B.E. Computer Science & Engineering Seven Semester **CSE701 - Digital Image Processing**

	Note	 All questions carry equal marks. Due credit will be given to neatness and adequate dimensions. Illustrate your answers wherever necessary with the help of neat sketches. 					
1.	a)	 An Image segment is shown below, Let, V be the set of gray level values used to define connectivity in the image. Compute D₄, D₈ and D_m distances between pixels, 'p' and 'q' for: i) V = {2,3} 					
		ii) $V = \{2,6\}$ $\begin{array}{c ccccccccccccccccccccccccccccccccccc$					
	b)	With the help of diagram explain structure of human visual system. OR	6				
2.	a)	With the help of diagram, Explain the fundamental steps in Digital Image processing.	8				
	b)	What is histogram equalization. Perform the histogram equalization for 8x8 image shown below.Gray levels01234567No. of Pixels98114101543	8				
3.	a)	Explain 2-D Hadamard Transform and it's properties.					
	b)	Explain about Haar Transform and Generate it's 2x2 & 4x4 matrix.					
		OR					
4.		Explain Discrete Cosine Transform (DCT). Find the DCT for the given Image using	16				

matrix multiplication method.

f(x,y) =

2	4	4	2
4	6	8	3
2	8	10	4
3	8	6	2

- 5. Explain the following filters with example. a) ii)
 - High Boost filter. i)

Gaussian High Pass filters.

1

P. Pages: 2

Time : Three Hours

8

GUG/W/18/1747

Max. Marks: 80

b)

OR

- **6.** a) Give the relationship between Filtering in the spatial and frequency domain.
 - b) Find DFT of the given image.

0	1	2	1
1	2	3	2
2	3	4	3
1	2	3	4

7. a) Explain Huffman Image compression techniques. Find Huffman code and average number 10 of bits per pixel for the 3-bit greyscale image.

Grey Values	0	1	2	3	4	5	6	7
Probability	0.19	0.25	0.21	0.16	0.08	0.06	0.03	0.02

b) Explain prewitt and sobel operator.

OR

8. a) Explain Run-length coding. Apply the RLE technique on given image. $\begin{bmatrix} 1 & 1 & 0 & 0 \end{bmatrix}$

- $\begin{bmatrix} 1 & 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 & 1 \\ 1 & 1 & 0 & 0 & 0 \end{bmatrix}$
- b) Write and explain Region based segmentation.
- 9. a) Give comparison of grey-scale erosion and dilation. Also Find dilated output of a given 12 Image A and structuring element is B.

$$\mathbf{A} = \begin{bmatrix} 1 & 0 & 0 & 0 & 1 \\ 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 1 & 1 \end{bmatrix}, \ \mathbf{B} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

- b) Explain Digital signature?
- OR

10. a) Explain Fourier Descriptors.

- Write short note on **any two.**
 - i) Chain codes.
 - ii) Hit-or-Miss transform.
 - iii) Opening or closing.

2

8

8

6

8

8

- 4
- 8
- ~
- 8