Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

Mid - Term Examinations – October 2025

Date: 07-10-2025 **Time:** 09.30am to 11.00am

School: SOCSE	**Program:** B.Tech Computer Science and Engineering (AI & ML)	
Course Code: ISE2504	**Course Name:** Image Processing and Computer Vision	
Semester: V	**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	Define digital image and mention the steps involved in image digitization.	**2 Marks**	**L**	**CO1**
2	Explain image sampling and quantization.	**2 Marks**	**L**	**CO1**
3	State four sources of noise in digital images.	**2 Marks**	**L**	**CO1**
4	Define image segmentation.	**2 Marks**	**L**	**CO2**
5	List morphological operations in image processing.	**2 Marks**	**L**	**CO2**

Part B

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

6.	**a.**	**Apply split and merge segmentation algorithm on given 2D image matrix. T=4** $\begin{bmatrix} 50 & 52 & 51 & 200 & 202 & 201 & 198 & 199 \\ 49 & 53 & 50 & 203 & 205 & 202 & 197 & 200 \\ 52 & 50 & 51 & 201 & 204 & 200 & 199 & 198 \\ 48 & 51 & 49 & 202 & 203 & 199 & 200 & 201 \\ 150 & 152 & 149 & 100 & 102 & 99 & 98 & 101 \\ 151 & 153 & 150 & 101 & 99 & 100 & 102 & 98 \\ 149 & 150 & 148 & 99 & 101 & 100 & 102 & 103 \\ 152 & 151 & 150 & 98 & 100 & 99 & 101 & 102 \end{bmatrix}$	**10 Marks**	**L3**	**CO 2**
		Or			
7.	**a.**	**Explain watershed segmentation algorithm with neat diagram.**	**10 Marks**	**L3**	**CO 2**

8.	**a.**	**Given Data:** **3x3 Image Matrix:** $I = \begin{bmatrix} 10 & 20 & 10 \\ 20 & 50 & 20 \\ 10 & 20 & 10 \end{bmatrix}$ **Gaussian Kernel:** $K = \frac{1}{16} \begin{bmatrix} 1 & 2 & 1 \\ 2 & 4 & 2 \\ 1 & 2 & 1 \end{bmatrix}$ **Apply the Gaussian filter for noise reduction.**	**10 Marks**	L3	**CO 1**
		Or			
9.	**a.**	**Given Data:** 3x3 Image Matrix:	**10 Marks**	**L3**	**CO 1**

		$I = \begin{bmatrix} 10 & 20 & 10 \\ 20 & 50 & 20 \\ 10 & 20 & 10 \end{bmatrix}$ **Apply Mean filter for noise reduction**			

10.	**a.**	**Explain the significance of morphological operations.**	**10 Marks**	**L2**	**CO 2**
		Or			
11.	**a.**	**Explain opening and closing morphological operations with an example**	**10 Marks**	**L2**	**CO 2**

12.	**a.**	**Apply a power-law (gamma) transformation on the given 2D image matrix to enhance its contrast. Use c=1 and γ=0.5.** $\begin{bmatrix} 25 & 50 & 75 & 100 \\ 125 & 150 & 175 & 200 \\ 225 & 100 & 50 & 25 \\ 75 & 125 & 175 & 225 \end{bmatrix}$	**10 Marks**	**L3**	**CO 1**
		Or			
13.	**a.**	**Apply a logarithmic transformation on the given 2D grayscale image matrix to enhance details in darker regions. Use c=1 and base-e logarithm.** $\begin{bmatrix} 5 & 10 & 15 & 20 \\ 25 & 30 & 35 & 40 \\ 45 & 50 & 55 & 60 \\ 65 & 70 & 75 & 80 \end{bmatrix}$	**10 Marks**	**L3**	**CO 1**