R22 Regulation *Subject code:4P6DD*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech VI Semester Regular/Supplementary Examinations, April 2026

DIGITAL IMAGE PROCESSING

(ECE)

Maximum Marks: 60 Date:21.04.2026 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X1M=10 Marks)		Marks	CO	Bloom Tx
1.a)	Define sampling and quantization.	1M	1	L1
b)	What is the purpose of image transforms in image processing?	1M	1	L1
c)	What is Histogram manipulation?	1M	2	L1
d)	What is meant by Image Degradation?	1M	2	L1
e)	What is meant by Global thresholding?	1M	3	L1
f)	Enumerate the differences between Image Enhancement and Image Restoration.	1M	3	L1
g)	What is region-oriented segmentation?	1M	4	L1
h)	Define erosion in the context of morphological image processing.	1M	4	L2
i)	What is meant by Fidelity criteria?	1M	5	L1
j)	Compare image segmentation and compression.	1M	5	L2

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	Bloom Tx
2	a) Find the Haar transformation matrix for N = 4. b) Apply 2D – Discrete Fourier Transform for the following image. $f(m.n) = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \end{bmatrix}$	5M 5M	1	L3 L4
	OR			
3	a) Compare and contrast the properties of the Walsh transform and the Hadamard transform, highlighting their unique characteristics. b) Derive 8 × 8 matrix of slant transform.	5M 5M	1	L3 L4
4	a) Explain the use of first derivative for image enhancement by taking a 3*3 region of image using the magnitude of the gradient. b) List the frequency domain enhancements advantages.	6M 4M	2	L2 L3

	OR			
5	a) Discuss the limiting effect of repeatedly applying a 3x3 low-pass spatial filter to a digital image. You may ignore border effects. Is this effect different from applying 5x5 filter? b) Discuss the working principle of a Median filter and its applications in image processing.	5M 5M	2	L2 L1
6	Describe constrained least square filtering technique for image restoration and derive its transfer function.	10M	3	L5
	OR			
7	a) Draw and explain image degradation model. b) Provide a step-by-step explanation of how interactive restoration is typically performed and discuss its significance in practical applications.	5M 5M	3	L2 L2
8	a) Elaborate on the various methods of thresholding used in image segmentation. b) Describe the concept of dilation in morphological image processing, emphasizing its role in expanding objects and enhancing their structural details.	5M 5M	4	L2 L2
	OR			
9	a) Explain about Region based segmentation. b) Discuss the process of edge linking in image processing. Explain how edges are connected to form boundaries and contours.	5M 5M	4	L2 L2
10	a) Predict the Code word, Average Length (L), Entropy (H(s)), Efficiency of the word "COMMITTEE" using binary Huffman coding. b) Discuss in detail the redundancies in a Digital Image.	5M 5M	5	L2 L2
	OR			
11	a) Explain with an example of how the drawbacks in Huffman encoding process is overcome in arithmetic encoding process. b) Explain how predictive coding is used for Lossy compression.	5M 5M	5	L2 L2