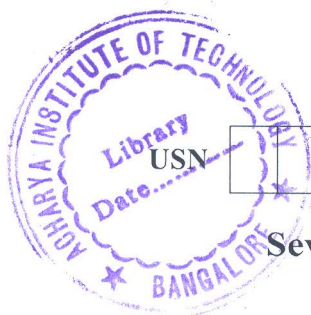


CBCS SCHEME



17MT754

Seventh Semester B.E. Degree Examination, July/August 2021 Digital Image Processing

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions.

- 1 a. With neat block diagram explain the fundamental steps in image processing. (10 Marks)
b. Explain the components of general purpose image processing system. (10 Marks)
- 2 a. Explain the structure of human eye in detail. (10 Marks)
b. Explain the brightness adaption and discrimination. (10 Marks)
- 3 a. Explain image acquisition using single sensor and multiple sensors. (10 Marks)
b. Explain the concept of image sampling and quantization with necessary diagrams. (10 Marks)
- 4 a. Explain the spatial and gray level resolution. (10 Marks)
b. Consider the image segment shown below :
Let $v = \{0, 1\}$ compute the lengths of the shortest 4, 8 and m – path between p and q. If path doesn't exists explain why?

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

c. Explain the different distance measurement between the pixels of an image. (05 Marks)
(05 Marks)
- 5 a. For the given orthogonal matrix A and image u obtain the transformed image and basis images :
$$A = \frac{1}{\sqrt{2}} \begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}, u = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}.$$
 (10 Marks)
b. Derive the expression for 2D circular convolution theorem. (10 Marks)
- 6 a. Explain the Hadamard transform with its properties for $n = 3$. (10 Marks)
b. Explain the Haar transform with its properties for $N = 3$. (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.

- 7 a. Explain the following gray level transformation in image enhancement.
 i) Image Negatives
 ii) Gray level Slicing
 iii) Contrast stretching. (10 Marks)
- b. Perform image histogram equalization for the image.

$$\begin{bmatrix} 0 & 0 & 0 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 \\ 2 & 2 & 2 & 2 & 3 \\ 3 & 3 & 3 & 3 & 3 \\ 0 & 0 & 0 & 7 & 7 \end{bmatrix}$$

Plot the graph of histogram equalized image. (10 Marks)

- 8 a. Explain the different filters used for smoothing in frequency domain. (10 Marks)
- b. With neat block diagram explain homomorphic filtering approach for image enhancement. (10 Marks)
- 9 a. Explain a model of the image degradation/ Restoration process. (04 Marks)
- b. Formulate and characterize different noise models. (06 Marks)
- c. Explain the linear position invariant degradation. (10 Marks)
- 10 a. Explain RGB and HSI colour models with their conversions. (10 Marks)
- b. Write a note on the following pseudo image processing techniques :
 i) Intensity slicing
 ii) Gray level and colour transformation. (10 Marks)
