Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII EXAMINATION – SUMMER 2020

Subject Code: 2181706 Date: 28.10.2020

Subject Name: Robotic Engineering

Time:02.30 to 05.00 pm Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			MARKS
Q.1	**(a)**	Explain degree of freedom with suitable example	**03**
	(b)	Draw various parts of a robot.	**04**
	(c)	How robots are classified based on coordinate system? Discuss any one of them with the help of neat sketches.	**07**
Q.2	**(a)**	Explain the working principal of Time of Flight range sensor.	**03**
	(b)	Explain Vacuum gripper.	**04**
	(c)	Discuss the types of drive systems used in robots.	**07**
		OR	
	(c)	Explain the construction of LVDT used in robotics for displacement measurement	**07**
Q.3	**(a)**	Write a short note on proximity sensor	**03**
	(b)	Explain in detail hydraulic actuator	**04**
	(c)	List various types of grippers. Explain magnetic grippers & state its advantages.	**07**
		OR	
Q.3	**(a)**	Explain work envelope with necessary example and figure.	**03**
	(b)	Write a short note on inverse kinematics.	**04**
	(c)	What are the points to be considered for selecting a robot for a particular application? Explain in detail.	**07**
Q.4	**(a)**	List various industrial applications where robots are preferred.	**03**
	(b)	Explain Any two robotic cell layouts.	**04**
	(c)	What is forward kinematics? Explain D-H parameter.	**07**
		OR	
Q.4	**(a)**	Differentiate between path planning and trajectory planning	**03**
	(b)	Explain the working of DC servo motors used in robotics	**04**
	(c)	Explain how to decide the gearing ratio of a motor?	**07**
Q.5	**(a)**	What is machine interference?	**03**
	(b)	Explain the various methods of Robot Programming.	**04**
	(c)	List out various sensors which can be interfaced with robots. Explain any one sensor interface with robot in detail	**07**
		OR	
Q.5	**(a)**	Explain various Torque sensors.	**03**
	(b)	The coordinates of a point Pabc=$(4,3,2)^T$ in the body coordinates frame Oabc are rotated through 45° about OZ axis. Determine the coordinates of the vector Pxyz with respect to base reference coordinate frame.	**04**
	(c)	List out various application in manufacturing where robots are used and explain any one application how robots are applied in detail.	**07**

****