The LNM Institute of Information Technology
ECE and CCE
Introduction to Image Processing (Quiz-1), Date: 05/09/2019

Name: Roll. No.

Q1. [4x1=4]

a) 128 x 128 x 8 number of bits are required to store a 128 X 128 image with 256 gray levels.
b) Digitizing coordinates of image is called sampling.
c) The enhancement technique used to highlight specific range of intensities and suppress other intensity values is intensity level slicing.
d) Large value of gamma will produce darker image. (darker/brighter)

Q2. Compute the Euclidean Distance (D_1), City-block Distance (D_2) and Chessboard distance (D_3) for points p and q, where p and q be (3, 0) and (2, 3) respectively. Give answer in the form (D_1, D_2, D_3). [3]

Ans: Euclidean Distance: $\sqrt{10}$

City-block Distance: 4

Chessboard Distance: 3

Q3. Given following 4 x 4 image (**Fig. 1**). Show the output of the image after applying unsharp masking (use 3 x 3 median filter for smoothening, apply zero padding for boundary pixels) [4]

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

Fig.1

Ans: Steps:

- Blur the image (done by median filter)

0	3	3	0
3	4	4	3
2	3	3	2
0	1	2	0

- $f_{sharp} = 2f(x,y) - f_b(x,y)$

16	5	5	10
9	2	2	1
0	7	5	4
4	9	0	4

Q4. Consider the histogram (2, 2, 4, 8, 16, 32, 64, 128), where the number of gray levels is 8. What is the output of histogram equalization? [4]

Ans:

Input intensity	No. of pixels	PDF	CDF	Output intensity
0	2	0.0078	0.0078	0
1	2	0.0078	0.0156	0
2	4	0.0156	0.0312	0
3	8	0.0313	0.0625	0
4	16	0.0625	0.1250	0
5	32	0.1250	0.2500	1
6	64	0.2500	0.5000	3
7	128	0.5000	1	7
Total:	256			

Thus histogram for input and output is given as follows: