University Institute of Engineering

Department of Electronics & Communication Engineering

Experiment No. :- 1.3

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Branch: Electronics and Communication
Section/Group: A
Semester: 7th
Date of Performance: 25/8/23
Subject Name: Industrial Automation & Robotics
Subject Code: 20ECA-446

1. Aim of the practical: To trace the trajectory of manipulator using MATLAB & Simulink. **2.**

Tool Used: MATLAB and Simulink

3. Theory:

Polynomial Trajectory :- This MATLAB-Simulink element is utilized to track the path a robot follows between two points. To establish the path, a matrix of size [NxP] is employed, containing P intermediate points. The source for waypoints is set as external, enabling us to input these parameters as block inputs.

Trapazoidal Trajectory :- This functionality is additionally employed for tracking trajectories. To create paths that encompass the P waypoints, specification of an [NxP] waypoint matrix is essential, with N denoting axis count.

5. Block Diagrams and Simulation Output:

Formation of the rigid body:-

Block diagram for the robot:-

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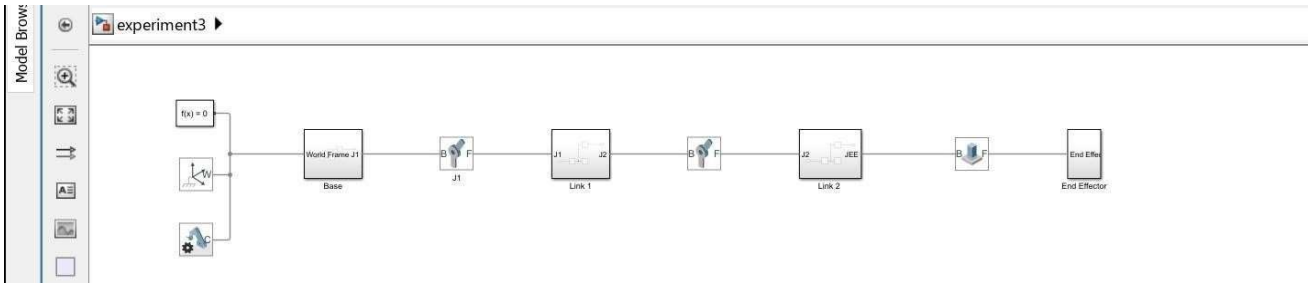
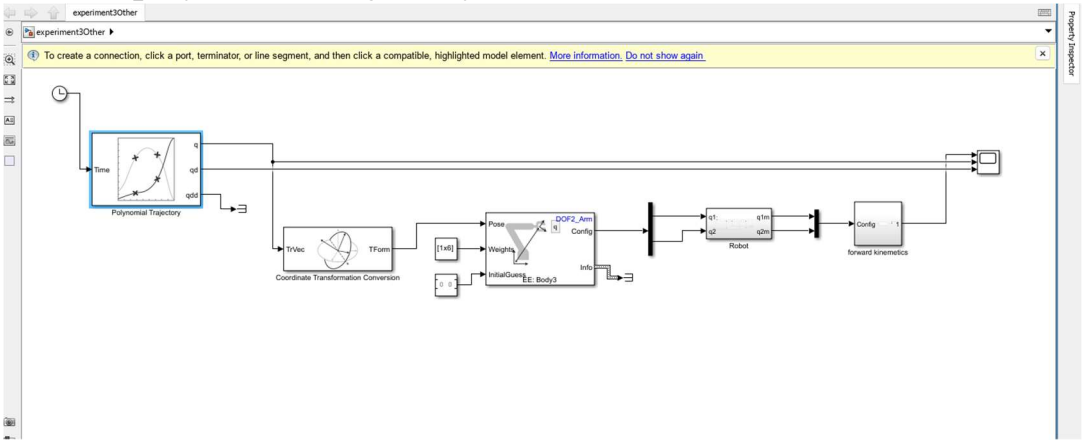
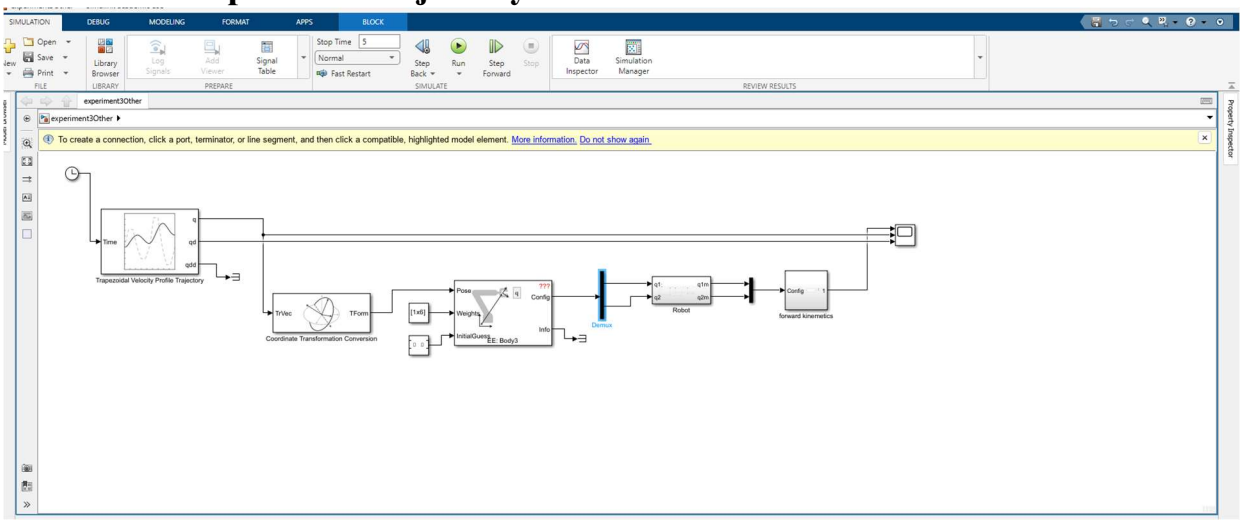


