Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

Mid - Term Examinations – October 2025

Date: 07-10-2025 **Time:** 02.00pm to 03.30pm

School: SOE	**Program:** B. Tech	
Course Code: ECE3029	**Course Name:** Digital Image Processing	
Semester: V	**Max Marks**: 50	**Weightage**: 25%

CO - Levels	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Marks	**6**	**32**	**12**	**--**	**--**

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	Differentiate between Sampling and quantization in Digital Image Processing	**2 Marks**	**L2**	**CO1**
2	Consider an image with resolution 312X624. If each pixel is of 7 bits, find the size of this image and the total number of intensity levels.	**2 Marks**	**L3**	**CO2**
3	Define the following: (i) Digital Image Processing (ii) Digital Image	**2 Marks**	**L2**	**CO1**
4	Define the following: Connectivity, Region and Boundary.	**2 Marks**	**L2**	**CO1**
5	List different forms of Spatial Intensity level transformation with a relevant figure and equation	**2 Marks**	**L3**	**CO3**

Part B

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

6.	In Digital Image Processing, there are various Set and Logical Operations. While dealing with Binary Images, the Foreground (1-Valued) and Background(0-Valued) sets of Pixels, we refer to Union, Intersection, and Compliment (Set Operations), and OR, AND, and NOT are Logical Operations respectively. Considering the two Regions (Sets) A and B as shown in the figure, perform the following Logical Operations. Given that: **i.** NOT (A) **ii.** (A) AND (B) **iii.** (A) OR (B) **iv.** A ∩ B **v.** A-B 	**10 Marks**	**L3**	**CO2**
	Or			
7A c	A Common measure of transmission for digital data is the baud rate, defined as the number of bits transmitted per second. Generally, transmission is accomplished in packets consisting of a start bit, a byte (8 bits) of information, and a stop bit. Using these facts, answer the following: (i)How many minutes would it take to transmit a 1024 X 1024 image with 256 gray levels using a 56K baud modem? (ii) What would the time be at 750K baud, a representative speed of a phone DSL (digital subscriber line) connection?	**10 Marks**	**L3**	**CO2**

8.	Consider a square with vertices (-1,1) (1,1) (-1,-1) (1,-1) is translated with vector (2,2). The translated object is then scaled by (2,2). Draw the new transformed figures and the original square figure.	**10 Marks**	**L3**	**CO2**
	Or			
9.	Consider the image segment shown. Let V={1,2} and compute the lengths of the shortest 4, 8 and m path between p and q. If a particular path does not exist between these two points explain why. Repeat the same problem for V={2,3,4}	**10 Marks**	**L3**	**CO2**

	3 4 1 2 0 0 1 0 4 2(q) 2 2 3 1 4 (p)3 0 4 2 1 1 2 0 3 4			

10.	Pixel values are integers composed of bits. Values in a 256-level gray scale image is composed of 8 bits (one byte). A gray scale image segment with 4*4 pixels is shown below. Perform a suitable transformation that can show the contribution of only S8, S6, S4, and S2 planes. Also list the advantages of this transformation. **132 14 38 232** **129 64 78 33** **32 155 198 126** **129 164 178 233**	**10 Marks**	**L3**	**CO3**
	Or			
11.	**(i)**Given f1 = $\begin{bmatrix}0 & 2\\ 2 & 3\end{bmatrix}$, f2 = $\begin{bmatrix}6 & 5\\ 4 & 7\end{bmatrix}$, a1=1 a2= -1 and H= max. Determine whether it is a Linear operation or non-Linear operation **(ii)** Let p and q are two pixels at co-ordinates (10,15) and (15,25) respectively. Compute i) Euclidean distance ii) Chessboard distance and iii) City Block distance.	**10 Marks**	**L3**	**CO2**

12.	Histogram is a graphical representation of the intensity distribution of an image. In simple terms, it represents the number of pixels for each intensity value considered. Consider a gray-scale image in matrix form, perform histogram equalization on this image and scale the intensity to 1:20. $\begin{bmatrix}3 & 2 & 4 & 5\\ 7 & 7 & 8 & 2\\ 3 & 1 & 2 & 3\\ 5 & 4 & 6 & 7\end{bmatrix}$	**10 Marks**	**L3**	**CO3**
	Or			
13.	For a given 5x5 gray scale image, perform the following transformations. **a.** Thresolding with T=128 **b.** Intensity level slicing r1=100 and r2=200 (without background) **101 255 30 102 155** **132 14 38 232 198** **129 64 78 33 126**	**10 Marks**	**L3**	**CO3**

		32	**155**	**198**	**126**	**127**				
		129	**164**	**178**	**233**	**126**				