



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)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, $42+8=50$, will be treated as malpractice.

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 lossless 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)
