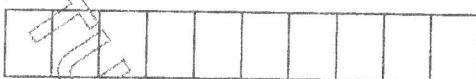


USN



10EC763

Seventh Semester B.E. Degree Examination, Dec.2017/Jan.2018 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. With the help of neat block diagram, explain the components of a general purpose image processing system. (08 Marks)
- b. With a neat block diagram explain the fundamental steps involved in digital image processing. (12 Marks)

2. a. Explain the image acquisition using single sensor. (06 Marks)
- b. Consider the image segment shown in Fig.Q2(b). Set $V = \{0, 1\}$, compute the lengths of shortest 4, 8 and m – path between p and q. If path does not exists between p and q, explain why? (06 Marks)

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

Fig.Q2(b).
- c. Explain the role of sampling and quantization with an example. (08 Marks)

3. a. For the 2×2 orthogonal matrix A and image U obtain the transformed image and basis images and inverse transformation. (06 Marks)

$$A = \frac{1}{\sqrt{2}} \begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix} \quad U = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}.$$
- b. Explain the following properties of unitary transform.
 - Energy conservation
 - Decofrelation.
(06 Marks)
- c. Define 2-D forward and inverse discrete cosine transform and mention its properties. (08 Marks)

4. a. Using the core matrix H_1 generate hadamard transform matrix H_3 and explain 4 properties of hadamard transform. (10 Marks)
- b. Define slant transform. Obtain 4×4 slant transformation matrix. Explain any four properties of slant transform. (10 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.

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(06 Marks)

PART - B

- 5 a. Explain the following intensity transformation functions with necessary graphs.
 i) Image negatives
 ii) Log transformations
 iii) Power law (Gamma) transformations. (10 Marks)
- b. Perform histogram equalization of an image whose pixel intensity distribution is given in table :
- | Gray levels | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|------------------|-----|------|-----|-----|-----|-----|-----|----|
| Number of Pixels | 790 | 1023 | 850 | 656 | 329 | 245 | 122 | 81 |
- Construct the histogram of the image before and after equalization. (10 Marks)
- 6 a. Explain the smoothing of images in frequency domain using :
 i) Ideal lowpass filter
 ii) Butterworth lowpass filter. (10 Marks)
- b. With the help of a block diagram, explain the homomorphic filtering approach for image enhancement. (10 Marks)
- 7 a. Explain the model of image degradation/restoration. List all noise probability density functions and explain any three with necessary equations and graphs. (10 Marks)
- b. Explain inverse filtering and Weiner filtering in image processing. (10 Marks)
- 8 a. Explain briefly any two color models. Write equations for converting RGB to HSI. (10 Marks)
- b. Write a note on Pseudo color image processing. Explain intensity slicing as applied to pseudo color image processing. (10 Marks)
