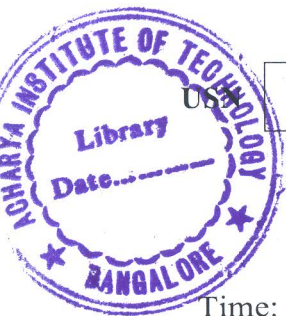


# CBCS SCHEME



17MT754

## Seventh Semester B.E. Degree Examination, Jan./Feb.2021 Digital Image Processing

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

### Module-1

- 1 a. With a neat block diagram, explain the fundamental steps involved in "Digital Image Processing". (10 Marks)
- b. Explain brightness adaptation with the help of suitable diagram. (10 Marks)

OR

- 2 a. With block diagram, explain the components of a general purpose image processing system. (10 Marks)
- b. With a neat sketch, explain the structure of human eye. (10 Marks)

### Module-2

- 3 a. Consider the image segment given in Fig. Q3 (a). Let  $V = \{0, 1\}$ . Compute the lengths of the shortest 4, 8 and m path between p and q. (06 Marks)

	3	1	2	1	(q)
	2	2	0	2	
	1	2	1	1	Fig. Q3 (a)
(p)	1	0	1	2	

- b. Let p and q be the two pixels at coordinates (100, 120) and (130, 160) respectively. Compute (i) Euclidian distance (ii) Chess board distance. (04 Marks)
- c. Explain the sampling and quantization and representation of digital image. (10 Marks)

OR

- 4 a. Explain the following terms between pixels :
  - (i) Neighbors of a pixel.
  - (ii) Adjacency
  - (iii) Connectivity.
  - (iv) Region. (10 Marks)
- b. With a neat diagram, explain image acquisition using single sensor, linear sensor strip and circular sensor strip. (10 Marks)

### Module-3

- 5 a. For a  $2 \times 2$  transform A and the image u  $A = \frac{1}{\sqrt{2}} \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$ ,  $u = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ ,

Calculate the transformed image V and the bias images. Also reconstruct the original image u by inverse transform. (10 Marks)

- b. Discuss any three properties of 2D Discrete Fourier transform. (10 Marks)

OR

- 6 a. Compute the Haar Basis for  $N = 2$ . (10 Marks)  
 b. Write the expression for 2D discrete cosine transformation pair. Also compute DCT matrix for  $N = 4$ . (10 Marks)

**Module-4**

- 7 a. Explain the following image enhancement techniques, (10 Marks)  
 (i) Contrast stretching.  
 (ii) Intensity level slicing.  
 (iii) Bit-plane slicing.  
 b. A 3 bit image of size  $64 \times 64$  has intensity distribution as shown in table. Implement histogram equalization and plot the same.

Gray level	0	1	2	3	4	5	6	7
Number of pixels	790	1023	850	656	329	245	122	81

(10 Marks)

OR

- 8 a. Briefly explain homomorphic filtering and its implementation. (10 Marks)  
 b. Write the functions for the below smoothing frequency domain filters: (10 Marks)  
 (i) Ideal low pass filter.  
 (ii) Butterworth low pass filter.  
 (iii) Gaussian low pass filter.

**Module-5**

- 9 a. Write the functions and characteristics for different noise models. (10 Marks)  
 b. Derive the equation for Wiener filtering. (10 Marks)

OR

- 10 a. Write a note on RGB colour model with neat diagram. (10 Marks)  
 b. What is pseudo colour image processing? Explain intensity slicing with neat sketches. (10 Marks)

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