

Time: 3 Hours

Marks: 80

Note:

1. Question No.1 is compulsory.
2. Solve any three from the remaining questions.
3. Assume suitable data wherever it is necessary.

1. Answer any four

20

- (a) Can two different images have the same histogram? Justify your answer.
- (b) What are the advantages of wiener filter over an inverse filter and when will wiener filter reduce to inverse filter.
- (c) What is hit-or-miss transformation? Explain in brief.
- (d) Justify Discrete Cosine Transform is real and orthogonal.
- (e) Explain the basics of sampling the video signals.

2 (a) Explain averaging filter used for enhancement of images? Filter the following image using a 3x3 neighborhood averaging by assuming (a) zero padding and (b) pixel replication.

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

- (b) Discuss the different filters used in frequency domain filtering. Explain the ringing effect in ideal low pass and high pass filters.

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3 (a) Prove the separable and spatial shift property of Fourier transform.

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- (b) Compute the 2D DFT and IDFT of the 4x4 gray scale image $f(m, n)$ given below .

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1	2	3	4
5	6	7	8
1	2	3	4
5	6	7	8

- 4 (a) Explain opening and closing operations used for morphological image processing. Apply opening and closing operations the following image using the given structuring element. 10

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

0	1	0
1	1	1
0	1	0

- (b) Find the minimum cost path for edge linking using graph theoretical technique for the given image. Show the cost of all the paths on the graph. 10

5	6	1
6	7	0
7	1	3

- 5 (a) Explain the wiener filter used for restoration of degraded images. 10

- (b) Explain in detail block based motion estimation techniques for video signals. 10

6. Write short notes on (Any three) 20

- (a) Adaptive median filter
(b) Discrete Cosine Transform
(c) Adjacency, connectivity of pixels
(d) Region filling