USN | | | | | | | | | | **15CS753**

Seventh Semester B.E. Degree Examination, Dec.2018/Jan.2019
Digital Image Processing

Time: 3 hrs.   Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. With a neat block diagram, explain the fundamental steps in image processing. **(10 Marks)**
   b. Explain the data structure of representing digital images. **(06 Marks)**

OR

2 a. Briefly explain the following terms:
   i)   Neighbours
   ii) Connectivity of pixels
   iii) Euclidean distance
   iv) City block distance **(08 Marks)**
   b. Consider the two image subsets S1 and S2 as shown in the Fig.Q2(b) for $V = \{1\}$. Determine whether these two subsets are (i) 4-adjacent (ii) 8-adjacent (iii) M-adjacent.
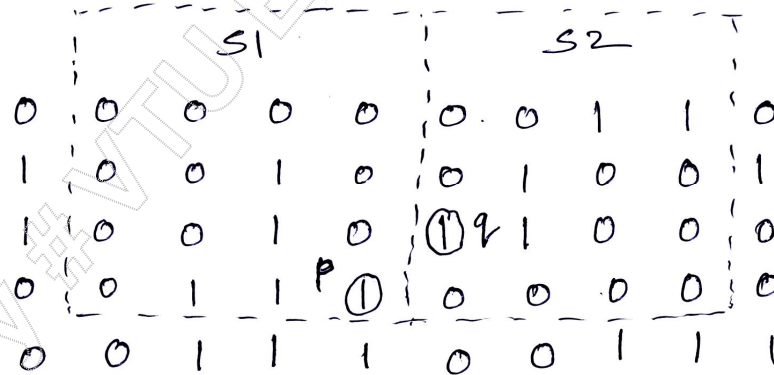

Fig.Q2(b) **(08 Marks)**

Module-2

3 a. With necessary graph, explain the following spatial image enhancement operations:
   i)   Image negative
   ii) Log transformations
   iii) Power-law transformation
   iv) Contrast stretching
   v)   Bit-plane slicing **(10 Marks)**
   b. Define image enhancement. Explain how arithmetic operators are helpful in image enhancement. **(06 Marks)**

OR

4 a. Define histogram and normalized histogram. Discuss histogram equalization for contrast enhancement. **(10 Marks)**
   b. Explain image smoothing in spatial domain. **(06 Marks)**

Module-3

5 a. Explain any four properties of two dimensional discrete Fourier transform. **(08 Marks)**
   b. Obtain the equation for DFT from the continuous transform of sampled function of one variable. **(08 Marks)**

OR

6 a. Explain any four application of digital image processing. **(08 Marks)**
   b. Explain the steps involved in filtering in frequency domain. **(08 Marks)**

Module-4

7 a. Explain how image segmentation algorithms are categorized. Discuss how point detection algorithm works. **(08 Marks)**
   b. Briefly explain the different phases of Canny edge detector. **(08 Marks)**

OR

8 a. Explain region growing and region splitting merging scheme of region based segmentation. **(10 Marks)**
   b. Explain concept of edge linking by local processing. **(06 Marks)**

Module-5

9 a. Explain with a neat diagram, a general compression system model. **(08 Marks)**
   b. Explain:
      i) Coding Redundancy
      ii) Spatial and Temporal redundancy with an example. **(08 Marks)**

OR

10 a. With a neat block diagram, explain block transform coding. **(06 Marks)**
   b. Explain the Huffman error-free compression technique. Given the following symbols and their probability in Fig.Q10(b) of occurrence, calculate the code and average length of the code.

Symbol	Probability
a2	0.4
a6	0.3
a1	0.1
a4	0.1
a3	0.06
a5	0.04

Fig.Q10(b) **(10 Marks)**

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