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**Gandhi Institute of Engineering and Technology University, Odisha, Gunupur
(GIET University)**

M. Tech. (Third Semester - Regular) Examinations, December – 2025

24MCSPE23001 – Mechatronics



Time: 2 hrs

Maximum: 60 Marks

Answer ALL questions

(The figures in the right hand margin indicate marks)

PART – A

(2 x 5 = 10 Marks)

Q.1. Answer **ALL** questions

	CO #	Blooms Level
a. What is the basics of PLC ?	CO1	K2
b. State the primary function of an LVDT (Linear Variable Differential Transformer).	CO2	K2
c. Differentiate between pneumatic and hydraulic actuation systems.	CO3	K2
d. State the principle of Pulse Amplitude Modulation (PAM).	CO4	K2
e. State any two key components required for remote monitoring systems.	CO6	K2

PART – B

(10 x 5 = 50 Marks)

Answer **ALL** the questions

	Marks	CO #	Blooms Level
2. a. Describe the interdisciplinary nature of mechatronics. How do mechanical engineering, electronics, computer science, and control engineering contribute to building mechatronic systems?	5	CO1	K2
b. Explain how electromechanical design improves system performance and functionality.	5	CO1	K2

(OR)

c. Explain the role of mechatronics in the manufacturing and automation industry. Provide examples of smart manufacturing systems influenced by mechatronic integration.	5	CO1	K1
d. Describe how electromechanical design improves system performance and functionality.			
3.a. Discuss the future trends in mechatronics. Explain how AI, IoT and robotics are transforming next-generation mechatronic applications.	5	CO2	K4
b. Describe the working principle of photoelectric transducers.	5	CO2	K2

(OR)

c. Describe how mechatronics contributes to robotics. Explain the integration of sensing, actuation, drive systems, and controllers in modern robots.	5	CO2	K4
d. Discuss the working of optical encoders as motion transducers.	5	CO2	K2
4.a. Describe various analog and digital filtering techniques.	5	CO3	K3

b.	Illustrate the architecture of a typical Data Acquisition System (DAS).	5	CO3	K4
(OR)				
c.	Describe the architecture and features of a microcontroller.	5	CO3	K3
d.	Discuss various applications of microcontrollers in Mechatronics and industrial automation.	5	CO5	K4
5.a.	Discuss the role of modular design in Mechatronic systems. Explain with suitable examples how modularity improves system performance.	5	CO6	K3
b.	Discuss the challenges faced in mechanical–electrical integration and propose engineering solutions.	5	CO6	K4
(OR)				
c.	Discuss the role of microcontrollers and PLCs in achieving seamless system integration in industrial Mechatronics.	5	CO4	K3
d.	Explain the model-based system engineering (MBSE) approach for mechatronic system integration and its benefits.	5	CO4	K4
6.a.	Discuss its role in data acquisition and system control with suitable examples.	5	CO4	K4
b.	How does modularity improve system scalability, reliability, and maintainability?	5	CO6	K4
(OR)				
c.	How does remote monitoring enhance predictive maintenance in industrial systems?	5	CO6	K3
d.	Describe the use of robotics in advanced manufacturing.	5	CO5	K3

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