Block diagram for the whole system:-

- **For polynomial trajectory:-**



- **For trapezoidal trajectory:-**



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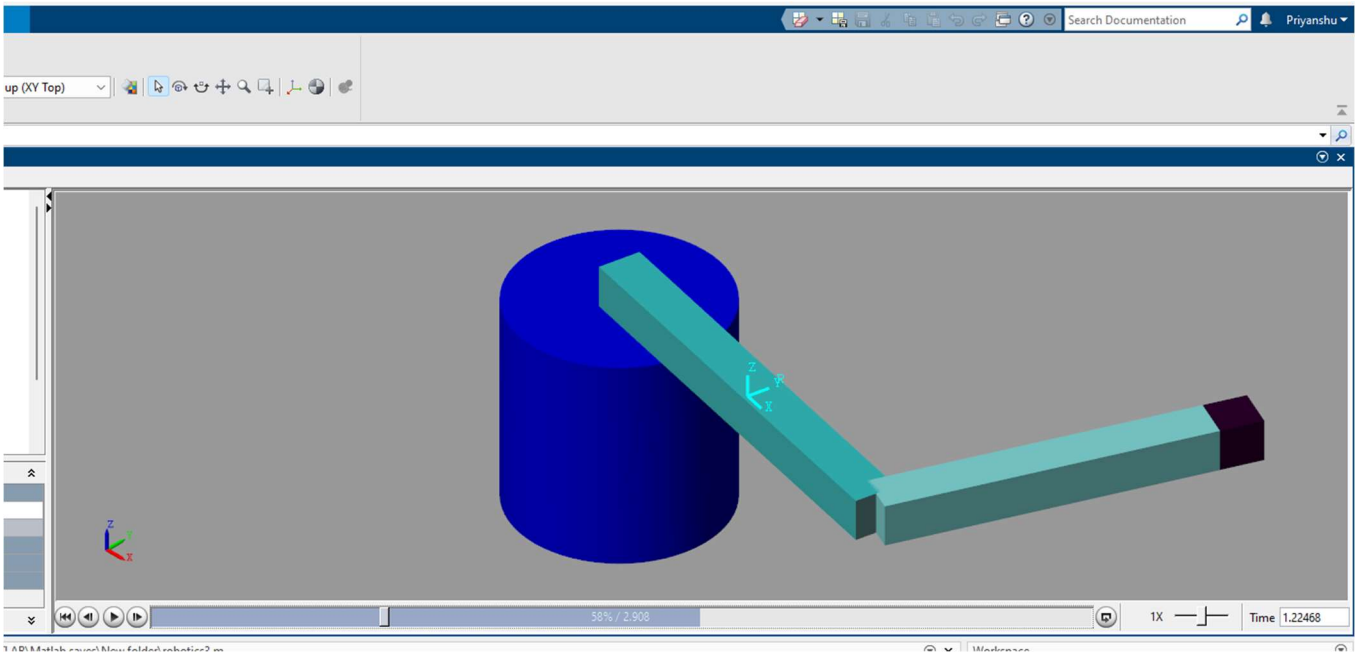
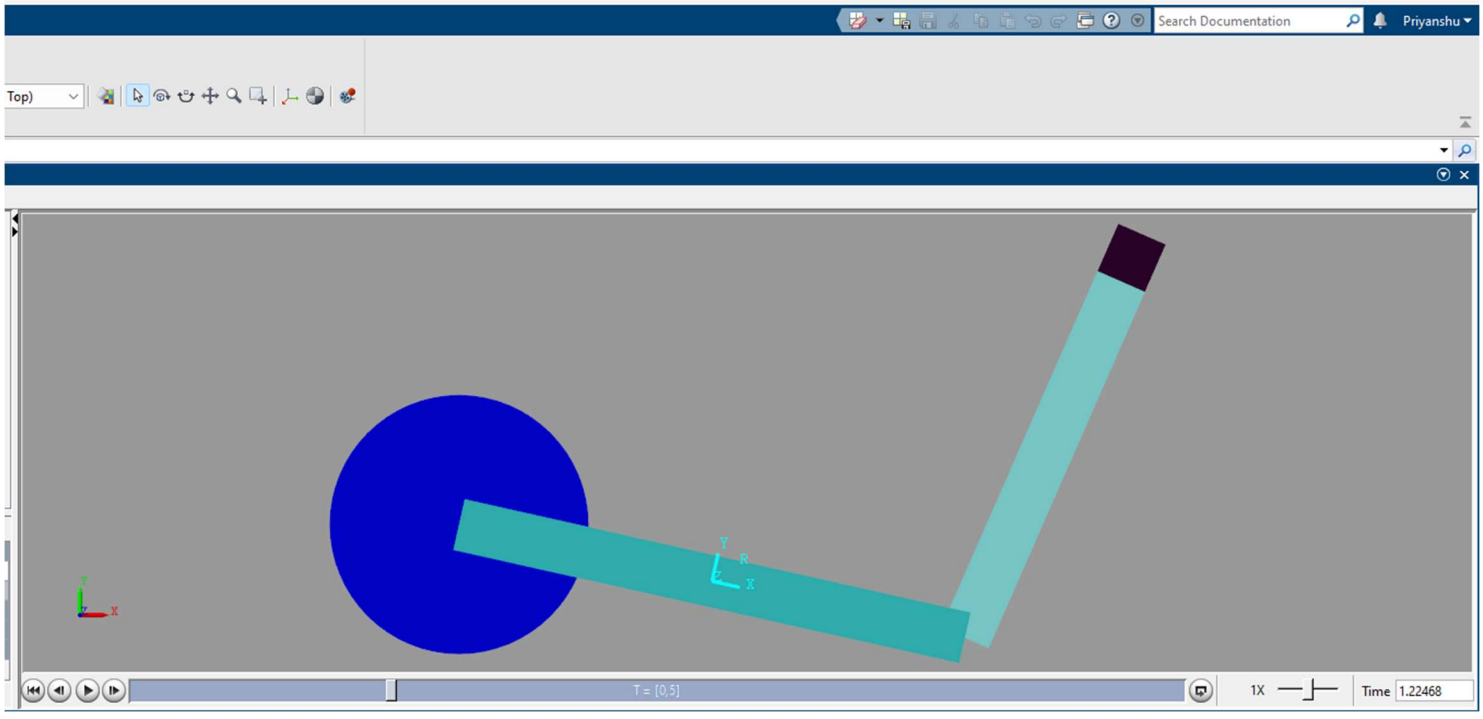
Simulation on mechanics explorer:-

