Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–V EXAMINATION – WINTER 2025

Subject Code:3151110 Date:17-11-2025

Subject Name:Robotics and Automation

Time:10:30 AM TO 01:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			Marks
Q.1	**(a)**	Write brief history of Robotics.	**03**
	(b)	Explain Asimov's Law of Robotics.	**04**
	(c)	Discuss about various basic components of a robotic system? Explain the functions of each of the components in detail.	**07**
Q.2	**(a)**	Write the application of microprocessors and microcontrollers used in robotics and automation.	**03**
	(b)	What is meant by gripper? Explain mechanical Grippers in brief.	**04**
	(c)	Write Arduino program for Stepper Motor interfacing to rotate the motor in 4-degree steps (0,90,180 and 270 degree) with the interfacing diagram.	**07**
		OR	
	(c)	Write an Arduino program for to detect object using IR Sensor and explain with interfacing diagram.	**07**
Q.3	**(a)**	Explain any two type of temperature Sensors.	**03**
	(b)	Explain the mechanical actuators with its characteristics.	**04**
	(c)	Draw the construction of LVDT used in robotics for Displacement measurement and Explain the Working of LVDT.	**07**
		OR	
Q.3	**(a)**	Discuss the Optical sensor.	**03**
	(b)	Compare pneumatic & electrical actuators.	**04**
	(c)	Discuss the different Robot Languages	**07**
Q.4	**(a)**	Explain on-line robot programming in short?	**03**
	(b)	Write Short note on Robot operating System(ROS).	**04**
	(c)	Write the various inputs to an inverse kinematics algorithm. Discuss functioning of an inverse kinematic algorithm.	**07**
		OR	
Q.4	**(a)**	List different operating systems available for Raspberry Pi.	**03**
	(b)	Explain path planning algorithm.	**04**
	(c)	Describe how robots are classified based on coordinate system. Draw suitable diagrams to illustrate the same.	**07**
Q.5	**(a)**	What is pallet? Differentiate between palletizing and depalletizing.	**03**
	(b)	Discuss any two application for industrial application of robot	**04**
	(c)	What is meant by robot cell? Explain the different robotic cell layouts.	**07**
		OR	
Q.5	**(a)**	Explain working of robotic arm in brief by keeping the consideration of degree of freedom point of view.	**03**
	(b)	Explain work envelope with necessary example	**04**
	(c)	What are different selection criteria for robots? Explain in detail.	**07**