Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII(NEW) EXAMINATION – SUMMER 2019

Subject Code:2181919 **Date:13/05/2019**

Subject Name:Robotics

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.**

Q.1	**(a)**	Brief today's commercially available basic configuration of robot in Indian Market.	**03**
	(b)	Discuss the merits and demerits of using robots in today's industry.	**04**
	(c)	Define Robot anatomy. Explain Spherical configuration of robot and its work envelope.	**07**
Q.2	**(a)**	Briefly state PID Control System for Robotics.	**03**
	(b)	Describe various terminology of trajectory planning in brief.	**04**
	(c)	Discuss in detail GANTRY type robots for industrial used.	**07**
		OR	
	(c)	Derive transformation matrix of a 3-DOF articulated arm with three revolute joints.	**07**
Q.3	**(a)**	Explain programming methods used in robotics system.	**03**
	(b)	Explain with neat sketch Roll-Pitch-Yaw angles for Robotics.	**04**
	(c)	Discuss the gripper design consideration in robotics.	**07**
		OR	
Q.3	**(a)**	Brief out type of motion control systems for Robotics.	**03**
	(b)	Discuss briefly linear and angular velocity of rigid body.	**04**
	(c)	Explain following terms for Robotic sensors: (1) Limit switches (2) potentiometers	**07**
Q.4	**(a)**	Discuss briefly mapping velocity vectors.	**03**
	(b)	Discuss the 'External sensors' used in Robotics.	**04**
	(c)	Describe principle function of robot vision system.	**07**
		OR	
Q.4	**(a)**	Describe in brief about artificial intelligence in terms of Robotics.	**03**
	(b)	Discuss briefly comparison of Lagrange – Euler and Newton – Euler formulations.	**04**
	(c)	Describe manipulator workspace for Robots.	**07**
Q.5	**(a)**	Explain with neat sketch 'Inverse kinematics.	**03**
	(b)	Discuss capacitive and laser sensing system in brief.	**04**
	(c)	Using D-H representation derive the matrix for Cartesian configuration of robot.	**07**
		OR	
Q.5	**(a)**	What is feed forward and feedback control loops.	**03**
	(b)	Discuss the Manipulator Jacobian Method.	**04**
	(c)	Give applications of robotics. What will be its future applications?	**07**