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10EC763

Seventh Semester B.E. Degree Examination, June/July 2017
Digital Image Processing

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Explain the fundamental steps in digital image processing. **(08 Marks)**

b. Explain mass storage capability in image processing applications and also its principal categories. **(07 Marks)**

c. Write a note on optical illusions. **(05 Marks)**

2 a. Consider the two image subsets s_1 and s_2 shown in Fig. Q2(a). For v = {1}, determine whether these two subsets are : i) 4-adjacent ii) 8-adjacent iii) m-adjacent. **(06 Marks)**

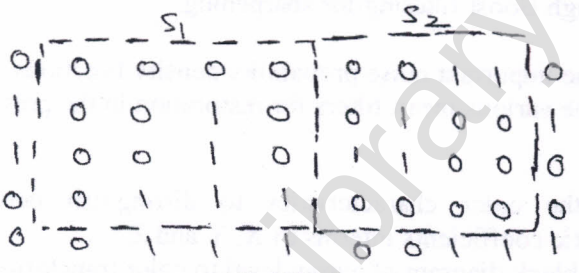

Fig.Q2(a)

b. Explain the process of generating digital image. **(08 Marks)**

c. Explain linear and non-linear operations in digital image processing. **(06 Marks)**

3 a. Define 1D-unitary transform, and mention its properties. **(06 Marks)**

b. Compute 2D-DFT of a 4 × 4 grey scale image shown in Fig.Q3(a) and corresponding inverse DFT. **(08 Marks)**

$$V = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \end{bmatrix}$$

Fig.3Q(b)

c. Prove that $FF^{*T} = 1$, where F is the DFT matrix. **(06 Marks)**

4 a. Write the generation of N × N Hadamard transform matrix by iterative rule. Mention its advantages and properties. **(08 Marks)**

b. What are the properties of slant transform and also find forward slant transform and inverse slant transform of U.

Where $U = \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}$. **(06 Marks)**

c. Define 1-Dimensional DCT for N = 4 obtain N × N cosine transform matrix(c). **(06 Marks)**

PART – B

5 Explain the following terms with respect to image enhancement.
   a. Log transformation
   b. Bit-plane slicing
   c. Histogram equalization
   d. Image averaging. **(20 Marks)**

6 a. Draw the block diagram of a homomorphic filtering approach for image enhancement and explain it. **(08 Marks)**
   b. Explain Butterworth lowpass filter for smoothing. **(06 Marks)**
   c. Discuss high Boost filtering for sharpening. **(06 Marks)**

7 a. Discuss the important noise probability density functions. **(10 Marks)**
   b. Discuss the various mean filters for restoration in the presence of noise only-spatial filtering. **(10 Marks)**

8 a. Explain the color characteristics to distinguish between various colors. Write the trichromatic coefficients interms of X, Y and Z. **(08 Marks)**
   b. Draw the block diagram of a gray level to color transformations and explain it. **(08 Marks)**
   c. Write a note on CMY color model. **(04 Marks)**

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