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10EC763

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
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. What is Digital Image Processing and explain fundamental steps in Digital image processing with neat block diagram. **(12 Marks)**

b. Explain brightness adaptation and discrimination with suitable diagram. **(05 Marks)**

c. Explain any one application of Digital Image Processing. **(03 Marks)**

2 a. Explain with neat diagram Single Image Sensor and Sensor Strips. **(08 Marks)**

b. Define Image Sampling and Quantisation. Also mention any 3 methods of Image Zooming. **(05 Marks)**

c. Consider the image segment given in Table Q2(c). Let V = {2, 3, 4} compute the lengths of shortest 4, 8 and m path between 'P' and 'Q'. If path does not explain why it is not existing. Also find : i) Euclidean ii) City – block iii) Chess – board distances.

	3	4	1	2	0
	0	1	0	4	2 (Q)
	2	2	3	1	4
(P)	3	0	4	2	1
	1	2	0	3	4

Table Q2(c) **(07 Marks)**

3 a. Explain with suitable equations the
i) Energy conservation
ii) Energy compaction and variance of transform coefficients properties of unitary transforms. **(08 Marks)**

b. Prove that the DFT of two dimensional circular convolution of two arrays is the product of their DFTs. **(06 Marks)**

c. Compute the 2D-DFT of the 4×4 gray scale image given below :

$$u[m, n] = \begin{vmatrix} 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \end{vmatrix}$$ **(06 Marks)**

4 a. Write defining equations for Discrete cosine transform and write any four properties for the same. **(06 Marks)**

b. Generate Haar basis for N = 2. **(10 Marks)**

c. List any 4 properties of slant transform. **(04 Marks)**

PART – B

5 a. Explain :
   i) Contrast stretching
   ii) Gray level slicing
   iii) Bit-plane slicing
   iv) High boost filtering. **(08 Marks)**

b. Perform histogram equalization for the image

4	4	4	4	4
3	4	5	4	3
3	5	5	5	3
3	4	5	4	3
4	4	4	4	4

(12 Marks)

6 a. Explain Homomorphic filtering approach for Image Enhancement. **(10 Marks)**

b. Explain five important noise probability functions with suitable equations. **(10 Marks)**

7 a. Draw and explain Image degradation and restoration model. **(08 Marks)**

b. Discuss various mean filters used in Image Restoration system. **(08 Marks)**

c. Explain Inverse filtering approach and its limitations. **(04 Marks)**

8 a. Discus briefly on RGB and HSI colour model. **(08 Marks)**

b. What is Pseudo color processing and explain Intensity slicing method. **(08 Marks)**

c. Given (RGB) = (0.683, 0.1608, 0.1922). Find Intensity and saturation in HSI model. **(04 Marks)**

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