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15CS753

Seventh Semester B.E. Degree Examination, July/August 2022
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. Explain the steps involved in digital image processing with block diagram. (10 Marks)
b. Explain the role of sampling and quantization. (06 Marks)

OR

- 2 a. Explain the components of Image Processing system, with neat diagram. (10 Marks)
b. Discuss distance metrics used in digital images. (06 Marks)

Module-2

- 3 a. Explain following gray level transformation:
i) Image Negative
ii) Log transformation
iii) Contrast stretching. (09 Marks)
b. Explain how arithmetic operations are useful in image enhancement. (07 Marks)

OR

- 4 a. Write an Algorithm to perform histogram equalization. Consider 8-level 64×64 image with gray values (0, 1,, 7). Perform histogram equalization of given image shown in Fig.Q.4(a). (08 Marks)

r_K	0	1	2	3	4	5	6	7
n_K	790	1023	850	656	329	245	122	81

Fig.Q.4(a)

- b. Explain image smoothing in spatial Domain. (08 Marks)

Module-3

- 5 a. Explain how ideal band pass and Butterworth band pass filter is used for filtering. (08 Marks)
b. Explain Homomorphic filters for image enhancement. (08 Marks)

OR

- 6 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)

Module-4

- 7 a. Explain image segmentation. Discuss about point detection and line detection. (08 Marks)
b. Define basic thresholding. Write an iterative algorithm for optimal threshold selection. (08 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.

OR

- 8 a. Explain the algorithm for curve detection using Hough transformation. (08 Marks)
 b. Explain split and merge algorithm. (08 Marks)

Module-5

- 9 a. Define image compression. Explain types of redundancies in the images that are used to achieve higher compression ratio. (08 Marks)
 b. Define Run-Length encoding with example. (08 Marks)

OR

- 10 a. Explain Huffman coding technique. Given the following symbols and their probability in Fig.Q.10(a) of occurrence. Calculate the code and average length of the code. (10 Marks)

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

Fig.Q.10(a)

- b. Explain in brief LZW coding model. (06 Marks)
