

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

Time: 3 Hours

Total Marks: 100

**Note 1.** Attempt all sections equally and give answers in a neat and orderly manner.

**SECTION A**

**1. Attempt all questions briefly. 2 x 10 = 20**

- a. Explain sampling and quantization.
- b. Explain spatial domain processing.
- c. What do you mean by image processing?
- d. Explain the steps in image processing with the help of block diagram.
- e. Give various grey level slicing techniques.
- f. What is contrast stretching?
- g. Suppose that A,B,C are three points prove that:  

$$(((A.B) \circ C).B) \circ C = (A.B) \circ C$$
- h. Explain the thresholding method of segmentation.
- i. What are blurring and ringing effects?
- j. How ringing effects can they be avoided?

**SECTION B**

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

- a. Explain the steps involved in sampling and quantization of images. How many minutes are required for a  $512 \times 512$  image with 256 grey levels at 300 baud rate for transmission? The transmission is accomplished using packets consisting of a start bit, a byte(8 bits) of information and a stop bit.(Baud rate means number of bits per second).
- b. Explain the action of the following spatial mask on an image.

|    |    |    |
|----|----|----|
| 0  | -1 | 0  |
| -1 | 4  | -1 |
| 0  | -1 | 0  |

- c. Describe any one image sharpening method in detail with example.
- d. What do you mean by Noise Models in image restoration? Describe WIENER Filter and Inverse Filtering.
- e. Perform linear stretching on the following data

|               |   |   |     |     |     |     |     |   |
|---------------|---|---|-----|-----|-----|-----|-----|---|
| Grey level    | 0 | 1 | 2   | 3   | 4   | 5   | 6   | 7 |
| No. Of pixels | 0 | 0 | 100 | 160 | 150 | 120 | 110 | 0 |

## SECTION C

3. Attempt any *one* part of the following: **10 x 1 = 10**
- (a) What do you mean by morphology? Discuss any one morphological algorithm with suitable example.
  - (b) What do you mean by thinning and thickening of an image? Discuss the method for thinning of an image.
4. Attempt any *one* part of the following: **10 x 1 = 10**
- (a) Suppose two discrete one dimensional functions are represented by the sequences:  
 $f=[5\ 7\ 11\ 8\ 2\ 6\ 8\ 9\ 7\ 4\ 3]$   $h=[1\ 2\ 1]$  compute  $f+h$ ,  $f \circ h$ ,  $f \otimes h$ ,  $f$ .
  - (b) Explain the Watershed Segmentation algorithm in detail with example.
5. Attempt any *one* part of the following: **10 x 1 = 10**
- (a) What do you mean by Feature thresholding in pixel based approach?
  - (b) Describe any one depth recover algorithm in detail.
6. Attempt any *one* part of the following: **10 x 1 = 10**
- (a) Explain different visions of human eye. And how an image is formed in the human eye?
  - (b) Compare the given basic frequency domain filters:  
(i) Ideal low pass (ii) Butterworth low pass (iii) Gaussian low pass
7. Attempt any *one* part of the following: **10 x 1 = 10**
- (a) What do you mean by power law transformation? Explain in detail.
  - (b) What is Hit-Miss Transform and why they are used in digital image processing? Explain in detail..