

(3 hours)

[80 marks]

Instructions:

Question 1 is compulsory.

Answer any 3 from remaining 5 Questions.

Figures to the right indicate full marks.

Assume suitable data wherever necessary

- Q1. a. Explain 4, 8 and m connectivity between pixels (5)
 b. Explain euclidean, D4, D8 and Dm distance by taking a suitable example (5)
 c. How is line detected? Explain using the operators and also demonstrate by taking a set of points how edge linking can be done. (5)
 d. What is a Median filter, maximum filter and minimum filter? When is the median filter not effective in noise removal (5)

- Q2. a. Do histogram equalisation on the following image which has 8 discrete pixel levels (0 - 7), transforming it into a histogram equalised image also with 8 discrete grey levels in the range (0-7). (10)

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

- b. What is the effect of repeatedly applying a contrast stretching and intensity slicing preserving background on a digital image (10)

- Q3. a. Consider an 8- pixel line of gray-scale data, {12, 10, 13, 13, 10, 13, 57, 54}, which has been uniformly quantized with 6-bit accuracy. Construct its 3-bit IGS code. (10)

- b. Given an input image F of size (3 X 3). Find filtered image R using median filter using mask M. (10)

F =

3	2	1
5	2	6
7	9	1

R =

R1	R2	R3
R4	R5	R6
R7	R8	R9

M =

0	1	0
1	1	1
0	1	0

- Q4. a. Show that a high pass-filtered image in the frequency domain can be obtained by using the method of subtracting a low pass filtered image from the original (10)

- b. How many Huffman codes possible for a 3-symbol source? Construct these codes. (10)

Q5. a. Segment the given 8X8 image using Region splitting. Let the predicate be $\text{threshold} \leq 3$. Also draw the quad tree. (10)

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

b. Explain the process of high boost filtering mathematically (10)

Q6. Write Short note: (Any 4) (20)

- Biometric Authentication
- Hough Transform
- Opening and Closing Operations
- Justify the statement Laplacian is not a good edge detector
- Differentiate lossy and lossless Compression