- **For polynomial trajectory:-**





- **For trapezoidal trajectory:-**

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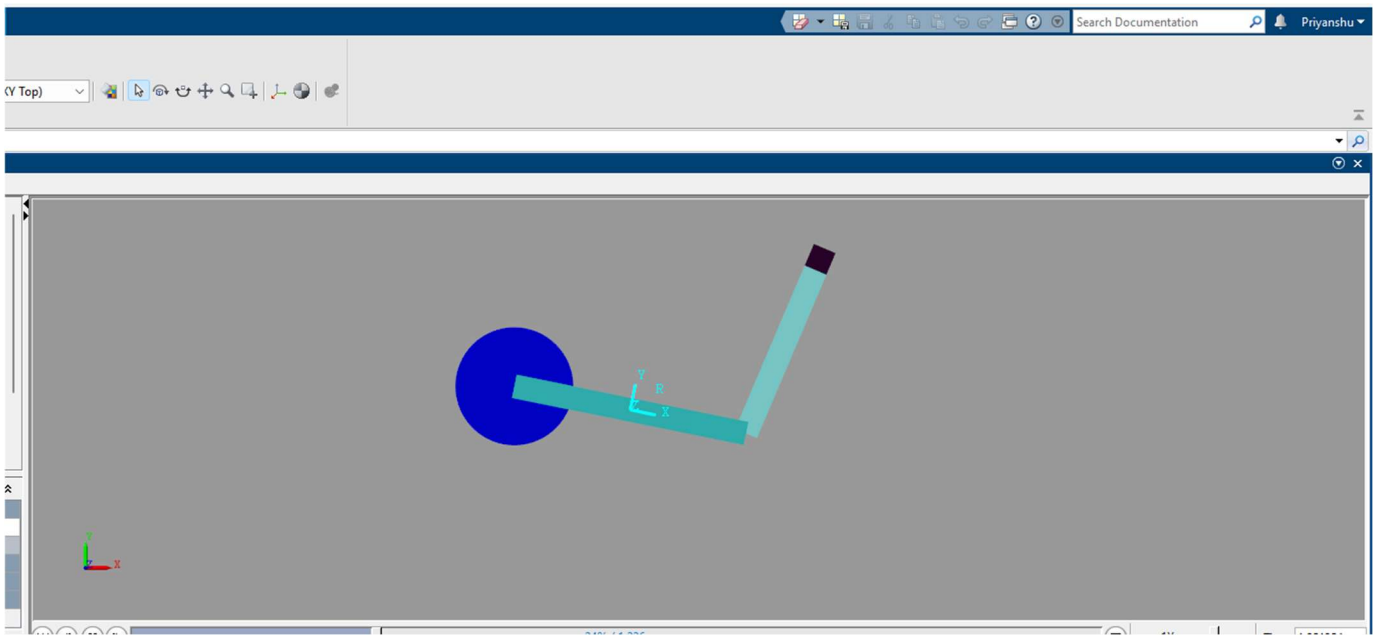

