Printed Pages:02 **Sub Code: NCS801**

Paper Id: 110253 **Roll No.** | | | | | | | | | | |

B.TECH
(SEM VIII) THEORY EXAMINATION 2018-19
DIGITAL IMAGE PROCESSING

Time: 3 Hours ***Total Marks: 100***

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x10 = 20**

a. Define components of image processing system.
b. Name some applications of digital image processing.
c. Write down mask of Sobel filter.
d. Differentiate between image enhancement and restoration.
e. Explain Laplacian filter.
f. Define Dilation Process.
g. What is the use of Boundary Extraction?
h. Define morphological image processing.
i. What is geometric transformation?
j. What are first order derivative filters?

SECTION B

2. Attempt any *three* of the following: **10 x 3 = 30**

a. Consider the image segment shown.

3	1	2	1 (q)
2	2	0	2
1	2	1	1
(p) 1	0	1	2

(i) Take V={0,1} and compute the lengths of shortest 4-,8-, and m-path between p and q. If a particular path does not exist between these two points, explain why.
(ii) Repeat for V={1,2}

b. What are the linear and non-linear smoothing filters in spatial domain? Compute the new pixel values after applying the 3x3 box filter on the following 5x5 matrix of a 3-bit image.

2	3	7	0	7
6	4	4	1	5
1	3	2	2	3
4	5	0	6	4
6	1	7	6	4

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c. Explain edge detection and edge linking. Also write the difference between edge detection and edge linking.

d. What is image restoration? Explain in detail the image restoration in presence of noise only.

e. Explain the following morphological operations: i. Opening ii. Closing iii. Region Filling.

SECTION C

3. Attempt any *one* part of the following: 10 x 1=10

(a) Explain low level, mid level and high level image processing. Also explain sampling and quantization process.

(b) Explain the process of filtering in frequency domain. Discuss low pass and high pass frequency domain filters.

4. Attempt any *one* part of the following: 10 x 1=10

(a) Explain piecewise linear transformations of image enhancement with suitable example.

(b) Write notes on: i. Bit plane slicing ii. Homomorphic Filter iii. Image histogram

5. Attempt any *one* part of the following: 10 x 1=10

(a) Discuss order statics filters with suitable example.

(b) Explain the process of minimum mean square error restoration.

6. Attempt any *one* part of the following: 10 x 1=10

(a) Explain thinning and thickening operation with suitable example.

(b) Prove the validity of the duality expressions $(A \bullet B)^C = \left(A^C o\hat{B}\right)$and $(A o B)^C = \left(A^C \bullet \hat{B}\right)$.

7. Attempt any *one* part of the following: 10 x 1=10

(a) Explain i. Stereo Imaging ii.Multi-level thresholding iii.Image Registration

(b) The so-called compass gradient operators of size 3x3 are designed to measure gradients of edges oriented in eight directions: E, NE, N, NW, W, SW, S, and SE. Give the form of these eight operators using coefficients valued 0, 1, or -1.

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