



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

InSem Examination-II Summer 2025	
Exam Seat No.:	
Academic Year: 2024-2025	Semester: IV
Class: SY	Program: B.Tech
Branch Code: ROB	Pattern: 2023
Name of Course: Robot Operating Systems	Course Code: 2312211
Max. Marks: 30	Duration: 1.15 Hrs.

**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.

1. This question paper contains 01 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 column indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

**Marks CO**

**Question No. 1**

- 1 a) Describe the ROS ecosystem in detail. What are its key components, and how do they interact to enable robot development and deployment? (7) CO1, CO2

**Question No. 2**

- 2 a) What is Coordinate Transformation in ROS? Explain its importance in robot navigation and manipulation with an example. (8) CO1, CO2

**OR**

- 2 b) Explain the concept of a Meta-Operating System in the context of ROS. How does it differ from traditional operating systems? Provide suitable examples. (8) CO1, CO2

**Question No. 3**

- 3 a) Describe the process of creating and running Publisher and Subscriber nodes in ROS. Provide an example of a simple ROS program implementing both. (7) CO1, CO2

**Question No. 4**

- 4 a) What is MoveIt in ROS? Explain its setup process, working, and how it is used for manipulator control and motion planning. (8) CO1, CO2

**OR**

- 4 b) Discuss the role of the ROS GUI development tool (rqt). Explain its key plugins such as rqt\_graph, rqt\_plot, and rqt\_image\_view with their applications. (8) CO1, CO2

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