

ONE TIME EXIT SCHEME

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BANGALORE - 560 037

10TE754

Seventh Semester B.E. Degree Examination, April 2018

Image Processing

Time: 3 hrs.

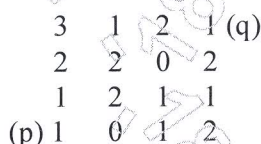
Max. Marks:100

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

PART – A

- 1 a. With a neat diagram, explain the fundamental steps in digital image processing. (10 Marks)
- b. With a neat diagram, briefly explain the brightness adaptation and discrimination applicable to Image processing. (10 Marks)

- 2 a. Explain the process of Image acquisition by sensor strips and sensor arrays. (10 Marks)
- b. Consider the image segment shown :
 - i) Let $V = \{0, 1\}$ and compute the lengths of shortest 4, -8 and m path between p & q. If a particular path does not exists between these two points explain why? (10 Marks)
 - ii) Repeat for $V = \{1, 2\}$



- 3 a. For the given orthogonal matrix A and image U, calculate the transformed image V and the basis image. Also reconstruct the original image U by inverse transform. (10 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 any three properties of two dimensional discrete Fourier transform. (06 Marks)
- c. Write a note on Separable Unitary Transforms. (04 Marks)

- 4 a. Give an expression for 2D – forward and inverse discrete cosine transform and list its properties. (10 Marks)
- b. Generate Hadamard transform matrix H_n for $n = 2, 3$ for the given core matrix.

$$H_1 = \frac{1}{\sqrt{2}} \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$$

- c. List any 2 properties of Harr transform. (02 Marks)

PART – B

- 5 a. Explain the following : (10 Marks)
 - i) Log transformation
 - ii) Power Law transformation
 - iii) Contrast stretching.
- b. Briefly explain Histogram Statistics used for local and global image enhancement.(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.

- 6 a. Explain the following frequency domain filters and compare :
i) Ideal high pass filter ii) Gaussian high pass filter. (10 Marks)
b. Illustrate Homomorphic filtering process in image enhancement and derive the suitable result. (10 Marks)
- 7 a. Explain Image degradation and Restoration model, with a neat diagram. (06 Marks)
b. Write a note on the following noise probability density functions :
i) Gaussian noise ii) Erlang noise. (06 Marks)
c. Derive an expression of the linear degradation model in the presence of additive noise. (08 Marks)
- 8 a. With the help of a neat diagram, explain RGB color model and HSI color model. (10 Marks)
b. What is pseudo color image processing? Explain gray level to color transformations. (10 Marks)
