

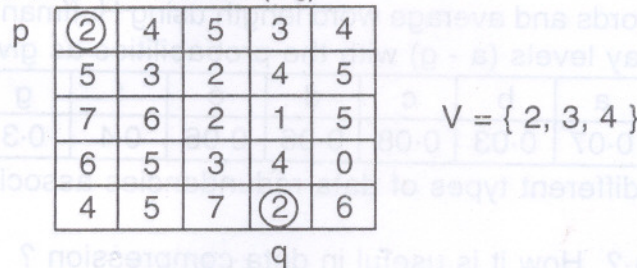
B.E. (Comp) Sem. VII (CR)
Image Processing
 (3 Hours)

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- N.B.** (1) Question No. 1 is **compulsory**.
 (2) Attempt any **four** questions out of remaining **six** questions.
 (3) Assume **suitable** data wherever **necessary** and state them **clearly**.

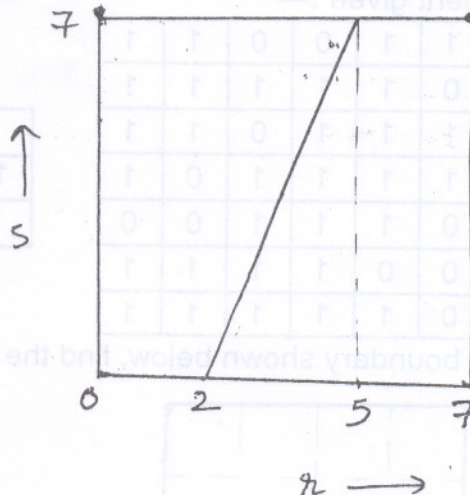
1. Justify the following statements :— 20
- (a) Median filter is the best filter to remove salt and pepper noise in an image.
 - (b) Image resulting from poor illumination could be quite difficult to segment.
 - (c) The process of removing the psychovisual redundancy is a lossy technique.
 - (d) Convolution in spatial domain is multiplication in frequency domain.
 - (e) Mixed adjacency is introduced to eliminate the ambiguities that often arise when 8-adjacency is used.

2. (a) For pixels p and q shown in **figure** with co-ordinates (1, 1) and (4, 4), find — 2
- (i) Euclidean distance 3
 - (ii) City block distance (D_4) 3
 - (iii) Chess board distance (D_8)



- (b) Perform contrast stretching on the image segment shown below according to the **figure**. Draw the histogram of the original image and contrast stretched image. 4+2+2

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



- (c) What is false contouring ? When does it happen in digital images ? 4

3. (a) Suppose that a 64×64 8 level image has the following gray level distribution. **6+2+2**

Gray Level r_k	0	1	2	3	4	5	6	7
No. of pixels n_k	780	1024	855	650	335	240	125	83

Perform histogram equalization and draw the original and equalized histogram.

- (b) Differentiate between Point Processing and Mask Processing Techniques. **4**

- (c) Classify the following Image processing technique into point processing and mask processing :— **6**

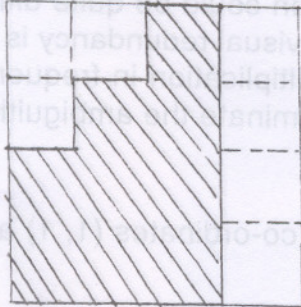
- (i) Digital negative
- (ii) Laplacian filter
- (iii) Bit plane slicing
- (iv) Power log transformation
- (v) Gray level slicing
- (vi) Derivative filtering.

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4. (a) Find the 2D-DFT of the following image segment using any FFT algorithm :— 12

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

(b) Segment the image shown in the **figure** using Region splitting and Merging technique. 4+4
Show the Quadtree representation corresponding to your segmentation :—



5. (a) Find a set of code words and average word length using Huffman coding scheme 8
for a set of input gray levels (a - g) with the probabilities as given below :—

Symbol	a	b	c	d	e	f	g
Probability	0.07	0.03	0.08	0.06	0.06	0.4	0.3

(b) Name and explain different types of data redundancies associated with digital images. 6

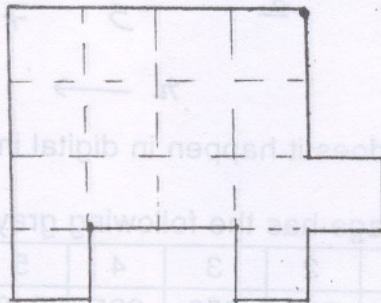
(c) What is IGS coding ? How it is useful in data compression ? 6

6. (a) Perform the dialation and erosion operations on the image below with the 4+4
structuring element given :—

1	1	1	0	0	1	1
1	0	1	1	1	1	1
0	1	1	1	0	1	1
1	1	1	1	1	0	1
1	0	1	1	1	0	0
0	0	0	1	1	1	1
0	0	1	1	1	1	1

	1	
1	1	1
	1	

(b) For the following boundary shown below, find the chain code and shape number. 3+3



(c) Define moments of an image. Explain how they can be used in shape analysis of an image. 6

7. Write short notes on any **four** of the following :— 20

- (a) Hough transform
- (b) Closing and opening
- (c) Transform coding
- (d) Haar transform
- (e) Fourier descriptors.