PA-10013

[6008] - 272

S.E. (Robotics and Automation) (Insem)
COMPUTER GRAPHICS FOR ROBOTICS
(2019 Pattern) (Semester - II) (211512)
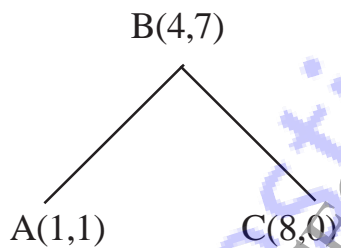
Time : 1 Hour]   *[Max. Marks : 30*

Instructions to the candidates:

    1)   *Solve Q1 or Q2, Q3 or Q4.*

    2)   *Figure to the right indicate full marks.*

    3)   *Assume suitable data, if necessary.*

    4)   *Neat diagrams must be drawn wherever necessary.*

    5)   *Use of calculator is allowed.*

Q1) a)   Determine mathematically the angle formed by two intersecting lines AB and BC as shown in Fig. below.   **[8]**

        B(4,7)

      A(1,1)   C(8,0)

  b)   Write down the equation of plane containing three points A(1, 3, –2), B(4, –1, 3), and C(1, 2, 1).   **[7]**

OR

Q2) a)   Is the line through points (3, 2, 5) and (–2, 5, 1) parallel, orthogonal or neither to the another line having vector $\langle 4-3t, -2+3t, 8+6t \rangle$?   **[8]**

  b)   Explain the applications of vector in 2D and 3D space in computer graphics.   **[7]**

Q3) a)   (a) Perform 55° rotation of a rectangle *A* (1, 3), *B* (5, 2), *C* (4, –1), and *D* (–2, 5) about the point A.   **[8]**

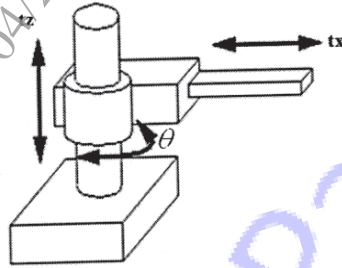 b)   Obtain the 3D transformation matrix for forward kinematic analysis of a spherical robot.   **[7]**

OR

P.T.O.

Q4) a) (a) For a cylindrical robot shown in Fig., following transformations are applied: **[8]**

  • Swing $(\theta) = 30°$

  • Stroke $(t_z) = 2$ Units

  • Reach $(t_x) = 1.5$ Units.

If the end effector is originally at (5, 0, 3), determine its transformed position.

b) Write note on: 3D transformation matrix for reflection through arbitrary axis. **[7]**

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