Reg. No.															

Question Paper Code	13422

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2025

Seventh Semester

Electronics and Instrumentation Engineering

20ICPC701 - LOGIC AND DISTRIBUTED CONTROL SYSTEM

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

		Marks	*K – Level*	*CO*
1.	What type of signal does a discrete input module handle? (a) Continuous voltage (b) Digital signals (c) Analog signals (d) Temperature signals	*1*	*K1*	*CO1*
2.	What does an analog input module typically convert? (a) Analog signals to digital signals (b) Digital signals to analog signals (c) Voltage to current (d) Temperature to pressure	*1*	*K1*	*CO1*
3.	What type of diagram in Functional Block Diagram is most similar to in terms of visual representation? (a) Flowchart (b) Gantt chart (c) P&ID (d) Bar chart	*1*	*K1*	*CO2*
4.	What is the primary advantage of using Sequential Function Chart in PLC programming? (a) Simplifies complex sequential operations (b) Provides a text-based approach to programming (c) Optimizes memory usage (d) Reduces execution time	*1*	*K1*	*CO2*
5.	In a Data acquisition system, which component is responsible for amplifying or modifying signals before conversion? (a) Analog-to-Digital Converter (b) Signal Conditioner (c) Data Processing Unit (d) Data Storage	*1*	*K1*	*CO3*
6.	In SCADA systems, which communication protocol is commonly used for data exchange between devices? (a) HTTP (b) Modbus (c) FTP (d) SMTP	*1*	*K1*	*CO3*
7.	Distributed Control Systems evolved primarily to overcome limitations associated with (a) PLCs (b) SCADA systems (c) Single-loop controllers (d) All of the above	*1*	*K1*	*CO4*
8.	The communication backbone of a DCS is typically (a) Ethernet-based (b) Serial-based (c) Wi-Fi-based (d) Infrared-based	*1*	*K1*	*CO4*
9.	Plant-wide control refers to (a) Control of individual units in isolation (b) Coordination and control of multiple units across a plant (c) Supervisory control at the enterprise level (d) Remote monitoring without control actions	*1*	*K1*	*CO5*
10.	In IoT, which protocol is commonly used for low-power, short-range communication? (a) TCP/IP (b) Zigbee (c) Ethernet (d) HTTP	*1*	*K1*	*CO5*

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

11.	What is the function of an optical isolator?	*2*	*K1*	*CO1*
12.	Define Scan cycle.	*2*	*K1*	*CO1*
13.	Mention the difference between ON delay and OFF delay timer.	*2*	*K1*	*CO1*
14.	Discuss the significance of Instruction list programming.	*2*	*K2*	*CO2*
15.	Mention the structured text instruction for open contact and closed contact.	*2*	*K2*	*CO2*
16.	Write the structured text instruction for any two logical operations.	*2*	*K2*	*CO2*
17.	What are the tasks performed by microprocessor in DDC?	*2*	*K1*	*CO3*

18.	Mention the two algorithms used in DDC software.		*2*	*K1*	*CO3*
19.	What is the importance of distributed architecture over centralized architecture?		*2*	*K1*	*CO4*
20.	What is a Shared communication facility in DCS?		*2*	*K1*	*CO4*
21.	Distinguish the local server and remote server.		*2*	*K2*	*CO5*
22.	List out the advantages of IOT.		*2*	*K2*	*CO5*

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a)	What is a PLC and explain with neat diagram the architecture of PLC.	*11*	*K2*	*CO1*
		OR			
	b)	Write a ladder logic program to implement the following sequence • 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**.**	*11*	*K2*	*CO1*
24.	a)	Construct a transition and action with regards to sequential function chart (SFC).	*11*	*K3*	*CO2*
		OR			
	b)	What is instruction list programming in PLC? i) List out the various operators in instruction list and describe them. ii) Develop a minimum of five logical operations in ladder logic programming and implement its equivalent instruction list program.	*11*	*K3*	*CO2*
25.	a)	What is SCADA? Explain in detail the various functional blocks of SCADA.	*11*	*K2*	*CO3*
		OR			
	b)	What are the major functions of data acquisition system? Explain the various block of data acquisition system in detail.	*11*	*K2*	*CO3*
26.	a)	Give a detailed case study on Distributed control system use for process industry.	*11*	*K2*	*CO4*
		OR			
	b)	Describe in detail the evolution of DCS along with its architecture supported by a neat diagram.	*11*	*K2*	*CO4*
27.	a)	Discuss in detail about the cloud based automation with typical application.	*11*	*K2*	*CO5*
		OR			
	b)	Describe in detail about Internet of things with neat sketch and also summarize the various applications of IoT.	*11*	*K2*	*CO5*
28.	a) (i)	Compare the low level and High level human interface in DCS	*6*	*K2*	*CO4*
	(ii)	What is safety PLC? Describe the necessity of safety PLC in detail.	*5*	*K2*	*CO5*
		OR			
	b) (i)	Discuss about the different configurations of Local Control Unit with neat diagram.	*6*	*K2*	*CO4*
	(ii)	Discuss the various levels or hierarchy in a networked control system.	*5*	*K2*	*CO5*