

TE/IT/20-21 'C' scheme/Sem VI

Duration: 3 hrs

10

[Max Marks: 80]

- N.B. : (1) Question No 1 is Compulsory.
 (2) Attempt any THREE questions out of the remaining FIVE.
 (3) All questions carry equal marks.
 (4) Assume suitable data, if required and state it clearly.

Q.1) Explain the following:

- (i) Dynamic Range Compression
- (ii) Edge Detection Operators
- (iii) Vector Quantization
- (iv) Erosion and Dilation

[20]

Q.2 (a) For given 5x5 image compute the D_e , D_4 , D_8 and D_m distances between pixels p and q .
 Let V be the set of gray levels to define the similarity criteria, where $V = \{2, 3\}$.

[10]

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

(b) What are point-processing techniques for enhancement? Explain Contrast Stretching in detail.

[10]

Q.3 (a) Explain filtering in the spatial domain.

[10]

(b) Equalize the given histogram and plot the new equalized histogram. Show necessary Steps.

[10]

Gray Level	0	1	2	3	4	5	6	7
No. of Pixels	70	100	40	80	60	40	08	02

[10]

Q.4 (a) Explain Homomorphic filtering with the help of a block diagram.

[10]

(b) Compute the Hadamard transform of the given image:

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

Q.5 (a) Consider an 8-pixel line of gray scale data: [12, 12, 13, 13, 10, 13, 57, 54] which has been uniformly quantized with 6-bit accuracy. Construct its 3-bit IGS code. Compute the RMS error and rms signal to noise ratio for the decoded IGS code.

[10]

(b) Explain Lossless predictive coding with the help of suitable encoder and decoder models.

[10]

Q.6 Write short notes on ANY TWO of the following:

[20]

- (a) Chain codes and Shape Number
- (b) Hit - or - Miss Transform
- (c) Graph Theoretic Technique

---X---X---X---

20/12/23

TE/Sem-VI/IT/C-scheme/IP

Duration: 3hrs

[Max Marks: 80]

(10)

N.B. : (1) Question No 1 is Compulsory.

(2) Attempt any three questions out of the remaining five.

(3) Assume suitable data, if required and state it clearly.

Attempt any FOUR

[20]

- 1
 - A Differentiate between 8 connectivity and 'm' connectivity.
 - B Explain how point processing technique differ from mask processing technique
 - C What do you mean by point, line and edge in an image? Name some techniques to detect them.
 - D Justify/Contradict the statement "Run length coding is lossless compression"
 - E Write different properties of DCT. Explain any one in detail.
- 2 A Apply histogram equalization to the given following image and show the histogram equalized image.

[10]

0	1	1	3	4
7	2	5	5	7
6	3	2	1	1
1	4	4	2	1

- B Explain Huffman coding algorithm.
- 3 A Explain Gray level slicing and contrast stretching with examples.
- B Write a short note on vector quantization.
- 4 A Write the steps of filtering in frequency domain.
- B Apply Discrete Walsh transform to the following sequence:
 $f(x) = \{1, 2, 0, 3\}$
- 5 A Draw the block diagram of components of image processing and explain it.
- B Write a short note on region based segmentation.
- 6 A Give the difference between chain code and shape number with an example.
- B Explain dilation, erosion, opening and closing morphological operations

[10]

[10]

[10]

[10]

[10]

[10]

[10]

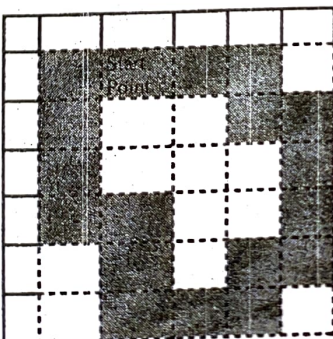
[10]

[10]

