USN

10EC763

Seventh Semester B.E. Degree Examination, Jan./Feb. 2021
Image Processing

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

PART - A

1 a. Explain the components of a general purpose image processing system, with block diagram. **(08 Marks)**

b. Describe Brightness adaptation and Weber ratio as applicable to Image processing. **(06 Marks)**

c. Explain the Image formation in the eye with example. **(06 Marks)**

2 a. Discuss Image Acquisition using Multi sensor array system. **(06 Marks)**

b. Describe the process of image sampling and quantization in the Digital Image Processing. **(06 Marks)**

c. Let V = {0, 1} and compute the D_4 and D_8 distance between p and q for the image segment. Indicate the shortest distance path.

	2	1	0	1	q
	0	0	2	0	
	1	0	1	1	
P	1	2	1	0	

(08 Marks)

3 a. Discuss the properties of 2 – D unitary transforms. **(08 Marks)**

b. For the given orthogonal matrix A and image U, obtain the transformed image V.

$$A = \frac{1}{\sqrt{2}}\begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix} \quad U = \begin{bmatrix} 6 & 3 \\ 12 & 1 \end{bmatrix}.$$ **(06 Marks)**

c. Define two dimensional unitary DFT check whether unitary DFT matrix is unitary or not for N = 4. **(06 Marks)**

4 a. Explain Haar transform with its properties. Construct Haar transform matrix for n = 2 and compute the Haar transformation for 2 × 2 image shown below :

$$\begin{bmatrix} 3 & -1 \\ 6 & 2 \end{bmatrix}.$$ **(12 Marks)**

b. Define Hadmard transformation and generation Hadmard matrix Hn for n = 3 from the core matrix

$$H_1 = \frac{1}{\sqrt{2}}\begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}.$$ **(08 Marks)**

PART - B

5 a. Discuss the following enhancement operation to enhance the image :
i) Negative of image ii) contract stretching iii) Log transformation. **(09 Marks)**

b. Perform histogram equalization for the 32 ×32 image and its histogram is shown in table.

Gray level	0	1	2	3	4	5	6	7
No. of pixels	100	250	450	85	40	40	34	25

(11 Marks)

6 a. Describe the Laplacian filter to sharpen the images. **(06 Marks)**
b. Discuss in detail the basic steps for enhancing images in frequency domain, with block diagram. **(06 Marks)**
c. Explain different types of Low – pass filter in frequency domain. **(08 Marks)**

7 a. Describe the model of image degradation process. **(04 Marks)**
b. With probability density function, explain any three noises. **(06 Marks)**
c. What is the importance of adaptive filters in image restoration? Explain the adaptive median filter with example. **(10 Marks)**

8 a. Explain the intensity slicing and gray level colour transformation as applied to pseudo colour image processing. **(10 Marks)**
b. Describe the conversion of RGB colour model into HIS colour model and HIS to RGB. **(10 Marks)**

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