

Time: 3 Hrs

Total marks: 80

**Instructions**

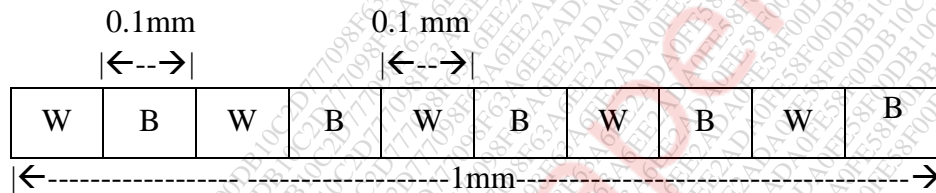
1. Q1 is compulsory
2. Solve any 3 from remaining
3. Assume suitable data if necessary

Q1 Answer the following

1. Identify the noise in following image and remove it by filtering 4M

19	0	20	21
21	150	25	26
22	23	24	27

2. For given figure, Improve and reduce the spatial resolution, consider W= White line, B = Black line, Size of each white and black line is 0.1 mm, total length is 1 mm. 4M



3. Explain the steps in digital image processing 4M
4. Write Hadamard transform matrix for N=4 and its application 4M
5. Explain the effect of illumination in thresholding 4M

Q2

1. Find Haar basis for N=4 10M
2. Explain image enhancement using frequency domain filtering 10M

Q3

1. For given image find and equalize histogram 07M

10	12	8	9
10	12	12	14
12	13	10	9
14	12	10	12

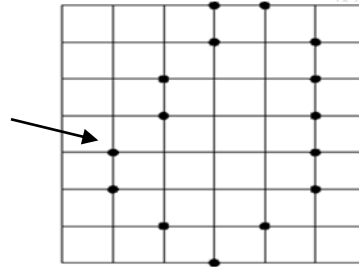
1. Apply Averaging filter on given image Use pixel replication for padding. 05M

4	8	9
12	15	18
30	32	46

2. Explain 1) Sharpening using 2<sup>nd</sup> order derivative 2) Unsharp masking and high boost filtering 8M

Q4

1. Draw PDF and write equation for following noise models 04M
  - a) Gaussian Noise
  - b) Rayleigh noise
2. Find the chain code, shape number for given image using 8-connectivity. Use anti-clockwise direction. (Arrow shows starting point) 6M



3. Find the border for image F given below using 2 different structural elements A and B respectively 10M

F=

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

A=

0	1	0
1	1	1
0	1	0

B=

1	1	1
1	1	1
1	1	1

Q5

1. Explain SVM in detail? 10M
2. Explain canny edge detection algorithm with proper steps 10M

Q6

- Write Short Notes on any 2 of the following 20M
1. Geometric border representation
  2. B-spline algorithm
  3. Statistical texture description methods

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