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B.TECH.

THEORY EXAMINATION (SEM-VIII) 2016-17

DIGITAL IMAGE PROCESSING

Time : 3 Hours

Note : *Be precise in your answer. In case of numerical problem assume data wherever not provided.*

SECTION - A

 $10 \ge 2 = 20$

Max. Marks : 100

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

SECTION – B

Attempt any five of the following questions: 2.

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

f[x]	1	3	2	5	3	4	3	3	3	2	5
X	0	1	2	3	4	5	6	7	8	9	

- Tabulate h[k] and H[k]. (i)
- Plot h[k] and H[k]. (ii)
- What is Edge & Line detection? **(d)**
- Explain Noise Model in detail. **(e)**
- **(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.
 - Mean Filter (i) (ii) Minimum
 - (iii) Maximum (iv) Median
 - Weighted filter given by following 3*3 masks (v)

1	2	0
4	2	5
2	6	4

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

SECTION - C

Attempt any two of the following questions:

$2 \ge 15 = 30$

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

$5 \ge 10 = 50$