Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–VII EXAMINATION – WINTER 2025

Subject Code:3171717 Date:13-11-2025

Subject Name:Robotic Engineering

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)**	Explain degree of freedom with suitable example.	**03**
	(b)	Explain the origin and history of Robotics in detail	**04**
	(c)	Discuss the performance characteristics of actuators. Compare electrical, pneumatic & hydraulic actuators for their characteristics.	**07**
Q.2	**(a)**	What is machine interference?	**03**
	(b)	Explain how to decide the HP rating of a motor?	**04**
	(c)	Discuss in detail factors considered while selection and design of grippers.	**07**
		OR	
	(c)	List various types of grippers. Explain any one in detail with its advantages.	**07**
Q.3	**(a)**	What is the workspace? Explain in detail.	**03**
	(b)	How robots are classified based on coordinate system? Discuss any one of them with the help of neat sketches.	**04**
	(c)	Describe the rotation matrix in detail.	**07**
		OR	
Q.3	**(a)**	Explain various Torque sensors.	**03**
	(b)	What is full form of SCARA? Explain SCARA.	**04**
	(c)	What is robot programming? Explain in detail various types of robot Programming	**07**
Q.4	**(a)**	Explain a robot cell and its use.	**03**
	(b)	List the type of robot joints along with notation, symbol and description.	**04**
	(c)	What are the points to be considered for selecting a robot for a particular application? Explain in detail.	**07**
		OR	
Q.4	**(a)**	State Asimov's Law of Robotics	**03**
	(b)	What are the uses of sensor in robotics? What are the types of sensors used in robotics?	**04**
	(c)	List out various application in manufacturing where robots are used and explain any one application how robots are applied in detail.	**07**
Q.5	**(a)**	Differentiate between path planning and trajectory planning	**03**
	(b)	Discuss in detail Hill climbing technique.	**04**
	(c)	Explain in detail Jacobian Transpose method for solving inverse kinematic problem.	**07**

OR

Q.5	**(a)**	Define the terms 'Robot' and 'Robotics'. Discuss the role of robots in engineering.	**03**
	(b)	Explain the working of DC servo motors used in robotics.	**04**
	(c)	What is the role of D-H notation? Explain their importance in solving Forward Kinematics.	**07**

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