R22 Regulation *Subject code: 4P6DD*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech VI Semester Supplementary Examinations, November 2025

DIGITAL IMAGE PROCESSING

(ECE)

Maximum Marks: 60 Date:13.11.2025 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)	List the applications of digital image processing.	1M	CO1	BT1
b)	State the advantages of Walsh transform over Fourier transform.	1M	CO1	BT2
c)	Specify the objective of image enhancement technique.	1M	CO2	BT2
d)	Write the steps involved in frequency domain filtering.	1M	CO2	BT1
e)	List the disadvantage of inverse filtering.	1M	CO3	BT2
f)	Write a short note on Wiener Filtering.	1M	CO3	BT1
g)	What is meant by image segmentation? Write its use in image processing.	1M	CO4	BT1
h)	How boundary extraction evaluated by morphological processing?	1M	CO4	BT2
i)	What is Huffman coding?	1M	CO5	BT1
j)	Define compression ratio.	1M	CO5	BT1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	Bloom Tx
2	What is Image Quantization? Evaluate and explain the various types of quantization with its properties and remarks.	10M	CO1	BT3
	OR			
3	a) Apply 2D – Discrete Fourier Transform for the following image $f(m,n) = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \end{bmatrix}$ b) Determine the Hadamard matrix for N =8 using recursive calculation from N=2.	5M 5M	CO1	BT5
4	With neat diagram, explain Histogram processing and equalization.	10M	CO2	BT3
	OR			
5	If a low pass filter is formed that averages the 4 neighbors of a point (x,y) but excludes point(x,y) itself. Analyze and derive the equivalent filter function H(u,v) in the frequency domain. Show that it is a low pass filter.	10M	CO2	BT4

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<tr><td>6</td><td>a) Explain about degradation model with the help of block diagram.
b) Discuss in detail about the Wiener filter approach.</td><td>5M
5M</td><td>CO3</td><td>BT3</td></tr>
<tr><td></td><td>OR</td><td></td><td></td><td></td></tr>
<tr><td>7</td><td>Discuss the algebraic approach of constrained Least Square filter restoration.</td><td>10M</td><td>CO3</td><td>BT3</td></tr>
<tr><td>8</td><td>a) Explain the fundamental steps performed in edge detection of images.
b) Summarize the concept of image gradient and its properties in edge detection.</td><td>5M
5M</td><td>CO4</td><td>BT3</td></tr>
<tr><td></td><td>OR</td><td></td><td></td><td></td></tr>
<tr><td>9</td><td>a) Explain Morphological processing- erosion and dilation.
b) Discuss about opening and closing for gray scale images.</td><td>5M
5M</td><td>CO4</td><td>BT2</td></tr>
<tr><td>10</td><td>Design Huffman coding for the following symbols.
<table>
<tr><td>Symbols</td><td>P</td><td>Q</td><td>R</td><td>S</td></tr>
<tr><td>Probability</td><td>0.4</td><td>0.2</td><td>0.3</td><td>0.1</td></tr>
</table></td><td>10M</td><td>CO5</td><td>BT5</td></tr>
<tr><td></td><td>OR</td><td></td><td></td><td></td></tr>
<tr><td>11</td><td>Discuss: a) Lossless Predictive coding b)Lossy Predictive coding</td><td>5M
5M</td><td>CO5</td><td>BT3</td></tr>
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