

22640

23242

3 Hours / 70 Marks

Seat No.

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- Instructions* – (1) All Questions are *Compulsory*.
(2) Answer each next main Question on a new page.
(3) Illustrate your answers with neat sketches wherever necessary.
(4) Figures to the right indicate full marks.
(5) Assume suitable data, if necessary.
(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.
(7) Preferably, write answers in sequential order.

Marks

1. Attempt any FIVE of the following: 10

- a) State the benefits of automation with respect to :
 - i) Product quality
 - ii) Productivity
 - iii) Product cost and
 - iv) Manpower utilization
- b) Differentiate between PLC and DCS system on the basis of response time and scalability.
- c) State the selection criteria for discrete input module and discrete output module.
- d) Enlist the different PLC programming languages.
- e) Compare retentive and non retentive on delay timer instruction.
(any two points)
- f) Enlist different types of SCADA.
- g) Define :
 - i) Tags and
 - ii) Items w.r.t. SCADA

P.T.O.

- 2. Attempt any THREE of the following:** **12**
- a) Draw the architecture of PLC and explain functions of the input module, output module, CPU and power supply unit.
 - b) State the sourcing and sinking concept in DC input module of PLC with neat block schematic.
 - c) Draw the functional block diagram of up counter. Also draw its word format. Explain the function of CV and orbits.
 - d) Describe the steps involve in interfacing the PLC based application with SCADA system.
- 3. Attempt any THREE of the following:** **12**
- a) Describe the discrete AC input module with neat wiring diagram.
 - b) Explain with suitable example the circular nature of limit instruction used in PLC.
 - c) Write a ladder logic program for converting 400°C to °Farhreneit use $^{\circ}\text{F} = (9/5 \times ^{\circ}\text{C}) + 32$.
 - d) Explain the significance of OPC in SCADA based applications.
- 4. Attempt any THREE of the following:** **12**
- a) Describe the redundancy in PLC system.
 - b) Draw the block diagram of analog output module and explain function of each block.
 - c) List the comparison instructions used in PLC ladder logic programming language. Draw the functional diagram of any two instructions.
 - d) Compare PLC and SCADA on any four points.
 - e) Describe the steps in creating SCADA screen for simple object.

- 5. Attempt any TWO of the following:** **12**
- a) Explain the single point relay output module with neat diagram. Also draw the wiring diagram for the system used in an automation industry where $120 V_{AC}$ input is to be used to control the DC motor connected with the PLC using combination i/o module.
 - b) Write a ladder logic program using single timer instruction for following conditions :
 - i) When START PB is pressed solenoid valve A will be ON.
 - ii) After 5 seconds solenoid valve B should be ON. When B is ON, after 5 seconds solenoid C should be ON.
 - iii) After 15 seconds solenoid D should be ON.
 - iv) All solenoids should be OFF after pressing STOP PB.
 - v) Mention the input addresses required for above operation.
 - vi) Mention the output addresses required for above operation.
 - c) Describe with neat block diagram simple water distribution system using SCADA. Also draw ladder logic diagram used for simple water distribution system.
- 6. Attempt any TWO of the following:** **12**
- a) Write a ladder logic program for motor sequence control for following conditions :
 - i) Motor 1 starts as soon as start switch is ON.
 - ii) After 10 seconds motor 1 goes OFF and motor 2 starts.
 - iii) After 5 seconds motor 2 goes OFF and motor 3 starts.
 - iv) After 5 seconds motor 3 goes OFF and motor 4 starts.
 - v) After 10 seconds motor 4 goes OFF and motor 1 starts.
 - vi) Cycle should repeat until stop switch is pressed.
 - b) Write a ladder logic program for stepper motor control to rotate the motor in clockwise direction continuously until the stop push button is pressed. Also explain the operation.
 - c) Draw block diagram of SCADA system and explain its parts. Enlist any four benefits of SCADA in automation industry.
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