

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 :

$u[m, n] =$	1	1	1	1
	1	1	1	1
	1	1	1	1
	1	1	1	1

(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)

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 – B

- 5 a. Explain :
- Contrast stretching
 - Gray level slicing
 - Bit-plane slicing
 - High boost filtering.
- 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 |
- 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. Discuss 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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