USN | 1 | M | V | 1 | 0 | E | C | 1 | 0 | 7 | **10EC763**

Seventh Semester B.E. Degree Examination, Dec.2013/Jan.2014

Image Processing

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. With a neat block diagram, explain the steps in image processing. **(10 Marks)**

b. Explain the following terms as applicable to image processing with necessary graphs:
   i) Brightness adaptation
   ii) Weber ratio
   iii) Mach bands **(10 Marks)**

2 a. Discuss the role of sampling and quantization with an example. **(08 Marks)**

b. Explain the image acquisition using micro densitometer. **(06 Marks)**

c. Explain spatial resolution and gray level resolution of an image. **(06 Marks)**

3 a. Describe the following terms applied to image processing:
   i) Neighbors of a pixel
   ii) Adjacency of pixels
   iii) Digital path
   iv) City-block distance measure **(04 Marks)**

b. Let V = {0, 1}, compute D_e, D_4, D_8 distance between the pixels p and q for the Fig.Q3(b).

(q) 1	1	2	3	
0	2	2	1	
1	1	0	2	
2	1	2	1	(p)

Fig.Q3(b) **(08 Marks)**

c. For the 2 × 2 transform 'A' and the image 'U', calculate the transformed image 'V' and basis images.

$$A = \frac{1}{\sqrt{2}}\begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}; \qquad U = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$$ **(08 Marks)**

4 a. Explain any four properties of two dimensional Fourier transform. **(08 Marks)**

b. Define 2-D forward and inverse discrete cosine transform and mention its properties. **(08 Marks)**

c. Generate the Hadamard transform H_n matrix for n = 3. Given the core matrix $H_1 = \frac{1}{\sqrt{2}}\begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}$. Also, indicate its sequency. **(04 Marks)**

PART – B

5 a. With necessary graphs, explain the following spatial image enhancement operations:
   i) Image negative
   ii) Log transformation
   iii) Power law transformation
   iv) Contrast stretching **(12 Marks)**

b. Perform histogram equalization of the 5 × 5 image whose data is shown in Table Q5(b).

Gray level	0	1	2	3	4	5	6	7
Number of pixels	0	0	0	6	14	5	0	0

Table Q5(b) **(08 Marks)**

6 a. Explain with a block diagram, the basic steps for image filtering in frequency domain. **(10 Marks)**

b. Illustrate Homomorphic filtering approach for image enhancement. Derive the suitable result. **(10 Marks)**

7 a. Explain the basic model of image restoration process. Also, with necessary equations, explain the most common PDFs in an image processing. **(10 Marks)**

b. With necessary mathematical equations, explain inverse filtering and Wiener filtering for image restoration. **(10 Marks)**

8 a. Discuss briefly any two color models used in color image processing. **(10 Marks)**

b. Explain intensity slicing and Graylevel to color transformation as applied to pseudocolor image processing. **(10 Marks)**

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