CBCS SCHEME

USN						17EC	IZ

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022 Digital Image Processing

Time: 3 hrs. Max. Marks: 100

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

Module-1

- a. Explain seven important applications of Digital Image Processing based on the EM energy or frequency range used. (07 Marks)
 - b. Describe the fundamental steps in digital image processing with a block diagram. (07 Marks)
 - c. Define D_e , D_4 and D_8 distance between the pixels. Let $V = \{0, 1\}$. Compute D_e , D_4 and D_8 between the pixels p and q for the image segment, Fig.Q1(c). Row and column number starts from (0, 0).

(06 Marks)

OR

- 2 a. Describe the various components of a general purpose image processing system with a block diagram. (07 Marks)
 - b. Explain the three methods of image acquisition using sensors.

(07 Marks)

c. Determine the memory capacity required for storing a 1024×1024 monochrome image with 256 intensity levels. If each byte is transmitted with a start bit and a stop bit using a 56 K baud modem then how many minutes are required for transmitting this 1024×1024 size image? What is the time required for 3000 K baud DSL without a start and stop bit?

(06 Marks)

Module-2

- 3 a. Describe six basic intensity transformation functions with equations, examples and graphs, including piecewise linear transformation functions. (12 Marks)
 - b. Write the original histogram, transformation function and equalized histogram for the 3 bit, 64×64 size image whose information is given in below table.

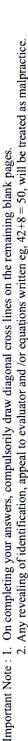
				$r_3 = 3$			$r_6 = 6$	$r_7 = 7$
n _K	790	1023	850	656	329	245	122	81

(08 Marks)

OR

- 4 a. Describe 2-D impulse, sifting property, 2-D continuous Fourier transform, 2-D sampling theorem and 2-D DFT with equations and examples with respect to digital image processing.

 (12 Marks)
 - b. Explain periodicity and symmetric properties of 2D DFT with equations, diagrams and examples. (08 Marks)



Module-3

- 5 a. Given a = 2 and b = 4, find the mean and variance for uniform noise and exponential noise models along with their PDFs, showing the maximum value. (06 Marks)
 - b. Explain four types of mean filters.

(08 Marks)

c. Describe the three methods of estimation of degradation functions with equations and examples. (06 Marks)

OR

- 6 a. Given a = 2 and b = 4, find the mean and variance for Rayleigh and Gamma noise models along with their PDFs, showing the peak values. (06 Marks)
 - b. Explain four types of order statistics filters.

(08 Marks)

c. Describe adaptive median filter with equations and examples.

(06 Marks)

Module-4

- 7 a. Explain RGB color model with diagrams and color equivalent values in binary/HEX. How it can be converted to CMY and HSI models using suitable equations? (12 Marks)
 - b. Describe the two approaches for pseudo color image processing.

(08 Marks)

OR

- 8 a. Explain any six basic morphological algorithms with equations and an example for each.
 - b. Describe Erosion, Dilation, Opening and Closing operations with equations and an example for each.

 (08 Marks)

Module-5

- 9 a. Describe the Laplacian usage for the detection of isolated points with equations and an example.

 (08 Marks)
 - b. Explain edge detection principle using the image gradient and different types of masks or operators.

 (08 Marks)
 - c. Describe edge linking using local processing technique with an example.

(04 Marks)

OR

- 10 a. Describe border following and chain code methods for boundary representation, with examples. (08 Marks)
 - b. Explain shape numbers and Fourier description used in image shape and boundary representation/description, with examples. (08 Marks)
 - Describe statistical moments used for the representation of boundary segments. (04 Marks)

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