *one* full question from each Unit. Each full question carries **15** marks)

UNIT – I

III. (a) Compare batch process and continuous process.   (8)

     (b) Describe cascade control with suitable example.   (7)

OR

IV. (a) Compare feedback and feedforward control system. (7)

    (b) Illustrate the independent and interactive variable process control system. (8)

UNIT – II

V. (a) Explain supervisory control system using block diagram. (9)

    (b) A holding tank is shown in figure in which liquid level, inflow A, and in flow B are monitored. These measurements are converted to voltage and then, with comparators to digital signals that are HIGH when some limit is exceeded. The variables FA and FB will be 0 for low flow and 1 for high flow. The level variables are such that L2 is 1 if the level exceeds the lower limit and L1 will be 1 if the level exceeds the upper limit. The alarm will be triggered if either of the following condition occurs. Implement this problem with digital logic circuits.

    L2 LOW and neither FA nor FB HIGH &

    L1 HIGH and FA or FB or both HIGH (6)

OR

VI. (a) Explain the data logging system with block diagram. (8)

    (b) Describe the Distributed control System with architecture. (7)

UNIT- III

VII. (a) Explain SCADA with block diagram. (8)

    (b) One open tank is installed in the plant of which liquid level is to be controlled. When level reaches the level low, outlet flow is blocked and inlet flow is allowed until high level is achieved. When level high is detected, outlet flow is allowed and inlet flow is blocked. Draw the PLC ladder diagram for this situation. (7)
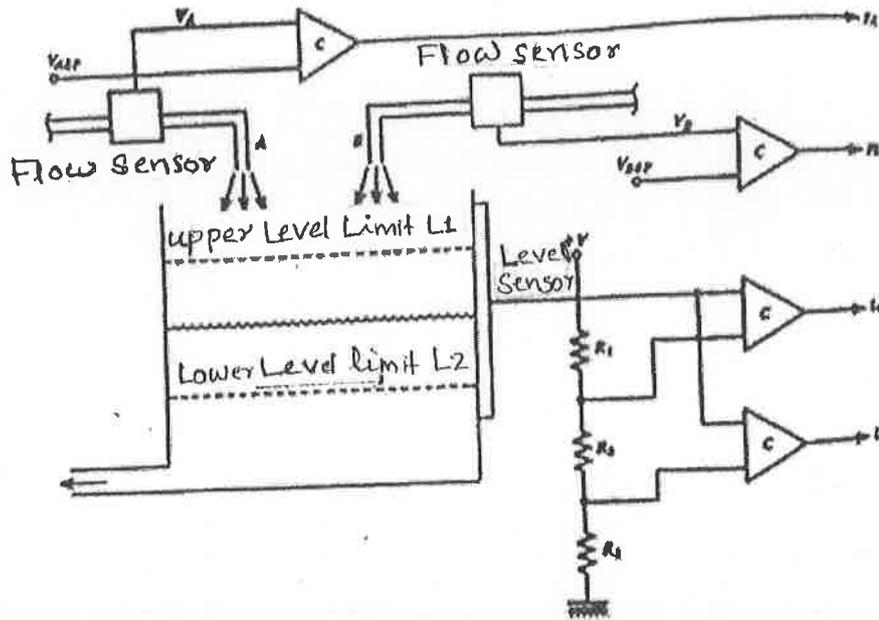
OR

VIII. (a) Draw the PLC ladder diagram for logic gates (AND, OR, NOT, X-OR, X-NOR, NAND and NOR) with truth table. (7)

    (b) Illustrate the block diagram of PLC. (8)

UNIT - IV

IX. (a) Explain the fuzzy controller with block diagram. (8)

    (b) Compare the text based and graphical based programming. (7)

X.   (a) Explain the connecting lines, generals instruments, and identification letters used in P&I diagram. (9)

(b) Explain Ziegler - Nichols method of controller tuning. (6)

Figure

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