Printed Pages:02 **Sub Code:MTCS052**

Paper Id: 238550 **Roll No.** | | | | | | | | | | |

M.Tech

(SEM II) THEORY EXAMINATION 2022-23

DIGITAL IMAGE PROCESSING

Time: 3 Hours ***Total Marks: 70***

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 7 = 14

(a) List some applications of Image processing.
(b) Write different components of image processing.
(c) How does contrast stretching improve the contrast of an image?
(d) Discuss dilation and erosion in morphological image processing.
(e) Write short note on watershed segmentation.
(f) Discuss lossless and lossy image compression.
(g) Briefly describe the concept of principal component analysis.

SECTION B

2. Attempt any *three* of the following: 7 x 3 = 21

(a) Explain sampling and quantization of images. Describe the effects of reducing sampling and quantization.

(b)

Gray level	0	1	2	3	4	5	6	7
Frequency	400	700	1350	2500	3000	1500	550	0

Calculate the histogram of the output image obtained by enhancing the input by histogram equalization technique.

(c) Discuss robert, sobel and prewitt operator of edge detection.
(d) Illustrate the procedures for region filling and convex hull.
(e) Explain Huffman coding of image compression with suitable example.

SECTION C

3. Attempt any *one* part of the following: 7 x 1 = 7

(a) Illustrate the term adjacency and connectivity in images. Consider following two image subsets S1 and S2 of a 3-bit gray level image shown below.

S1 S2

1	0	0	0	1	0	2	1	1	1
1	0	0	0	0	7	0	6	1	0
7	1	0	8	0	3	0	0	1	7
0	1	0	0	1	0	1	0	0	1
2	0	0	0	8	1	0	0	0	1

For V= {1, 2, 3} evaluate whether S1 and S2.
(i) 4-connected (ii)8-connected (iii)m-connected

(b) Describe the role of smoothing filters, such as mean and median filters, in

image enhancement. How do these filters reduce noise and improve image quality?

4. Attempt any *one* part of the following: 7 x 1 = 7

(a) Illustrate Wiener filter for image restoration. Discuss noise models in details.

(b) Derive the transfer function of Homomorphic filter.Also discuss the advantages and disadvantages of homomorphic filtering.

5. Attempt any *one* part of the following: 7 x 1 = 7

(a) Discuss laplacian operator of second order derivative. "Second order derivative of edge detection is prone to noise and detect false edges." Justify the statement.

(b) Explain the concept of multi-level thresholding and its applications in image segmentation tasks.

6. Attempt any *one* part of the following: 7 x 1 = 7

(a) Illustrate the basics of color image processing. Convert the RGB model to HSI model.

(b) Justify the need of compression in image processing. Compare statistical and spatial compression.

7. Attempt any *one* part of the following: 7 x 1 = 7

(a) Explain DFT and DCT. Apply the DFT to x={1 2 8 9} and verify whether it works.

(b) What are boundary descriptors in image processing, and how do they contribute to shape analysis and recognition tasks?Briefly explain the concept of chain codes as boundary descriptors.