Reg. No.															

Question Paper Code	13426

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

Seventh Semester

Electrical and Electronics Engineering

20EEEL709 - INDUSTRIAL CONTROL AND AUTOMATION

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

		Marks	*K – Level*	*CO*
1.	Which of the following is a key component of a basic feedback control system? (a) Sensor, Actuator, Controller, and Process (b) Sensor, Controller, Processor, and Analyzer (c) Actuator, Sensor, Processor, and Operator (d) Controller, Operator, Sensor, and Feedback Device	*1*	*K1*	*CO1*
2.	Which layer of the industrial automation pyramid is primarily responsible for the real-time control of processes and machinery? (a) Enterprise Resource Planning (ERP) (b) Supervisory Control and Data Acquisition (SCADA) (c) Programmable Logic Controller (PL(C) (d) Manufacturing Execution System (MES)	*1*	*K1*	*CO1*
3.	In a PLC architecture, what is the primary purpose of the Central Processing Unit (CPU)? (a)To interface with external sensors (b) To execute control instructions and manage I/O operations (c) To store program files (d) To provide power to the PLC system	*1*	*K1*	*CO2*
4.	Which of the following functions in a PLC would most likely be used for arithmetic operations? (a) ADD, SUB, MUL, DIV (b) MOVE, COPY, RESET (c) FIFO, LIFO (d) JUMP, SUBROUTINE	*1*	*K1*	*CO2*
5.	What is the primary function of Direct Digital Control (DD(C) in industrial automation? (a) Manual operation of equipment (b) Digital control of processes through centralized systems (c) Enhancing mechanical control systems (d) Reducing the use of microprocessors	*1*	*K1*	*CO3*
6.	In DCS programming, which of the following languages is commonly used for configuring control logic? (a) Python (b) Ladder Logic, Function Block Diagrams, and Structured Text (c) HTML (d) SQL	*1*	*K1*	*CO3*
7.	Which of the following is a key advantage of automating a production system? (a) Increased manual supervision (b) Enhanced productivity and consistent product quality (c) Higher operating costs due to automation equipment (d) Greater human error	*1*	*K1*	*CO4*
8.	Which of the following is a key characteristic of an induction motor in industrial drives? (a) Requires commutators for operation (b) Operates on both AC and DC power (c) Self-starting and operates on alternating current (A(C) (d) Requires high levels of maintenance due to brushes	*1*	*K1*	*CO4*

9.	PROFIBUS-DP is designed for: (a) Communication between sensors and actuators (b) Supervisory control (c) Internet access (d) Wireless networking	*1*	*K1*	*CO5*
10.	The main advantage of using a barcode is: (a) It can store a large amount of data (b) It is cheap and easy to implement (c) It can transmit data wirelessly (d) It is immune to damage	*1*	*K1*	*CO6*

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

11.	List out the main components of a feedback control system in process control.	*2*	*K1*	*CO1*
12.	Differentiate between fixed automation and programmable automation.	*2*	*K2*	*CO1*
13.	Compare the program memory and data memory in a PLC.	*2*	*K2*	*CO2*
14.	Write the differences between an AND logical function and an OR logical function in a PLC program.	*2*	*K2*	*CO2*
15.	List two advantages of using a Distributed Control System (DCS) in industrial automation.	*2*	*K1*	*CO3*
16.	Name two common communication protocols used in SCADA systems.	*2*	*K1*	*CO3*
17.	Write the primary goal of automation in production systems.	*2*	*K1*	*CO4*
18.	Why are adjustable speed drives important for energy efficiency in industrial motors.	*2*	*K1*	*CO4*
19.	Differentiate between ControlNet and Ethernet.	*2*	*K2*	*CO5*
20.	Differentiate between Control Net and Device Net in terms of industrial applications.	*2*	*K2*	*CO5*
21.	List two advantages of HMI in improving industrial productivity.	*2*	*K1*	*CO6*
22.	Compare the industrial applications of RFID and Barcode systems.	*2*	*K2*	*CO6*

PART - C (6 × 11 = 60 Marks)

Answer ALL Questions

23.	(a)	Draw the block diagram of generalized process control and explain each of its functions.	*11*	*K2*	*CO1*
		OR			
	(b)	Explain the concept of a cascade control system and its benefits in managing complex processes.	*11*	*K2*	*CO1*
24.	a)	With neat diagram explain in detail about input modules of the PLC.	*11*	*K2*	*CO2*
		OR			
	b)	Explain about PLC arithmetic and logical functions with suitable examples.	*11*	*K2*	*CO2*
25.	a)	Explain the architecture of a Distributed Control System (DCS). What are its key components, and how do they interact to control industrial processes?	*11*	*K2*	*CO3*
		OR			
	b)	Define the roles of Master Terminal Unit (MTU) and Remote Terminal Unit (RTU) in a SCADA system. How do they communicate with each other and with the control center?	*11*	*K2*	*CO3*
26.	a)	Explain the principles and strategies of automation in production systems. How do these strategies help improve productivity, quality, and cost-efficiency?	*11*	*K2*	*CO4*
		OR			
	b)	Describe the characteristics of induction motor drives. Discuss how adjustable speed drives are used to enhance the performance and efficiency of induction motors.	*11*	*K2*	*CO4*

27.	a)	Provide a detailed comparison between ControlNet and Ethernet for industrial control systems.	*11*	*K2*	*CO5*
		OR			
	b)	Discuss the differences between PROFIBUS-PA and PROFIBUS-DP in industrial networks.	*11*	*K2*	*CO5*
28.	a)	Compare and contrast the working of active and passive RFID tags, including their industrial applications.	*11*	*K2*	*CO6*
		OR			
	b)	Discuss the role of HMI in automation, focusing on the differences between basic and advanced HMI systems.	*11*	*K2*	*CO6*