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:VII
Class:FINAL	Program:B.Tech
Branch Code:ROB	Pattern:2022
Name of Course:Machine Vision System	Course Code:ROB224002
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)	Define a Machine Vision System and briefly describe the role of the lighting system, optical system (lens), and sensors in machine vision applications.	(6)	CO1
Question No. 2			
2a)	Explain the basic morphological operations used in image processing. Describe erosion, dilation, opening, and closing with examples	(6)	CO1, CO2, CO3, CO4
Question No. 3			
3a)	Explain detailed process of noise reduction using frequency domain filtering. Discuss the working of band-pass and band-reject filters.	(8)	CO1, CO2, CO3
	OR		
3b)	Describe the working principles of arithmetic mean filter, geometric mean filter, and adaptive filters. Analyze their performance in removing different types of noise	(8)	CO1, CO2, CO3
3c)	Explain image compression? Distinguish between lossless and lossy compression	(8)	CO1, CO2, CO3
	OR		
3d)	Explain in detail the adaptive filtering process used in image restoration. Why are adaptive filters more effective than linear filters for non-uniform noise?	(8)	CO1, CO2, CO3
Question No. 4			
4a)	Discuss the technique-based classification of image segmentation: structural, stochastic, and hybrid techniques. Describe one example technique from each category	(8)	CO3, CO4

OR

4b)	Convert (R, G, B) = (120, 70, 240) into CMYK format. Show step-by-step calculation.	(8)	CO3, CO4
4c)	Explain color-based image representation? Explain how images are represented using RGB, HSV, color models	(8)	CO3, CO4

OR

4d)	Compare boundary-based and region-based segmentation	(8)	CO3, CO4

Question No. 5

5a)	Explain the concept of hierarchical motion estimation. Describe how multi-resolution image pyramids help achieve faster and more reliable motion detection.	(8)	CO3, CO4

OR

5b)	Describe the process of incremental refinement in motion estimation. Explain why this technique is useful for improving initial motion estimates	(8)	CO3, CO4
5c)	Explain in detailed Convolutional Neural Network (CNN) with applications	(8)	CO3, CO4

OR

5d)	Explain the concept of layered motion representation in video processing. Describe how motion layers are extracted and why they are useful in complex scenes	(8)	CO3, CO4

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