

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: **07**
(1) Limit switches (2) potentiometers
- 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**