Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–VII EXAMINATION – WINTER 2025

Subject Code:3174206 Date:01-12-2025

Subject Name:Computer Vision

Time:10:30 AM TO 01:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Define the following: 1) Pixel 2) Kernel 3) Radiometry	**03**
	(b)	Explain Discrete Fourier Transform (DFT) in brief.	**04**
	(c)	What is computer vision? Discuss low-level, mid-level and high-level computer vision with its applications.	**07**
Q.2	**(a)**	What is image segmentation? Discuss various applications of image segmentation.	**03**
	(b)	Discuss any two morphological operations in detail.	**04**
	(c)	What do you understand by geometric 2D transformation in image formation? Explain with suitable examples.	**07**
		OR	
	(c)	The following input image has a size of 5 x 5 pixels, and its gray level varies from 0 to 255. Apply 3 x 3 median filter for image enhancement to the input image and provide a 5 x 5 output image matrix. Make suitable assumptions for the border pixels.	**07**

227	145	215	140	130
140	254	140	109	155
115	133	255	109	115
130	155	240	115	109
115	140	155	109	130

Q.3	**(a)**	Describe watershed segmentation method in brief.	**03**
	(b)	Discuss the two-dimensional wavelet decomposition with necessary figure.	**04**

	(c)	What is the use of PCA in image processing? Explain PCA in detail.	**07**

OR

Q.3	**(a)**	Discuss region splitting and region merging image segmentation method in brief.	**03**
	(b)	Explain normalized cut method for image segmentation.	**04**
	(c)	Discuss any one method for corner detection with suitable example.	**07**
Q.4	**(a)**	Explain the motion parallax in brief.	**03**
	(b)	Describe the fisheye camera model in detail.	**04**
	(c)	Discuss the intrinsic and extrinsic parameters related to camera models.	**07**

OR

Q.4	**(a)**	Discuss pinhole imaging model in brief.	**03**
	(b)	Explain radial distortion in camera calibration.	**04**
	(c)	What is optical flow? Describe optical flow algorithm in motion analysis.	**07**
Q.5	**(a)**	Explain any two methods of pixel transformation in image processing.	**03**
	(b)	What is machine learning? Explain different types of machine learning methods used in computer vision.	**04**
	(c)	Discuss the kalman filter for motion tracking in detail.	**07**

OR

Q.5	**(a)**	Describe any one method or algorithm for edge detection.	**03**
	(b)	Describe appearance-based object identification methods.	**04**
	(c)	What is Image classification? Discuss the use of machine learning in image classification.	**07**

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