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	_____ is not a lossless compression algorithm
Option A:	Huffman coding
Option B:	Arithmetic coding
Option C:	Dictionary based coding
Option D:	Vector quantization
2.	Operations on single pixels of a digital image are known as _____.
Option A:	Point Operation
Option B:	Diagonal Pixel Operation
Option C:	Value Transformation
Option D:	Neighbours pixel Operation
3.	_____ filter works best to remove salt and pepper noise.
Option A:	Low pass
Option B:	High pass
Option C:	Median
Option D:	Max
4.	In _____ technique an entire sequence of source symbol is assigned a single code.
Option A:	Arithmetic Coding
Option B:	LZW Coding
Option C:	Huffman Coding
Option D:	Run-length Coding
5.	Three basic types of discontinuities are _____
Option A:	Lines, Edges, Planes
Option B:	Points, Lines, Planes
Option C:	Edges, Lines, Points

Option D:	Point, Planes, Edges
6.	The starting pixel of region growing process is called
Option A:	base pixel
Option B:	seed pixel
Option C:	original pixel
Option D:	image pixel
7.	_____ is the foremost step in Image Processing.
Option A:	Morphological Processing
Option B:	Image acquisition
Option C:	Segmentation
Option D:	Compression
8.	_____ is not a property of 2D Discrete Fourier Transform.
Option A:	Separability
Option B:	Real
Option C:	Periodicity
Option D:	Conjugate
9.	_____ is not a region based segmentation technique.
Option A:	Region growing
Option B:	Split and merge
Option C:	Region thinning
Option D:	Region splitting
10.	_____ is a horizontal line detection mask.
Option A:	$\begin{bmatrix} 2 & -1 & -1 \\ -1 & 2 & -1 \\ -1 & -1 & 2 \end{bmatrix}$
Option B:	$\begin{bmatrix} 1 & 2 & -1 \\ -1 & 2 & -1 \\ 1 & 2 & -1 \end{bmatrix}$
Option C:	$\begin{bmatrix} -1 & -1 & 2 \\ -1 & 2 & -1 \\ 2 & -1 & -1 \end{bmatrix}$
Option D:	$\begin{bmatrix} -1 & -1 & -1 \\ 2 & 2 & 2 \\ -1 & -1 & -1 \end{bmatrix}$

TE(IT) Sem VI 'C' scheme IP QP Code: 9428) ③

Q.2	Solve any Four out of Six.		[5 Marks Each]	Marks																		
A	List and define types of distance measures.			5																		
B	Draw the different steps in digital image processing.			5																		
C	Show transform matrix for N=4 and Give three properties each: (i) Discrete Walsh Transform (ii) Discrete Cosine Transform			5																		
D	Draw a block diagram showing processing of Homomorphic Filtering and explain the method.			5																		
E	Explain in brief Hough Transform.			5																		
F	Give a DFT Transform matrix and Apply it to find transformed coefficients for $f(x) = \{2, 1, 3, 1\}$.			5																		
Q.3	Solve any Two Questions out of Three.		[10 Marks Each]																			
A	Perform histogram equalization for the following pixel distribution: <table border="1"><tr><td>Gray Level</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr><tr><td>Frequency</td><td>10</td><td>0</td><td>4</td><td>15</td><td>25</td><td>6</td><td>0</td><td>4</td></tr></table> Draw original histogram and equalized histogram.			Gray Level	0	1	2	3	4	5	6	7	Frequency	10	0	4	15	25	6	0	4	10
Gray Level	0	1	2	3	4	5	6	7														
Frequency	10	0	4	15	25	6	0	4														
B	Explain following morphological methods with example: (i) Erosion (ii) Dilation			10																		
C	Illustrate Arithmetic Coding and Decoding.			10																		
Q.4	Solve any Two Questions out of Three.		[10 Marks Each]																			
A	List all Point Processing Techniques and explain any two with examples.			10																		
B	Obtain the four directional Chain Code and Shape number representation using 4-directional with the given starting point as shown in the image with dark filled cell as pixel is the boundary of the object. 			10																		

TE(IT) Sem VI 'C' Scheme IP QP Code: 94281

List all region based segmentation techniques. Apply region based segmentation on a 3-bit image of size 4x4. Assume Threshold = 3, a pixel value 7 as starting point, and use 4-way connectivity.

10

C

1	0	2	0
0	0	6	6
5	5	5	5
7	6	6	0

XX***