



K. K. Wagh Institute of Engineering Education & Research, Nashik
(An Autonomous Institute From A.Y. 2022-23)

	InSem Examination-IWinter 2023		
	Exam Seat No.:		
	Academic Year:2023-2024	Semester:III	
	Name of Programme:B.Tech	Pattern:2022	
	Name of Course:Computer Graphics for Robotics	Course Code:ROB222004	
	Max. Marks:30	Duration:1	

	<p>Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.</p> <ol style="list-style-type: none">1. This question paper contains 02 page(s).2. Answer to each new question is to be started on a new page.3. Assume suitable data wherever required, but justify it.4. Draw the neat labelled diagrams, wherever necessary.5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question	
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Question No. 1 Attempt following Question

- a) Show that line through points (3, 2, 5) and (-2, 5, 1) is orthogonal to line through points (4, -2, 8) and (7, -5, 2) (4) CO1

OR

- b) Does the line given by Equation $x = 9 - 5t, y = -5, z = 3 - 6t$ intersect xy plane? If yes, which is the point of intersection? (4) CO1
- c) Determine whether the lines AB and CD intersect each other. If they intersect, obtain the point of intersection. The coordinates of the points are A (1, 3, 5), B (2, 2, -1), C (3, 3, 2), D (-1, -1, -10) (5) CO1

OR

- d) Determine mathematically area of a triangular plate having co-ordinates of vertices as A (2, 6), B (4, 11) and C (5, 8). (5) CO1
- e) Write a note on vector representation of intersection of lines in 3D space. (6) CO1

OR

- f) Write short note on: Role of computer graphics in robotics (6) CO1

Question No. 2 Attempt following Question

- a) Perform 40 degree rotation of a rectangle A(2, 3), B(6, 3), C(6, 8), D(2, 8) about the point B. (4) CO2

OR

- b) Perform 30 Degree rotation of a triangle A(1, 4), B(3, -2), C(-5, 7) about the point A. (4) CO2

- c) Reflect a rectangle a triangle A(1, 4), B(3, -2), C(-5, 7) about line represented by an equation $y=3x+2$ (5) CO2

OR

- d) Perform a scaling transformation on a square object having co-ordinates (0, 3), (3, 3), (3, 0), and (0, 0) with scaling parameters as 2 towards X axis and 3 towards Y (5) CO2

- e) For a spherical robot following transformations are applied:

Rotation about Z axis = 30

Rotation about Y axis = -50 (6) CO2

Reach (t_x) = 3 Units.

If the end effector is originally at (4, 0, 6), determine its transformed position.

OR

- f) Obtain the 3D transformation matrix for forward kinematic analysis of a cylindrical robot (6) CO2