

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY-GURUJADA VIZINAGARAM
III B. Tech II Semester Regular/Supplementary Examinations November -2025
INDUSTRIAL ROBOTICS
 (Open Elective-II)

Time: 3 hours

Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**
 All Questions Carry Equal Marks

		UNIT-I	
1.	a)	Define Automation and Robotics. Explain how CAD/CAM systems are integrated with robotics in manufacturing processes.	[7M]
	b)	Compare and contrast the different types of control systems used in robotics with examples.	[7M]
		(OR)	
2.	a)	Discuss the requirements and challenges associated with designing and selecting robot end effectors.	[10M]
	b)	How are end effectors determined for specific applications?	[4M]
		UNIT-II	
3.	a)	Explain the working principles of pneumatic, hydraulic, and electric actuators used in industrial robots.	[7M]
	b)	Describe stepper motors and their role in robotic actuation. Compare them with conventional electric motors.	[7M]
		(OR)	
4.	a)	What are position sensors in robotics? Explain the working and applications of potentiometers, resolvers, and encoders.	[7M]
	b)	Describe the role of velocity sensors in robotic systems. How do they contribute to effective robot control?	[7M]
		UNIT-III	
5.	a)	A point $P(7,3,2)^T$ is attached to a frame (n,o,a) and is subjected to the transformations described next. Find the coordinates of the point relative to the reference frame at the conclusion of transformations. i) Rotation of 90° about the Z-axis, ii) Followed by a rotation of 90° about the Y-axis, iii) Followed by a translation of $[4, -3, 7]$.	[14 M]
		(OR)	
6.	a)	Explain the steps involved in forward kinematics of a robotic manipulator.	[7M]
	b)	Differentiate between joint coordinates and world coordinates. How are they related through transformation?	[7M]
		UNIT-IV	
7.	a)	What is trajectory planning in robotics? Explain the steps involved in trajectory generation with respect to obstacle avoidance.	[7M]
	b)	List the types of motion in robotics. Explain skew motion, joint-integrated motion, with diagrams.	[7M]
		(OR)	
8.	a)	Explain the various features robot programming languages.	[7 M]
	b)	Explain various types of robot programming methods.	[7 M]
		UNIT-V	
9.	a)	What is machine vision? Explain its importance and role in robotic systems with suitable examples.	[7M]
	b)	What is the digitizing function in machine vision? Explain how images are captured and converted for processing.	
		(OR)	
10.	a)	Explain the concept of training in machine vision systems.	[7M]
	b)	How is machine vision applied in industrial robotics? Discuss with examples such as inspection, sorting, and quality control.	[7M]