



PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – May/June 2026

Date: 14 – 05- 2026

Time: 01:00pm – 04:00pm

School : SOCSE	Program: BTech ISE, ISR	
Course Code: ISE2504	Course Name: Image Processing and Computer Vision	
Semester: VI	Max Marks: 100	Weightage: 50%

CO - Levels	C01	C02	C03	C04	C05
Marks	26	26	24	24	

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.

10Q x 2M=20M

1.	Explain the concept of image formation through a pinhole camera model.	2 Marks	L2	C01
2.	Explain Image digitization steps	2 Marks	L2	C01
3.	Define sampling in image processing	2 Marks	L2	C01
4.	State four sources of noise in digital images	2 Marks	L2	C02
5.	Define image segmentation.	2 Marks	L2	C02
6.	List morphological operations in image processing.	2 Marks	L2	C02
7.	Define a corner in an image? Why are corners important?	2 Marks	L2	C03
8.	Explain motion detection using frame differencing	2 Marks	L2	C03
9.	Explain the role of convolutional layers and pooling layers in CNNs.	2 Marks	L2	C04
10.	Explain role of computer vision systems in self-driving vehicles	2 Marks	L2	C04

Part B

Answer the Questions.

Total Marks 80M

11.	a.	Explain adjacency, connectivity (4, 8, m-connectivity).	20 Marks	L2	CO1
	b.	Given 2D Image matrix: $\begin{bmatrix} 1 & 0 & 1 \\ 1 & 1 & 0 \\ 0 & 1 & 1 \end{bmatrix}$ Find number of connected components using 4-connectivity.		L3	CO1
Or					
12.	a.	Explain averaging filter and its effect.	20 Marks	L2	CO1
	b.	Apply 3x3 Mean filter a given image matrix: $\begin{bmatrix} 10 & 20 & 30 \\ 40 & 50 & 60 \\ 70 & 80 & 90 \end{bmatrix}$ Show all intermediate steps and final filtered image.		L3	CO1

13.	a.	Explain Opening morphological operations and its applications.	20 Marks	L2	CO2
	b.	Given a Binary image: $A = \begin{bmatrix} 1 & 1 & 0 & 1 & 1 \\ 1 & 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 & 1 \\ 1 & 1 & 0 & 1 & 1 \end{bmatrix}$ Structuring element:		L3	CO2

		$B = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$ Perform opening morphological operation on image A using structuring element B, show the intermediate steps and final output image matrix.			
Or					
14.	a.	Explain opening morphological operation and its applications.	20 Marks	L2	CO2
	b.	Given a binary image: $A = \begin{bmatrix} 0 & 1 & 0 & 0 & 1 \\ 1 & 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 \\ 0 & 0 & 1 & 1 & 1 \\ 1 & 0 & 0 & 1 & 0 \end{bmatrix}$ Structuring element: $B = \begin{bmatrix} 0 & 1 & 0 \\ 1 & 1 & 1 \\ 0 & 1 & 0 \end{bmatrix}$ Perform closing morphological operation on image A using structuring element B, show the intermediate steps and final output image matrix.		L3	CO2

15.	a.	Explain texture features using GLCM. Define contrast, energy, homogeneity, and correlation.	20 Marks	L2	CO3
	b.	Given 2D image matrix:		L3	CO3

		$\begin{bmatrix} 1 & 2 & 1 \\ 0 & 1 & 2 \\ 2 & 1 & 0 \end{bmatrix}$ Compute GLCM (distance=1, horizontal) and extract contrast & energy.			
Or					
16.	a.	Explain Harris corner detection with mathematical formulation.	20 Marks	L2	CO3
	b.	Given 2D image matrix apply Harris corner detection show the response matrix $I = \begin{bmatrix} 10 & 10 & 10 \\ 10 & 50 & 80 \\ 10 & 80 & 120 \end{bmatrix}$ Compute Gradients Compute Structure Tensor Components Form Matrix M Compute Harris Response		L3	CO3
17.	a.	With neat architecture diagram explain the working of CNN model for medical image classification.	20 Marks	L3	CO
Or					
18.	a.	With neat architecture diagram explain the working of YOLO model for object detection.	20 Marks	L3	CO