

GUJARAT TECHNOLOGICAL UNIVERSITY**BE – SEMESTER- VII EXAMINATION-SUMMER 2023****Subject Code: 3171717****Date: 21/06/2023****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) State three laws of robotics stated by Isaac Asimov | 03 |
| | (b) Explain Degree of Freedom related to Robotics Engineering | 04 |
| | (c) Discuss the advantages and disadvantages of using robots in industry. | 07 |
| Q.2 | (a) Define Pitch, Yaw and Roll. | 03 |
| | (b) Draw and explain any one type of Gripper Mechanism | 04 |
| | (c) Explain the advantages and disadvantages of Robotics use in Industries. | 07 |
| OR | | |
| | (c) Explain in detail different types of robot programming with advantages and examples of each | 07 |
| Q.3 | (a) Enlist different drive technologies used in Robotics | 03 |
| | (b) Explain reach and stroke of robotic manipulator | 04 |
| | (c) Describe the types of end effectors & gripper mechanisms with simple sketches | 07 |
| OR | | |
| Q.3 | (a) What points are considered while selecting HP rating of a motor? | 03 |
| | (b) State any 4 sensors which are generally used in robots | 04 |
| | (c) Explain in detail the method used for solving inverse kinematic problem. | 07 |
| Q.4 | (a) Explain the use of optical sensors in robots | 03 |
| | (b) List in detail specifications of an industrial robot. | 04 |
| | (c) Explain the working of DC servo motors used in robotics | 07 |
| OR | | |
| Q.4 | (a) Explain in detail hydraulic actuator. | 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.5 | (a) What is meant by Jacobian? | 03 |
| | (b) Explain the use of tactile sensors in robots. | 04 |
| | (c) Explain working on external and internal grippers with suitable illustration. | 07 |
| OR | | |
| Q.5 | (a) Explain torque sensor | 03 |
| | (b) Explain types of wrists of robots in robotics | 04 |
| | (c) Explain in detail selection and design a robot for an assembly Solar panel where shouldering of panel is done in Solar panel making industry | 07 |
