

(3 Hours)

[ Total Marks : 80

- N.B. : (1) Question No 1 is compulsory.  
 (2) Attempt any three from remaining.  
 (3) ASSUME suitable data, if required.

1. Attempt the following :-

- a) What do you mean by image file format? Explain any two frequently used image file formats? 4
- b) Explain any four properties of 2D D.F.T. 4
- c) Justify Lossy compression is not suitable for compressing executable files. 4
- d) What is m-connectivity amongst pixels. Explain with example. 4
- f) For the given 3-bit 4x4 size image perform 4
- (i) Intensity level slicing with background for  $r1 = 2$
- (ii) Negation

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

2. a) What is a histogram of a digital image? Given below is a Grey Level Histogram of a Image, Compute Histogram Equalization. Draw histogram of input & output Image. 10

Grey Levels	0	1	2	3	4	5	6	7
No. of Pixels	790	1023	850	656	329	245	122	81

- b) Explain the following frequency domain filters. 10
- (i) Ideal Low Pass filter. (ii) Butterworth High Pass filter.
3. a) Explain region Based & boundary Based segmentations. Explain the use of thresholding in both the cases. 10
- b) Consider the image given below. Calculate the direction of the edge at the centre point of the image. 10

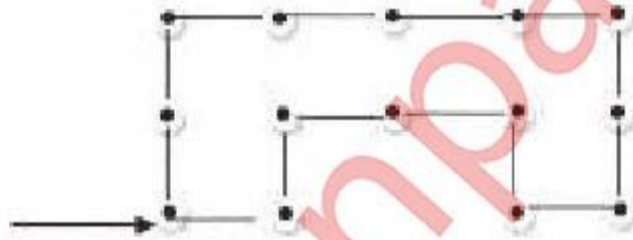
$$F = \begin{matrix} 50 & 60 & 70 \\ 5 & 50 & 80 \\ 7 & 9 & 50 \end{matrix}$$

[ TURN OVER]

4. a) Calculate the efficiency of Huffman Code for the following symbol whose probability & occurrence is given below :- 10

Symbol	Probability
A1	0.9
A2	0.06
A3	0.02
A4	0.02

- b) Explain the following morphological operations with example 10  
 (i) Dilation  
 (ii) Hit or Miss Transform
5. a) Explain smoothing & sharpening Filters in spatial domain. What are the properties that these masks must satisfy. 10  
 b) Obtain four directional chain code & shape no. representation of the following image. 5



- c) Explain fundamental steps in digital Image processing. 5
6. Write short notes on :- (Any four) 20  
 i) Homomorphic Filtering  
 ii) Bit Plane Coding  
 iii) Hough Transform  
 iv) Digital Watermarking  
 v) Content Based Image Retrieval  
 vi) Authentication

-----