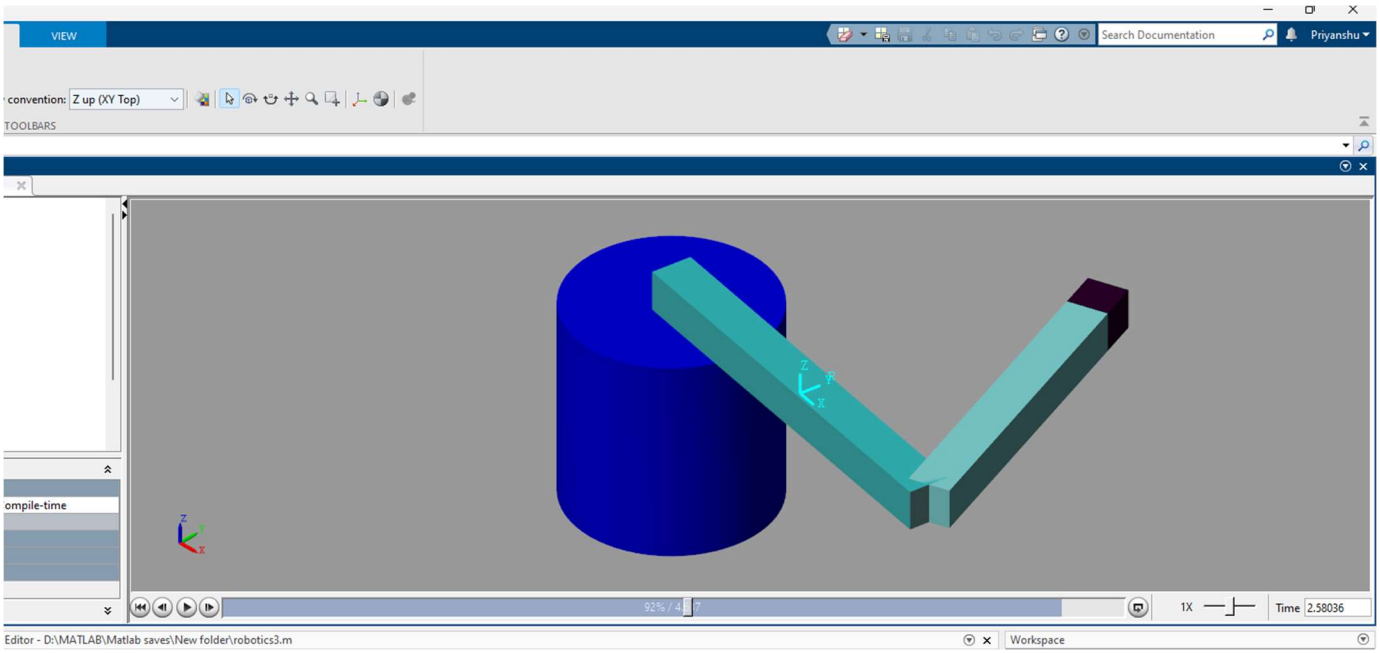

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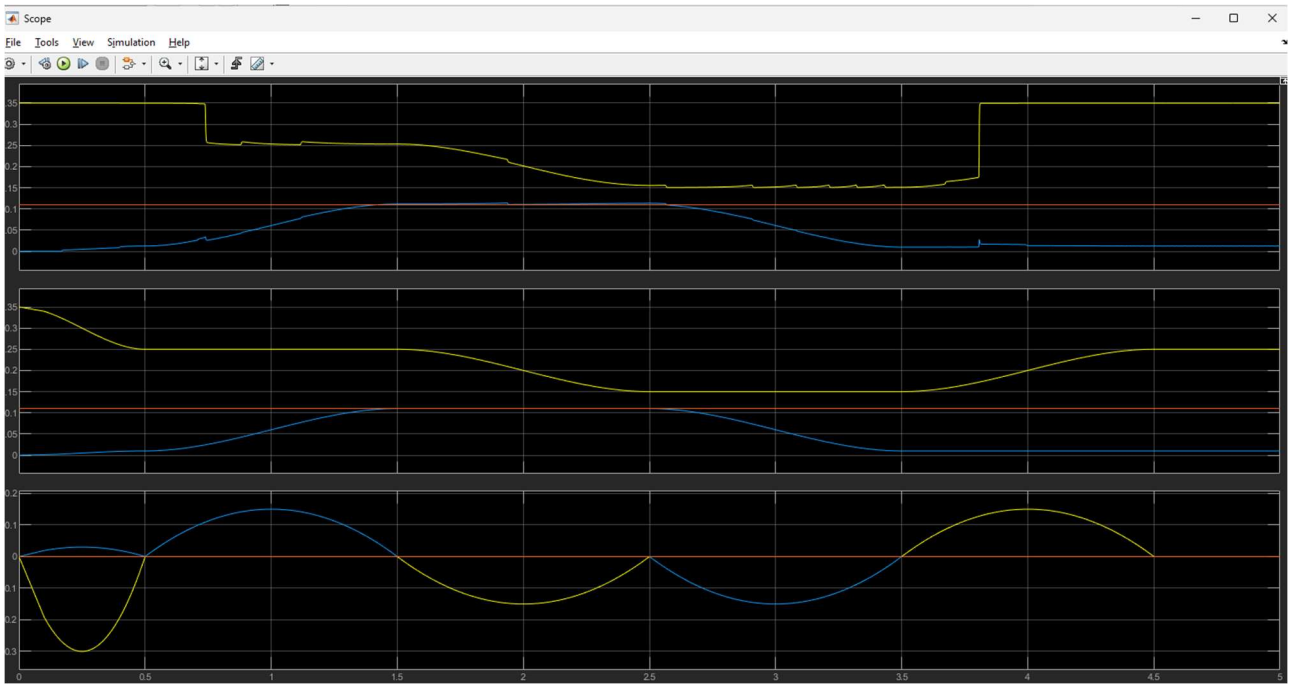
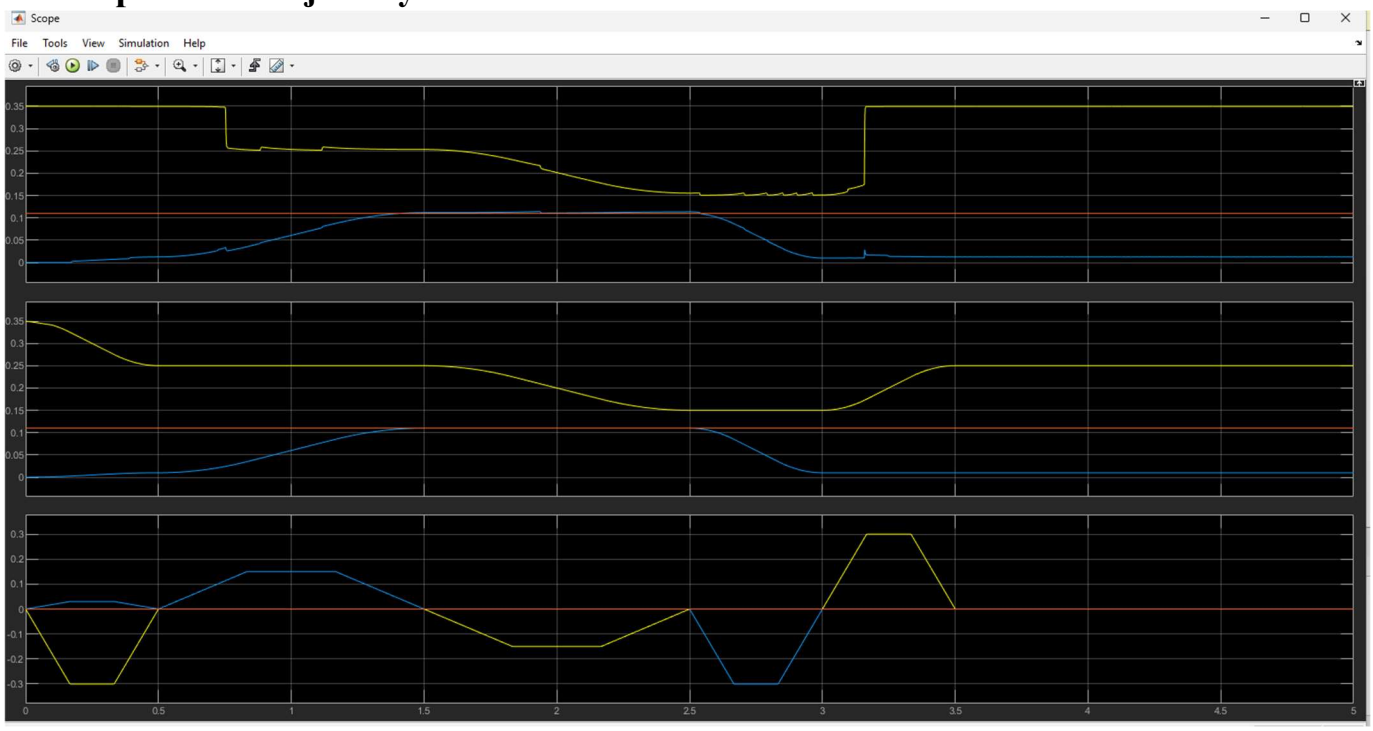
Wave output on scope: For

polynomial trajectory:-



- **For trapezoidal trajectory:-**



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Results and Discussion:-

When examining the scope of polynomial trajectory, it becomes clear that during its movement along either the x or y axis (excluding the z axis which remains constant

In the case of trapezoidal trajectory, a scope analysis reveals that while traversing along either the x or y axis (excluding the z axis which remains steady), the arm's velocity experiences distinct phases.

Learning outcomes (What I have learnt):

- Acquired knowledge regarding polynomial and trapezoidal trajectories.
- Understood the significance of ensuring matrix size alignment in both scenarios.
- Learned the process of imparting varied acceleration to a robotic arm as it moves through distinct path segments.

Evaluation Grid:

Performance (12 Marks)	Worksheet (10 Marks)	Viva (8 Marks)	Total
		Teacher Sign	