Reg. No.															

Question Paper Code	13763

M.E. - DEGREE EXAMINATIONS, APRIL / MAY 2025

Second Semester

M.E. - CAD/CAM

24PCDEL205 - MECHATRONICS APPLICATION IN MANUFACTURING

Regulations - 2024

Duration: 3 Hours | Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	List any two advantages of mechatronics systems in manufacturing.	2	K1	CO1
2.	Give two examples of mechatronics applications in automobile industry.	2	K1	CO1
3.	Define resolution of a transducer.	2	K1	CO2
4.	List any two basic operations performed during signal processing.	2	K1	CO2
5.	Infer the role of an Analog-to-Digital Converter (ADC) in interfacing sensors with a microprocessor.	2	K2	CO3
6.	List any two components required to interface a stepper motor with a microprocessor.	2	K1	CO3
7.	Infer how a PLC interacts with sensors and actuators in an automated production system?	2	K2	CO4
8.	Define the mnemonic representation of an ON-delay timer in PLC programming.	2	K1	CO4
9.	List the design considerations when implementing a robotic system in a manufacturing environment.	2	K1	CO5
10.	In a Mechatronics case study on 3D printing, what was the primary controller used to manage multi-axis movements?	2	K2	CO5

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

			Marks	K – Level	CO
11.	a)	Apply the concept of a control system in mechatronics to a real-world application and explain how feedback control improves system performance.	13	K3	CO1
		OR			
	b)	Apply the concept of Design for Manufacturability (DFM) to both traditional design and mechatronics design, and explain how DFM principles influence design decisions in each context	13	K3	CO1
12.	a)	Explain the key performance parameters of sensors and transducers, such as sensitivity, accuracy, precision, and resolution. Explain their significance in sensor performance with example**.**	13	K2	CO2
		OR			
	b)	Explain the various types of temperature sensors used in industrial applications. Explain the working principle, advantages, and limitations of each type with neat sketch.	13	K2	CO2
13.	a)	Describe the architecture of the 8085 microprocessor with a neat block diagram. Explain the function of each block in the architecture.	13	K2	CO3
		OR			
	b)	Explain the working of a microprocessor-based traffic light control system. Draw the block diagram and discuss how sensors, ADC, microprocessor, and actuators work together for traffic signal regulation.	13	K2	CO3

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

14.	a)	Outline and explain the basic structure and working of a PLC with a neat block diagram.	*13*	*K2*	*CO4*
		OR			
	b)	Infer the factors to be considered while selecting a PLC for an industrial application. Provide suitable examples.	*13*	*K2*	*CO4*
15.	a)	Develop a mechatronic design solution for reducing cycle time in an automated assembly process.	*13*	*K3*	*CO5*
		OR			
	b)	Develop a mechatronics-based pick-and-place system for a packaging line. Explain its components and working with a case study.	*13*	*K3*	*CO5*

PART - C (1× 15 = 15 Marks)

16.	a)	(i)	Explain how data handling operations such as move, compare, and arithmetic functions are performed in PLCs.	*8*	*K2*	*CO4*
		(ii)	Outline some important key design considerations when developing a mechatronics system for an automated assembly line in a manufacturing facility.	*7*	*K2*	*CO5*
			OR			
	b)	(i)	Explain the working of timers in PLC programming. Compile different types of timers used.	*8*	*K2*	*CO4*
		(ii)	Explain the design challenges faced when integrating sensors, actuators, and control systems in a mechatronics system.	*7*	*K2*	*CO5*