

SIXTH SEMESTER B.TECH. (INSTRUMENTATION AND CONTROL ENGG.) END SEMESTER DEGREE EXAMINATION, JUNE - 2019

SUBJECT: INDUSTRIAL AUTOMATION [ICE 3201]

TIME: 3 HOURS

MAX. MARKS: 50

Instructions to candidates : Answer ALL questions and missing data may be suitably assumed.

- 1A Explain centralized and distributed control system architecture in SCADA.
- 1B A proportional mode has $K_P=2.4$, input range of 255, and set point of 130. The output maximum is 180, and the output fraction with no error is 0.45.

a. Develop the control equations. (What is the output for no error?)

b. Find the output for an input of 124.

1C Determine an approximate value of derivative of e_p at a time of 12 min from the Fig.Q1C, using samples every 2 min and every 1 min. Compare the results.





2A Express the following equation as a ladder logic and IL program.

$$y = [(\bar{A} + \bar{B})C] + DE$$

2B Implement the following function and store data in location N7:40 using ladder logic and structured programming languages.

$$A = \sqrt{\ln B + e^{C} \operatorname{acos}(D)}$$

2C What is scan time and mention all the factors that affect PLC scan time?

(4+4+2)

(5+2+3)



Develop a ladder logic for the following condition

- When the start button is pressed, the robot starts its arm clockwise.
- When the robot arm has moved to the position of the work on the conveyor A, arm grasps the work.
- When the arm has grasped the work, it rotates in counter clockwise.
- When the arm has rotated to the position of the conveyor B, it releases the work.
- 3B In dangerous processes it is common to use two palm buttons that require an operator to use both hands to start a process. To develop this there are two inputs that must be turned on within 15s of each other before a machine cycle may begin. Write a ladder logic for the above process.
- 3C With an example describe CALL and JUMP functions.

(4+4+2)

- 4A Explain the working of Allen-Bradley CTUD. Give a suitable example to illustrate the usage of the same and draw the timing diagram.
- 4B Discuss the design of an intrinsic safety system using shunt diode barriers and isolators
- 4C Describe the communication profiles used in Profibus technology.
- 5A With necessary diagram explain generalized DCS architecture.
- 5B With an example, describe error checking method used in RTU mode of MODBUS communication.
- 5C Brief about RS-485 transmission technology used in Profibus.

(4+4+2)

(4+4+2)
