Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

Mid - Term Examinations – MARCH 2026

Date: 10- 03- 2026 **Time:** 09:30am – 11:00am

School: SOCSE	**Program:** B.Tech Information Science and Engineering	
Course Code: ISE2504	**Course Name**: Image Processing and Computer Vision	
Semester: VI	**Max Marks**:50	**Weightage**: 25%

CO - Levels	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Marks	**26**	**24**	**0**	**0**	**0**

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks. **5Q x 2M=10M**

1	Describe the steps involved in image digitization	**2 Marks**	**L2**	**CO1**
2	List the applications of Computer Vision.	**2 Marks**	**L2**	**CO1**
3	State two domains of digital image processing.	**2 Marks**	**L1**	**CO1**
4	Explain Band Pass filter in image processing.	**2 Marks**	**L2**	**CO2**
5	Define Digital image.	**2 Marks**	**L1**	**CO2**

Part B

Answer the Questions. **Total Marks 40M**

6.	**a.**	**Apply Region Growing segmentation algorithm on given 2D image matrix.** **Note: (3,4) location pixel i.e '9' as seed Point and threshold T=3** $\begin{bmatrix} 1 & 1 & 1 & 1 & 1 & 1 & 1 & 2 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & 0 \\ 3 & 1 & 4 & 9 & 9 & 8 & 1 & 0 \\ 1 & 1 & 8 & 8 & 8 & 4 & 1 & 0 \\ 1 & 1 & 6 & 6 & 6 & 3 & 1 & 0 \\ 1 & 1 & 5 & 6 & 6 & 3 & 1 & 0 \\ 1 & 1 & 5 & 6 & 6 & 2 & 1 & 0 \\ 1 & 1 & 1 & 1 & 1 & 1 & 0 & 0 \end{bmatrix}$	**10 Marks**	**L3**	**CO2**
		Or			
7.	**a.**	**Given the following binary image matrix A and a structuring element B:** $A = \begin{bmatrix} 0 & 1 & 1 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 \\ 0 & 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 0 & 0 \end{bmatrix}, \quad B = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$ **Perform Closing on A using B (Closing = Dilation followed by erosion).** **Show intermediate steps (dilation result and final erosion result).**	**10 Marks**	**L3**	**CO2**

8.	**a.**	**Given 3x3 Image Matrix:** $$I = \begin{bmatrix} 52 & 55 & 61 & 59 & 79 \\ 62 & 59 & 55 & 104 & 94 \\ 63 & 65 & 66 & 113 & 144 \\ 64 & 70 & 70 & 126 & 154 \\ 69 & 73 & 78 & 135 & 161 \end{bmatrix}$$ **Gaussian Kernel:** $$K = \frac{1}{16} \begin{bmatrix} 1 & 2 & 1 \\ 2 & 4 & 2 \\ 1 & 2 & 1 \end{bmatrix}$$ **Apply the Gaussian filter on pixel at (row 3, column 3),(3,4) and(4,3) for noise reduction.**	**10 Marks**	**L3**	**CO1**
		Or			
9.	**a.**	**Given Data:** **A 5×5 grayscale image segment is corrupted by salt-and-pepper noise as shown below:** $$I = \begin{bmatrix} 12 & 15 & 14 & 13 & 250 \\ 10 & 255 & 13 & 15 & 12 \\ 11 & 14 & 0 & 13 & 14 \\ 10 & 12 & 13 & 250 & 15 \\ 13 & 14 & 15 & 12 & 14 \end{bmatrix}$$ **Apply Median filter on (row 3, column 3) pixel and (2,2) for noise reduction. Show all intermediate steps, including the 3×3 neighborhood, sorting of values, and the median selection.**	**10 Marks**	**L3**	**CO1**
10.	**a.**	**Consider the binary image matrix C and structuring element D:**	**10 Marks**	**L3**	**CO2**

		$C = \begin{bmatrix} 0 & 1 & 1 & 0 & 0 \\ 1 & 1 & 1 & 1 & 0 \\ 0 & 1 & 1 & 1 & 1 \\ 0 & 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 0 & 0 \end{bmatrix}, \quad D = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$ **Apply Dilation operation on C using D** **Show intermediate results and the final output matrix.**			
Or					
11.	**a.**	**Consider the binary image matrix C and structuring element D:** $C = \begin{bmatrix} 0 & 1 & 1 & 0 & 0 \\ 1 & 1 & 1 & 1 & 0 \\ 0 & 1 & 1 & 1 & 1 \\ 0 & 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 0 & 0 \end{bmatrix}, \quad D = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$ **Apply Erosion operation on C using D** **Show intermediate results and the final output matrix.**	**10 Marks**	**L3**	**CO2**

12.	**a.**	**Apply a power-law (gamma) transformation on the given 2D image matrix to enhance its contrast. Use c=1 and γ=1.5.** **Given image matrix I (pixel values are normalized between 0 and 1):** $I = \begin{bmatrix} 0.2 & 0.5 & 0.7 \\ 0.4 & 0.6 & 0.8 \\ 0.3 & 0.9 & 1.0 \end{bmatrix}$	**10 Marks**	**L3**	**CO1**
Or					
13.	**a.**	**Apply Image Negative transformation on the given 2D grayscale image matrix to enhance details. Use L-1=255.**	**10 Marks**	**L3**	**CO1**

$$I = \begin{bmatrix} 12 & 45 & 78 & 90 & 120 & 150 & 200 & 220 & 240 & 250 \\ 10 & 30 & 60 & 80 & 100 & 130 & 160 & 180 & 210 & 230 \\ 5 & 25 & 50 & 75 & 95 & 115 & 140 & 170 & 200 & 225 \\ 15 & 35 & 55 & 85 & 105 & 135 & 165 & 185 & 205 & 245 \\ 20 & 40 & 70 & 100 & 110 & 140 & 175 & 190 & 215 & 235 \\ 18 & 42 & 68 & 92 & 122 & 152 & 198 & 222 & 238 & 248 \\ 8 & 28 & 58 & 82 & 102 & 132 & 162 & 188 & 208 & 228 \\ 22 & 46 & 76 & 98 & 118 & 146 & 176 & 196 & 216 & 236 \\ 11 & 33 & 66 & 88 & 108 & 138 & 168 & 186 & 206 & 226 \\ 9 & 29 & 59 & 89 & 109 & 139 & 169 & 189 & 209 & 229 \end{bmatrix}$$