Time: 3 Hrs **Total marks: 80**

Instructions

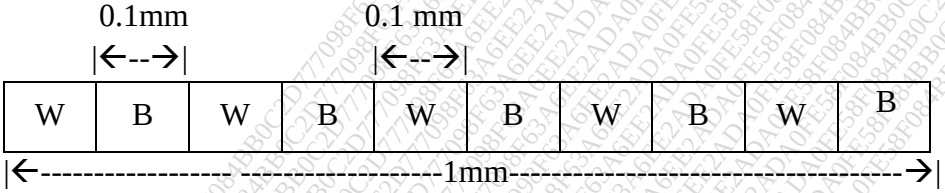
1. Q1 is compulsory
2. Solve any 3 from remaining
3. Assume suitable data if necessary

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

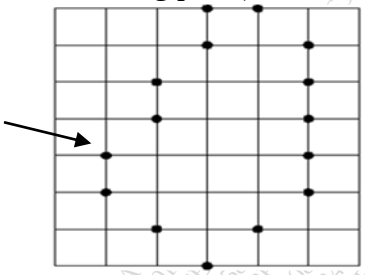
1. Apply Averaging filter on given image Use pixel replication for padding. 05M

4	8	9
12	15	18
30	32	46

2. Explain 1) Sharpening using 2nd 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	0
0	1	1	1	1	1	1	1	1	0
0	1	1	1	1	1	1	1	1	0
1	1	1	1	0	1	1	1	1	1
0	1	1	1	1	1	1	1	1	1
0	1	1	1	1	1	1	1	1	0
0	1	1	1	1	1	1	1	1	0
0	0	0	0	0	1	1	1	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

****