K. K. Wagh Institute of Engineering Education & Research, Nashik

(An Autonomous Institute From A.Y. 2022-23)

WINTER-2025	
Exam Seat No.:	
Academic Year:2025-2026	Semester:IV
Class:SY	Program:B.Tech
Branch Code:ROB	Pattern:2022
Name of Course:Robot Operating System	Course Code:ROB222014
Max. Marks:60	Duration:2.30 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 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.

		Marks	CO
Question No. 1			
1a)	Describe the ROS file system structure. Explain packages, nodes, launch files, and workspaces.	(6)	CO1, CO5
Question No. 2			
2a)	Explain the steps for creating a catkin workspace and building ROS packages using catkin commands.	(6)	CO2, CO5
Question No. 3			
3a)	Explain the characteristics of OpenCR that make it suitable for robotics applications.	(8)	CO2, CO5
	OR		
3b)	Discuss the rosserial server and rosserial client architecture.	(8)	CO2, CO5
3c)	Explain TurtleBot3 software architecture.	(8)	CO2, CO5
	OR		
3d)	Describe how TurtleBot3 simulation is performed using RViz.	(8)	CO2, CO5
Question No. 4			
4a)	Explain the complete navigation stack used in ROS for mobile robots.	(8)	CO3, CO5
	OR		
4b)	Describe SLAM process with a block diagram.	(8)	CO3, CO5
4c)	Discuss ROS SLAM packages like gmapping, Hector SLAM, Cartographer.	(8)	CO3, CO5

OR

4d)	Explain coordinate transformation in navigation with TF tree example.	(8)	CO3, CO5

Question No. 5

5a)	Compare ROS1 and ROS2.	(8)	CO4, CO5

OR

5b)	Explain ROS2 launch system and advantages.	(8)	CO4, CO5
5c)	Discuss the structure of ROS2 launch files.	(8)	CO4, CO5

OR

5d)	Explain steps for building ROS2 packages using colcon.	(8)	CO4, CO5

····· End of question paper·····