

GYANMANJARI INNOVATIVE UNIVERSITY

GYANMANJARI INSTITUTE OF TECHNOLOGY

M.Tech.-Mid Semester Examination (MSE)-S2026

Enrollment No.: _____

Subject Code: METAI12509

Date: 16-03-2026

Subject Name: Artificial Intelligence for Robotics

Semester: 02

Time: 10:30 AM To 12:30 PM

Total Marks: 60

Instructions:

1. Question No. 1 is compulsory.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		Marks
Q.1	(a) Explain the history and classification of industrial robots. Describe major structural configurations used in industrial robotics.	10
	(b) Differentiate between Artificial Intelligence and Natural Intelligence. Discuss major AI techniques and their applications in robotics.	10
Q.2	(a) Explain the working principle and design considerations of robotic grippers. Compare mechanical, hydraulic, and pneumatic gripper systems.	10
	OR	
	(a) A two-finger mechanical gripper is used to hold an object of known weight. Perform force analysis to determine required gripping force considering friction coefficient and safety factor. Explain assumptions and method.	10
	(b) Explain different types of sensors used in robotics. Analyze how tactile, proximity, and vision sensors complement each other in robotic perception.	10
	OR	
	(b) Using Denavit–Hartenberg parameters, derive the transformation matrix for a two-link planar manipulator and determine end-effector position.	10
Q.3	(a) Explain robot work cell design principles. Analyze robot cycle time and machine interference in multi-robot systems with suitable example.	10
	(b) Develop a conceptual robotic solution for an automated assembly or inspection task. Specify programming approach, sensors, and robot language features required.	10
	OR	
Q.3	(a) Design a robot program structure for machine loading and unloading using lead-through programming. Include motion interpolation, WAIT, SIGNAL, and DELAY commands.	10
	(b) Evaluate the importance of trajectory generation and safety considerations in robotic manipulators. Justify how improper trajectory planning can affect performance and reliability.	10