A   Reg. No. : [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

Question Paper Code: 59509

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2019

Elective

Electronics and Instrumentation Engineering

15UEI909 - ROBOTICS AND AUTOMATION

(Regulation 2015)

Duration: Three hours   Maximum: 100 Marks

PART A - (10 x 1 = 10 Marks)

1. A robot arm that moves along three independent axes, each of which   CO1- R
   is straight and perpendicular to the other two, employs _____

   (a) Revolute geometry   (b) Spherical coordinate geometry

   (c) Cartesian coordinate geometry   (d) Cylindrical coordinate geometry

2. Spherical coordinates can uniquely define the position of a point in   CO1- R
   up to _____

   (a) One dimension   (b) Two dimensions   (c) Three dimensions   (d) Four dimensions

3. Which of the following terms refers to the use of compressed gasses   CO2 -R
   to drive (power) the robot device?

   (a) Pneumatic   (b) Hydraulic   (c) Piezo electric   (d) Photo sensitive

4. Frame grabber is used to   CO2- R

   (a) archeive the image   (b) segment the image

   (c) process the image   (d) capture and store the image

5. Magnetic gripper is used only for _____ materials   CO3- R

   (a) Stainless steel   (b) Non-ferrous   (c) Ferrous   (d) Plastic

6. End effectors can be classified into two categories which are _____   CO3 -R

   (a) Elbows and wrists   (b) Grippers and end of arm tooling

   (c) Grippers and wrists   (d) End of arm tooling and elbows

7. Physical structure of robot which moves around, is called _____   CO4- R

   (a) Link   (b) Manipulator   (c) Joints   (d) End- effector

8. Identify which of the following statements is *not* true in the case of   CO4- R
   inverse kinematics problem, it is much more complex because
   _____

   (a) The equation to be solved are in general nonlinear in joint variables

   (b) Multiple solutions may exist

   (c) There might be no admissible solutions

   (d) Unique solution may exist

9. _____ type of robot control used in spot-welding applications.   CO5- R

   (a) Point to point   (b) Sequential

   (c) End point   (d) Continuous path

10. The robotic welding have demonstrated to make it a technology the   CO5- R
    helps Many manufactures increase .

    (a) Precision   (b) Repeatability   (c) output   (d) all the above

PART – B (5 x 2= 10Marks)

11. Recall the three laws of Robotics stated by Asimov.   CO1- R

12. Indicate the advantages of the electric actuator.   CO2- R

13. Classify the grippers used in robotic manipulator.   CO3- R

14. Identify the features / capabilities of second generation robot languages.   CO4- R

15. List the considerations for the implementation of robot to perform a task in   CO5- R
    industry.

PART – C (5 x 16= 80Marks)

16. (a) Demonstrate the following four robot configurations: CO1- App   (16)
         (i) polar configuration,
         (ii) cylindrical configuration,
         (iii) Cartesian co-ordinate configuration and
         (iv) Jointed arm configuration.
                                        Or
    (b) Differentiate between the various generations of robots.   CO1 -App   (16)

2

59509

17. (a) Execute how the proximity and range sensors can be built using   CO2 -App   (16)
         (i) Optical devices
         (ii) Acoustical devices

<div align="center">Or</div>

   (b) How do u sense the positional accuracy of robot? Discuss and   CO2- Ana   (16)
       explain the suitable   type of sensor used to measure the position.

18. (a) Analyze the working principle of magnetic and vacuum cup   CO3 -Ana   (16)
       grippers.

<div align="center">Or</div>

   (b) Derive the forward kinematics equation using the homogenous   CO3 -Ana   (16)
       transformation for the three link planar (3R) manipulator

19. (a) Explain the different types of programming language used in   CO4- U   (16)
       robotics.

<div align="center">Or</div>

   (b) Determine the manipulator Jacobian for the 3-DOF articulated   CO4 -U   (16)
       arm.

20. (a) Explain the any two applications of robots in manufacturing.   CO5- U   (16)

<div align="center">Or</div>

   (b) Explain the any two robot work cell configurations in robot   CO5- U   (16)
       applications.

59509

59509