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

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

SUMMER-2024	
Exam Seat No.:	
Academic Year:2023-2024	Semester: III
Class: S.Y.	Program: B.Tech
Branch Code: ROB	Pattern:2022
Name of Course: Robot Path Planning	Course Code:ROB222005
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 2 pages.
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.

Question No. 1 Attempt following Question

1a)	Explain the concept of a diffeomorphism and how it differs from a homeomorphism?	(6)	CO1

Question No. 2 Attempt following Question

2a)	Explain the term Accessibility, Departability and Connectivity	(6)	CO2

Question No. 3 Attempt following Question

3a)	Explain Morse Decomposition Definition	(8)	CO3

OR

3b)	Explain the steps involved in brushfire algorithm for sample environment.	(8)	CO3
3c)	What is the role of 4 point and 8 point connectivity in brushfire algorithm?	(8)	CO3

OR

3d)	How does the wavefront algorithm work? Explain with a diagram using any environment.	(8)	CO3

Question No. 4 Attempt following Question

4a)	Describe gradient descent in Potential function	(8)	CO4

OR

4b)	What is critical point analysis? Explain different critical points	(8)	CO4
4c)	Explain the Quadratic Attractive Potential Function with mathematical representation	(8)	CO4

OR

4d)	Explain the Repulsive Potential Function with diagram	(8)	CO4

Question No. 5 Attempt following Question

5a)	Write down the advantages and disadvantages of multi robot system.	(8)	CO5

OR

5b)	Describe Problem definition of multi robot path planning and its optimization criteria	(8)	CO5
5c)	Explain the concept of Potential Deadlock and Completeness with diagram in multi robot path planning.	(8)	CO5

OR

5d)	Explain in detail the Taxonomy of multi robot path planning	(8)	CO5

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