

Time: 3 Hrs

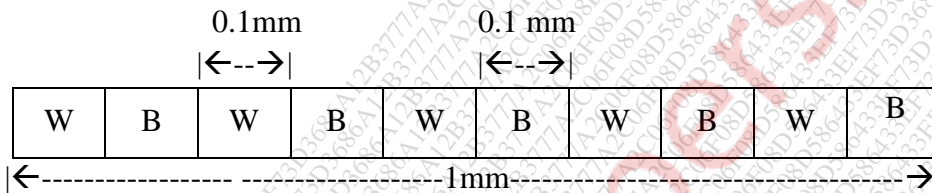
Total marks: 80

**Instructions**

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

Q1 Answer the following

1. Image resulting from poor illumination could be difficult to segment, State true or false, Justify your answer 4M
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. Two images have same histogram which of the following properties must they have in common 1) same total power 2) same entropy 3) same inter pixel covariance function Justify your answer 4M
4. Compare 2-D motion and optical flow 4M
5. Draw and explain the model of image degradation/restoration process 4M

Q2

1. For given image find and equalize histogram 8M

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

2. Explain 1) Contrast stretching 2) Log Transformation with neat diagrams 6M
3. Prove Periodicity and symmetry properties of DFT 6M

Q3

1. Apply 1) Averaging filter 2) Median filter on following image. Use pixel replication for padding. No marks if procedure not followed 8M

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
3. Let  $V = \{0,1\}$ . Compute 1) Euclidean distance 2) City block distance 3) Chess board distance between pixels p and q 4M

0	1	1	1
1	0	0	1 (q)
1	1	1	1
1 (p)	1	1	1

Q4

1. Draw PDF and write equation for following noise models 6M
  - a. Gaussian Noise
  - b. Rayleigh noise
  - c. Erlang noise
2. Apply bit plane slicing on following image

5	7	5
4	6	3
1	3	2

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

F=

```

0011111011110
0111111111110
0111111111110
1111011111111
0111111111111
0111111111110
0111111111110
000001111000
    
```

A=

0	1	0
1	1	1
0	1	0

B=

1	1	1
1	1	1
1	1	1

Q5

1. Classify video frames? What is GOP? 6M
2. Which are the digital quality measures? Explain any 2 6M
3. Find DCT of given image by finding kernel function 8M

4	2	2	1
2	5	8	9
2	4	5	2
2	3	2	2

Q6

1. Explain motion estimation criterion based on optical flow equation 10M
2. Write Short Notes on **any two** 10M
  1. Exhaustive block matching algorithms
  2. Binary Feature Matching
  3. Motion Representation