

**B.TECH.****THEORY EXAMINATION (SEM-VIII) 2018-19****DIGITAL IMAGE PROCESSING****Time : 3 Hours****Max. Marks : 100****Note : Be precise in your answer. In case of numerical problem assume data wherever not provided.****SECTION – A****1. Explain the following:****10 x 2 = 20**

- (a) What is Mean Square Error Restoration?
- (b) What do you mean by Dilation?
- (c) What is Mathematical Morphology?
- (d) What are Opening operations?
- (e) What are Closing operations?
- (f) What do you understand by Thinning?
- (g) What do you understand by Thickening?
- (h) What do you mean by Erosion?
- (i) Explain about various Degradation functions.
- (j) What is meant by Structuring elements?

**SECTION – B****2. Attempt any five of the following questions:****5 x 10 = 50**

- (a) What do you understand by Band-Pass Filter?
- (b) Draw and Explain Degradation model in detail.
- (c) Compute the histogram  $h[k]$  and cumulative histogram  $H[k]$  of a one dimension image  $f[x]$  below.

<b>f[x]</b>	1	3	2	5	3	4	3	3	3	2
<b>x</b>	0	1	2	3	4	5	6	7	8	9

- (i) Tabulate  $h[k]$  and  $H[k]$ .
  - (ii) Plot  $h[k]$  and  $H[k]$ .
- (d) What is Edge & Line detection?
  - (e) Explain Noise Model in detail.
  - (f) Consider the following figure where each small rectangle represents a pixel and the value inside it is gray level at the pixel. Hence the whole array represents a digital image  $f(x,y)$  of size  $5*5$ . The centre pixel  $f(2,2)$  is marked by underline. Applying the following  $3*3$  smoothing filters on this pixel.
    - (i) Mean Filter
    - (ii) Minimum
    - (iii) Maximum
    - (iv) Median
    - (v) Weighted filter given by following  $3*3$  masks

1	<u>2</u>	0
4	2	5
2	6	4

- (g) What do you understand by Band-Pass Filter?
- (h) Draw the block diagram of Restoration process & Explain each block.

**SECTION – C****Attempt any two of the following questions:****2 x 15 = 30**

- 3 What do you understand by Hit-Miss Transform and why they are used explain in brief?
- 4 Explain the Periodic Noise Reduction by Frequency Domain filtering.
- 5 What do you mean by various Arithmetic and Logical operations on image?