C

Reg. No. :

Question Paper Code: 99402

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2023

Elective

Electronics and Communication Engineering

19UEC902- PRINCPILES OF ROBOTICS

(Regulation 2019)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. If a robot has 3 legs, then the number of possible events is   CO1-U

    (a) 24   (b) 720   (c) 120   (d) 240

2. The unit of linear acceleration is   CO2- U

    (a) kg-m   (b) m/s   (c) m/s2d   (d) rad/s22

3. The inertia matrix of a rigid body or a link   CO3- U

    (a) is always positive definite

    (b)is always symmetric

    (c)is an orthogonal matrix

    (d) represents the mass distribution in 3D space

4. Gross motion planning problem is known a?   CO4- U

    (a) Fine motion planning problem.   (b) Free space motion planning problem.

    (c) Compliant motion planning problem   (d) none of the above.

5. What is necessity for a lot of sensible mobile robotics funaction   CO5- U

    (a) Map discovery   (b) Geomatric Maps   (c) Perceptul maps   (d) Sensorial maps

PART – B (5 x 3= 15 Marks)

6. What is meant by robot anatomy?   CO1 U

7. What is meant by unit Quaternion   CO2 U

8. Define Linear velocity.   CO5 U

9.   Define path.   CO3 U

10. Mention the need of continuous Trajectory Recording   CO3 U

PART – C (5 x 16= 80 Marks)

11. (a) Explain the different types of robots with neat diagrams   CO1-U   (16)

                                             Or

     (b) Discuss about micro machines in robotics   CO1-U   (16)

12. (a) Derive the   Denavit- Hartenberg   representation of forward CO2- App   (16)
          kinematic equations of robots

                                             Or

     (b) Derive the direct kinematics equation of SCARA robot using D H CO2- App   (16)
          transformation matrix.

13. (a) Express the jacobian matrix for motion of end-effecter generated   CO1-U   (16)
          by a rotary joint and prismatic joint.

                                             Or

     (b) Explain the following: CO1-U   (16)
             (i) Wrist and arm singularity
             (ii) Linear and Angular velocities

14. (a) Implement interpolation function with the help of p-Degree CO3- Ana   (16)
          polynomial and discuss its uses.

                                             Or

     (b) Express the time history of position velocity and acceleration for CO3- Ana   (16)
          blended trajectory for point-to-point motion with via points.

15. (a) Discuss in detail Methods of Robot programming with suitable CO1-U   (16)
          example.

                                             Or

     (b)   Explain in detail Robot program as a path in space with suitable CO1-U   (16)
          example

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