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Question Paper Code	12238
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B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2023
Seventh Semester
Instrumentation and Control Engineering
(Common to Electronics and Instrumentation Engineering)
20ICPC701 - LOGIC AND DISTRIBUTED CONTROL SYSTEM
(Regulations 2020)

Duration: 3 Hours

Max. Marks: 100

PART - A (10 × 2 = 20 Marks)
Answer ALL Questions

- | | <i>Marks,</i>
<i>K-Level, CO</i> |
|---|-------------------------------------|
| 1. Name any four discrete and analog I/O modules. | <i>2,K1,CO1</i> |
| 2. Discuss the advantages of PLC over relay logic. | <i>2,K2,CO1</i> |
| 3. Differentiate on-delay timer and off-delay timer. | <i>2,K2,CO2</i> |
| 4. Define instruction list in PLC Programming. | <i>2,K1,CO2</i> |
| 5. Why Data Acquisition System is required for a SCADA System? | <i>2,K2,CO3</i> |
| 6. How Remote Terminal Unit plays a vital role in SCADA communication? | <i>2,K2,CO3</i> |
| 7. Differentiate Programmable Logic Controller with Distributed Control System. | <i>2,K2,CO4</i> |
| 8. State the different functions performed by DCS. | <i>2,K1,CO4</i> |
| 9. Mention any four advantages of Networked Control Systems. | <i>2,K1,CO5</i> |
| 10. List the safety requirements to be maintained for industrial PLC. | <i>2,K1,CO5</i> |

PART - B (5 × 13 = 65 Marks)
Answer ALL Questions

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| 11. a) Describe in detail the architecture of PLC with neat diagram. | <i>13,K2,CO1</i> |
| OR | |
| b) Explain different types of timers in PLC Programming with detailed explanation of its various parameters. | <i>13,K2,CO1</i> |
| 12. a) Explain the features of Functional Block Diagram (FBD) programming. Develop a FBD program for an Automated Washing Machine process. | <i>13,K2,CO2</i> |
| OR | |
| b) Describe in detail about the structured text programming in PLC for an Industrial Process application. | <i>13,K2,CO2</i> |
| 13. a) Explain in detail about Direct Digital Control and Supervisory control of a SCADA System. | <i>13,K2,CO3</i> |

OR

- b) Briefly explain the various hardware and software system associated with SCADA and detail its Master Station and communication architecture. *13,K2,CO3*

14. a) (i) Sketch and explain the hardware architecture of Distributed Control System. *7,K2,CO4*
(ii) Explain how smart field devices can be interfaced with DCS Controller. *6,K2,CO4*

OR

- b) Explain the importance and functions of operator and engineering interfaces at field and control room level. *13,K2,CO4*

15. a) (i) Explain the importance of OLE for an industrial process. *6,K2,CO5*
(ii) Detail Cloud based automation and how it adds benefits to the current industrial needs. *7,K2,CO5*

OR

- b) For a Cement industry how plant wide control can be done. Explain with necessary automation devices and operations. *13,K2,CO5*

PART - C (1 × 15 = 15 Marks)

16. a) (i) Design a ladder diagram that will control a stepper motor so that it rotates 10 steps forward, waits for 20 Seconds and then causes the motor to rotate to steps in the reverse direction. *8,K3,CO1*
(ii) Design a PLC program to indicate a vessel over fill condition by energizing an alarm when a supply leaks 10 lb or more of the raw material into the vessel after a preset weight of 1000 lb has been reached. Also indicate by a pilot light when the raw material exceeds its preset weight. *7,K3,CO1*

OR

- b) Write a ladder logic program to implement the following sequence . *15,K3,CO1*
Indicate the input and output device with appropriate symbol and address.
- Normally open push button and normally closed push button are used to start and stop the process.
 - When the start button is pressed, solenoid A energizes to start filling the tank.
 - As the tank fills the empty level sensor switch closes.
 - When the tank is full the full level sensor switch closes.
 - Solenoid A is de-energized.
 - The agitator motor starts automatically and runs for three minutes to mix the liquid.
 - When the agitator motor stops solenoid B is energized to empty the tank.
 - When the tank is completely empty the empty sensor switch opens to de energize solenoid B.
 - The start button is pressed to repeat the sequence.