USN

18CS741

Seventh Semester B.E. Degree Examination, Jan./Feb. 2023
Digital Image Processing

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1	a.	With a neat block diagram, explain the fundamental steps in image processing.	(10 Marks)
	b.	Explain the concept of sampling and quantization of an image.	(05 Marks)
	c.	Explain any four fields that use digital image processing.	(05 Marks)

OR

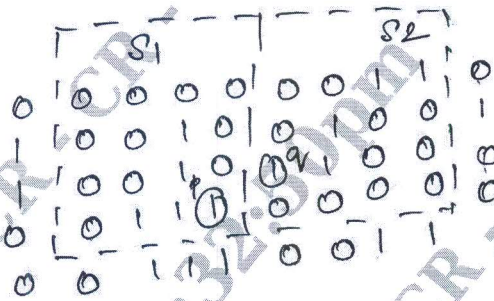|			
2	a.	Define 4-, 8-, m-adjacency with appropriate examples.	(04 Marks)
	b.	Explain the various distance measures used with suitable examples.	(06 Marks)
	c.	Consider the two image subsets S1 and S2 as shown in Fig. Q2 (c) for $V = \{1\}$. Determine whether these two subsets are (i) 4-adjacent (ii) 8-adjacent (iii) M-adjacent	

Fig. Q2 (c)

(10 Marks)

Module-2

3	a.	Explain in detail the basic gray level transformations used in image enhancement.	(10 Marks)
	b.	Define image enhancement. Explain how arithmetic operators are helpful in image enhancement.	(10 Marks)

OR

4	a.	Define histogram and normalized histogram. Discuss histogram equalization for contrast enhancement.	(10 Marks)
	b.	Explain image smoothing in spatial domain.	(03 Marks)
	c.	For a given 4×4 image having gray scales between [0, 9] perform histogram equalization and draw the histogram equalization and draw the histogram of image before and after equalization. 4×4 image is shown in Fig. Q4 (c).	

$$\begin{bmatrix} 2 & 3 & 3 & 2 \\ 4 & 2 & 4 & 3 \\ 3 & 2 & 3 & 5 \\ 2 & 4 & 2 & 4 \end{bmatrix}$$

Fig. Q4 (c)

(07 Marks)

Module-3

5 a. Explain the derivation of DFT from the continuous transform of a sampled function.
(10 Marks)

   b. Explain homomorphic filter with procedure for applying the same. **(10 Marks)**

OR

6 a. Write the properties of Discrete Fourier transforms. **(10 Marks)**
   b. Discuss Butterworth Low Pass filters and Gaussian Low Pass frequency domain filters.
(10 Marks)

Module-4

7 a. Explain various Gradient operators used for edge detection. **(10 Marks)**
   b. Explain Global Thresholding using Otsu's method. **(10 Marks)**

OR

8 a. Explain the various approaches used for edge linking. **(10 Marks)**
   b. Explain the basic of intensity thresholding in image segmentation. **(10 Marks)**

Module-5

9 a. Explain in detail the principal types of data redundancies. **(10 Marks)**
   b. Explain Huffman coding technique with an example. **(10 Marks)**

OR

10 a. Explain Lossy and Lossless compression. **(10 Marks)**
   b. Explain Arithmetic coding technique with an example. **(10 Marks)**

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