CBCS SCHEME

USN

BCS613B

Sixth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
Computer Vision

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Explain the working of a digital camera in capturing images.	10	L2	CO1
	b.	Differentiate between linear and non-linear filtering techniques.	4	L2	CO1
	c.	Assume the given image 5 × 5 pixel matrix is a part of a satellite image, where each element in the matrix represent the digital number (DN) of a pixel in the image. Based on this assumption. Calculate the following questions. $I = \begin{bmatrix} 10 & 20 & 30 & 40 & 50 \\ 60 & 70 & 80 & 90 & 100 \\ 110 & 80 & 130 & 90 & 150 \\ 160 & 170 & 180 & 190 & 200 \\ 210 & 220 & 230 & 240 & 250 \end{bmatrix}$ What is the value of the pixel position (2, 2) (3, 2) and (3, 3) applying the 3 × 3 mean filter assume index start from 0.	6	L3	CO1
		OR			
Q.2	a.	Explain how image brightness and contrast adjustments are performed.	6	L2	CO1
	b.	Discuss the role of point operators in image processing with examples.	6	L2	CO1
	c.	For the image matrix mentioned in the matrix IC. What is the value of the pixel position at (2, 3), (3, 3), (2, 2) apply the weighted average filter.	8	L3	CO1
		Module – 2			
Q.3	a.	Explain neighborhood operators and their significance in image processing.	6	L2	CO2
	b.	What is the Fourier transform in image processing and how is it applied?	6	L2	CO2
	c.	A 3 × 3 grayscale image matrix : $I = \begin{bmatrix} 100 & 100 & 100 \\ 100 & 255 & 100 \\ 100 & 100 & 100 \end{bmatrix}$ This matrix represents a smooth background (value 100) with a sharp impulse (value 255) at the centre think of it as a "salt noise".	8	L3	CO2

		OR			
Q.4	a.	Explain the importance of scaling and rotation in geometric transformations.	10	L2	CO2
	b.	Discuss the geometric transformations used in image processing.	10	L2	CO2
		Module – 3			
Q.5	a.	Explain the image degradation/restoration process model.	8	L2	CO3
	b.	How can point horizontal and vertical lines be detected in an image, and what techniques are commonly used for this task.	6	L2	CO3
	c.	Identify point detection, horizontal line and vertical line detection in the following matrix $I = \begin{bmatrix} 0 & 1 & 0 \\ 1 & 1 & 1 \\ 0 & 1 & 0 \end{bmatrix}$	6	L3	CO3
		OR			
Q.6	a.	Describe region growing and region splitting techniques in segmentation.	10	L2	CO3
	b.	Given a 3 bit image given below. Assume seed value of 6, segment the following image using 8 connectivity and threshold = 3. How many segments are identified? $I = \begin{bmatrix} 2 & 2 & 7 & 2 & 1 \\ 1 & 7 & 6 & 6 & 2 \\ 7 & 6 & 6 & 5 & 7 \\ 2 & 4 & 5 & 4 & 2 \\ 1 & 2 & 5 & 1 & 1 \end{bmatrix}$	10	L3	CO3
		Module – 4			
Q.7	a.	Discuss the fundamentals of color image processing.	10	L2	CO4
	b.	Explain pseudocolor image processing and its applications.	10	L2	CO4
		OR			
Q.8	a.	Compare RGB and CMYK color models in image processing.	10	L2	CO4
	b.	Describe the process of color image smoothing and sharpening.	10	L2	CO4

		Module – 5			
Q.9	**a.**	Discuss the operations of opening and closing in morphology.	**10**	**L2**	**CO5**
	b.	Consider the following matrix and structuring element. $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 1 & 1 & 0 \\ 0 & 0 & 1 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ $SE = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$ Perform following operation on the following image using i) A dilate SE ii) A^C erode SE	**10**	**L3**	**CO5**
		OR			
Q.10	**a.**	How is feature used in image classifications?	**10**	**L3**	**CO5**
	b.	Perform morphological opening and closing operation on the following image with structuring element and write the out of operations $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 \\ 0 & 1 & 1 & 1 & 0 \\ 0 & 1 & 1 & 1 & 0 \end{bmatrix}$ $SE \begin{bmatrix} 0 & 1 & 0 \\ 1 & 1 & 0 \\ 0 & 1 & 0 \end{bmatrix}$	**10**	**L3**	**CO5**

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