

Duration: 3hrs

[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.

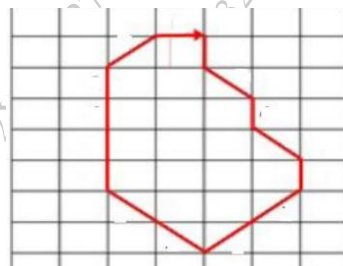
Q. 1	Attempt any FOUR	Marks
	a) Define various distance measures used in digital image processing. Specify their loci.	5
	b) Define morphological closing and opening of a binary image with mathematical expressions.	5
	c) Explain how wavelet transform stands different than other transforms in frequency domain processing of a digital image. State it's utility.	5
	d) Define what is an "edge" in a digital image. State the Prewitt and Sobel edge detection masks.	5
	e) What is a co-occurrence matrix? Where is it used?	5

Q.2 a) Apply contrast stretching to the following image and obtain output image. The parameters for the transformation are: $r_1 = 3, r_2 = 5, s_1 = 2, s_2 = 6$. The symbols have usual meanings. Draw the transformation characteristic too.

4	3	2	1
3	1	2	4
5	1	6	2
2	3	5	6

b) Compare ideal, Butterworth and Gaussian filtering, on their equations, 3-D characteristics, advantages/flaws if any and application.

Q.3 a) Find chain code and shape number using 8-connectivity (clockwise direction) for the given image. Arrow indicates starting point. Also explain why shape number is considered to be rotation-invariant.



b) Explain the Canny edge detection algorithm step by step. State the points on which Canny edge detection algorithm differs from other edge detection techniques.

- Q.4** a) Perform histogram equalization for the following image. Plot the original and the equalized histogram. Also draw the transformation function. 10

Intensity	0	1	2	3	4	5	6	7
Number of pixels	70	100	40	60	10	70	10	40

- b) Illustrate the split-and-merge segmentation technique with a suitable example. 10

- Q.5** a) Explain the K-means algorithm in detail, with an example. 10

- b) Explain basic global thresholding. 10

- Q.6** a) Explain the functioning of the SVM algorithm with proper diagrams. 10

- b) Describe what do you mean by Fourier transform of boundary? State its application. 10
