CBCS SCHEME

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17CS753

Seventh Semester B.E. Degree Examination, Jan./Feb. 2023
Digital Image Processing

Time: 3 hrs. Max. Marks: 100

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 involved in Digital Image Processing. **(10 Marks)**

b. Briefly explain the various applications of Image Processing System. **(10 Marks)**

OR

2 a. Discuss the process of image digitization with a neat diagram. **(10 Marks)**

b. With respect to neighbourhood of pixels discuss the following :
   i) Distance measures
   ii) Adjacency **(10 Marks)**

Module-2

3 a. What is spatial filtering? Discuss the various spatial filters used for smoothing under spatial domain. **(10 Marks)**

b. Write an algorithm for histogram equalization. Perform Histogram equalization for the given 8 × 8 image.

r_k	0	1	2	3	4	5	6	7
n_k	8	10	10	2	12	16	4	2

(10 Marks)

OR

4 a. Briefly explain the various types of gray level transformations. **(10 Marks)**

b. Discuss how sharpening is done to enhance an image under spatial domain. **(10 Marks)**

Module-3

5 a. Define the following terms with respect to frequency domain.
i) Fourier series ii) Fourier Transform. **(10 Marks)**

b. With algorithm steps, discuss how image filtering is done in frequency domain. **(10 Marks)**

OR

6 a. Write some properties of 2-DFT. Discuss. **(10 Marks)**

b. With a neat block diagram, explain how homomorphic filtering is performed. **(10 Marks)**

Module-4

7 a. Briefly discuss how discontinuities are detected in images. (10 Marks)

b. Explain the concept of Region growing and Region merging with the help of algorithm steps. (10 Marks)

OR

8 a. Define an edge. Discuss the detection of edges using canny edge method. (10 Marks)

b. What is thresholding? Explain the various methods of thresholding. (10 Marks)

Module-5

9 a. Define image compression. Bring out the differences between lossy and losseless compression. (10 Marks)

b. Given the message with the following probabilities :

$x_1 = 0.1, x_2 = 0.05, x_3 = 0.2, x_4 = 0.15, x_5 = 0.15, x_6 = 0.25, x_7 = 0.1$

Perform Huffman coding and show the step clearly.

Also compute :

i) Average length

ii) Entropy

iii) Efficiency of compression (10 Marks)

OR

10 a. The message "PET" is being transmitted with the probabilities P = 0.4, E = 0.3, T = 0.3 perform arithmetic coding and show that step clearly. (10 Marks)

b. With a neat diagram, explain block transform coding. (10 Marks)

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