Roll No: | | | | | | | | | | | |

GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

PRESIDENCY UNIVERSITY

Presidency University Act, 2013 of the Karnataka Act No. 41 of 2013 | Established under Section 2(f) of UGC Act, 1956
Approved by AICTE, New Delhi | Approved By BCI
Bengaluru

Mid Term Examinations - October 2026

Date: 05/10/2026 **Time:** 02:00 PM - 03:30 PM

Course Code: ECE3401 **Course Name:** Digital Image Processing

Semester: Fifth Semester **Max. Marks:** 50 **Weightage:** 50%

CO - Levels	CO1	CO2
Marks	50	40

PART A: Answer Following Questions. 10 M

Q.N.	Questions	M	CO	BT
1	Define pixel in a Digital Imge. For an image of size 120*480, find the number of pixels. If it is Grey Scale image Calculate the number bits required to store the image in a memory:	2	CO1	BT3
2	Using a suitable image example, explain path and connectivity and identify whether two specified pixels are 4-connected, 8-connected, or m-connected.	2	CO1	BT2
3	State the formula for calculating D4, D8, and m-distances between two pixels.	2	CO1	BT2
4	Describe any one logical opertion between two image:	2	CO1	BT3
5	In image processing transformation, one operation moves the object to the different position on the screen. Identify the operation name and explain with any image samples:	2	CO1	BT3

PART B : Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
6	Illustrate the complete block diagram of a Digital Image Processing system and explain the function of each fundamental processing stage.	10	CO1	BT3
7	Explain the simple image model with suitable mathematical representation, and discuss the processes of sampling and quantization involved in converting a continuous image into its digital form	10	CO1	BT3

PART C: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
8	Apply the D4, D8, and m-distance formulas to find the distance between pixels P(10,15) and Q(15,25) and identify the shortest distance measure.	10	CO1	BT3

9	Consider the image segment shown. Calculate the shortest-path distances D4, D8, and Dm between the specified pixels p and q for the following conditions i). V={0,1} ii) V={ 1,2} $\begin{bmatrix} 3 & 1 & 2 & q(1) \\ 2 & 2 & 0 & 2 \\ 1 & 2 & 1 & 1 \\ p(1) & 0 & 1 & 2 \end{bmatrix}$	10	CO1	BT3

PART D: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
10	Consider the 2 × 2 transformation matrix A and image matrix U given below. $A = \frac{1}{2}\begin{bmatrix} \sqrt{3} & 1 \\ -1 & \sqrt{3} \end{bmatrix}, \qquad U = \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}$ Apply the given transformation matrix to obtain the transformed image matrix V. Further, determine the corresponding basis images and verify the transformed image V using the basis-image decomposition method.	10	CO2	BT3
11	Select any two 2D geometric transformations and explaintheir transformation matrices, coordinate mappings, and practical significance in digital image processing with suitable examples.	10	CO2	BT3

PART E: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
12	Consider the following 8×8 grayscale image segment. $\begin{bmatrix} 1 & 2 & 3 & 3 & 4 & 3 & 5 & 7 \\ 7 & 6 & 7 & 4 & 4 & 5 & 8 & 8 \\ 9 & 9 & 5 & 4 & 5 & 8 & 8 & 11 \\ 12 & 13 & 14 & 14 & 10 & 13 & 4 & 5 \\ 9 & 11 & 15 & 9 & 9 & 14 & 14 & 5 \\ 12 & 15 & 12 & 12 & 13 & 14 & 14 & 12 \\ 12 & 12 & 12 & 12 & 13 & 14 & 14 & 12 \\ 12 & 12 & 12 & 13 & 13 & 14 & 14 & 12 \end{bmatrix}$ Using the above image segment, perform the required image processing operation and determine the enhanced resulting output using Histogram Equalization method:	10	CO2	BT3
13	For the given Histogram data, Calculate the enhanced image through Histogram Processing Method: Gray Level (X): 0 1 2 3 4 5 6 7 8 9 10 11 12 13 Frequency (Y): 0 1 1 3 5 6 1 3 4 5 1 2 14 6	10	CO2	BT3