

The LNM Institute of Information Technology
Multimedia Processing and Applications
Mid Term Exam 2018-19

Duration: 90 minutes

Maximum Marks: 20

- Q1 Given the following 3x3 image with eight intensity levels. It is required to do a bit-plane slicing of the given image. Show the Bit 2 plane.

[2 Marks]

5	7	3
0	5	0
1	0	2

- Q2 Given the following 3x3 image. Apply geometric mean filter and show pixel value at coordinate shown as $f(x, y)$.

[2 Marks]

3	4	5
4	2	4
4	5	4

	$f(x, y)$	

- Q3 With reference to an adaptive filter applied to any point (x, y) of a noisy image $g(x, y)$, answer the following in one sentence:

- (a) If the local variance is high compared to the variance of the noise corrupting the original image, what should be the response of the filter and why?
- (b) If the two variances are equal, what is the response of the filter and why?

[2+2=4 Marks]

- Q4 A unit square represented by $\begin{bmatrix} 0 & 0 \\ 1 & 0 \\ 1 & 1 \\ 0 & 1 \end{bmatrix}$ is transformed by a 2x2 transfor-

mation matrix. The resulting position vectors are $\begin{bmatrix} 0 & 0 \\ 2 & 3 \\ 8 & 4 \\ 6 & 1 \end{bmatrix}$. Determine the transformation matrix used.

[3 Marks]

- Q5 The transformation matrix obtained after rotating an image by an angle θ around its origin is given by:

$$\begin{bmatrix} x' \\ y' \end{bmatrix} = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix}$$

Obtain the transformation matrix after rotating the image around a point (x_c, y_c) , other than the origin. [4 Marks]

~~Q6~~ Show (for 2-D case) that division of a line in the ratio $m:n$ is invariant to affine transformation. [5 Marks]