

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VIII (NEW) EXAMINATION – WINTER 2018

Subject Code: 2181706

Date: 15/11/2018

Subject Name: Robotic Engineering

Time: 02:30 PM 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.

- Q.1** (a) 1) Define robot. 03
 2) Define base and tool coordinate systems
 3) Name the important specifications of an industrial robot.
 (b) Explain the various parts of a robot with neat sketch. 04
 (c) Sketch a robot wrist and explain its joint movements. 07

- Q.2** (a) 1) What is meant by pitch, yaw and roll? 03
 2) What is work volume?
 3) What is meant by a work envelope?
 (b) Discuss any one of the types of gripper mechanism. 04
 (c) Briefly explain in the following terms: (i) Payload (ii) compliance (iii) Precision 07
 (iv) Accuracy.

OR

- (c) Describe the types of end effectors & gripper mechanisms with simple sketches. 07
Q.3 (a) Explain a robot cell and its use. 03
 (b) What are the uses of sensor in robotics? What are the types of sensors used in robotics? 04
 (c) Discuss the types of drive systems used in robots. 07

OR

- Q.3** (a) 1) What is machine interference? 03
 2) What are the four basic robot configurations available commercially?
 3) Classify the robot as per the type of control and mobility
 (b) Explain how to decide the HP rating of a motor? 04
 (c) Explain the working of DC servo motors used in robotics 07
Q.4 (a) Write a short note on inverse kinematics. 03
 (b) What is meant by Jacobian? 04
 (c) Explain working on external and internal grippers with suitable illustration. 07

OR

- Q.4** (a) Sketch and explain 3 DOF associated with wrist. 03
 (b) Sketch and explain various types of joints in manipulator mechanisms. 04
 (c) Discuss the performance characteristics of actuators. Compare electrical, pneumatic & hydraulic actuators for their characteristics 07
Q.5 (a) What are the limitations of on-line robot programming? 03
 (b) Write down the basic types of robot programming. 04
 (c) Discuss the advantages and disadvantages of using robots in industry. 07

OR

- Q.5** (a) State Asimov's Law of Robotics 03
 (b) Differentiate between path planning and trajectory planning 04
 (c) Determine the translated vector for the given vector $v=25i+10j+20k$, perform a translation by a distance of 8 units in "X" direction, 5 units in "Y" direction and 0 units in "Z" direction. 07
