CBCS SCHEME

USN | | | | | | | | | | 18CS741

Seventh Semester B.E. Degree Examination, July/August 2022
Digital Image Processing

Time: 3 hrs. Max. Marks: 100

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

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-1

1 a. Explain the fundamental steps in digital image processing with a neat block diagram. **(10 Marks)**

b. Explain the concept of sampling and quantization. **(10 Marks)**

OR

2 a. Briefly explain the following terms:
(i) Neighbors of a pixel.
(ii) Distance function.
(iii) Euclidean distance.
(iv) City block distance. **(10 Marks)**

b. Consider the image segment shown,

3	1	2	1 (q)
2	2	0	2
1	2	1	1
(p)1	0	1	2

Let $V = \{1, 2\}$. Compute the lengths of the shortest 4, 8 and m-path between p and q. **(10 Marks)**

Module-2

3 a. Explain piecewise-linear transformation functions. **(10 Marks)**

b. Define normalized histogram. **(02 Marks)**

c. Consider a 3 bit image (L = 8) of size 64×64 pixels (MN = 4096) with the intensity distribution given in the table. Perform histogram equalization.

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

(08 Marks)

OR

4 a. Explain the following :
(i) Image negatives.
(ii) Log transformations.
(iii) Power law transformations. **(10 Marks)**

b. Explain smoothing spatial filters. **(10 Marks)**

Module-3

5 a. Discuss the following frequency domain filters:
(i) Ideal high pass filter.
(ii) Butterworth highpass filter.
(iii) Gaussian highpass filter. **(10 Marks)**

b. Define 2D Discrete Fourier Transforms (DFT) and its inverse. Explain any three properties of DFT. **(10 Marks)**

OR

6 a. Explain the algorithm for frequency domain filtering with a block diagram. **(10 Marks)**

b. Draw the block diagram of homomorphic filtering for image enhancement and explain it. **(10 Marks)**

Module-4

7 a. Define local and global threshold. Explain how point detection algorithm works. **(10 Marks)**

b. What conditions need to be satisfied while partitioning an image into regions? **(10 Marks)**

OR

8 a. Explain the following gradient operators:

(i) Roberts cross gradient operators.

(ii) Prewitt operators

(iii) Sobel operators.

(iv) Prewitt and Sobel mask for detecting diagonal edges. **(10 Marks)**

b. Explain global processing via the Hough Transform. **(10 Marks)**

Module-5

9 a. Given the following symbols and their probability of occurrence, calculate the code and average length of code. **(10 Marks)**

Symbol	a_2	a_6	a_1	a_4	a_3	a_5
Probability	0.4	0.3	0.1	0.1	0.06	0.04

b. Explain Arithmetic coding and Run length coding. **(10 Marks)**

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OR

10 a. Explain the general image compression model with a diagram. **(10 Marks)**

b. Explain coding redundancy and interpixel redundancy in image compression. **(10 Marks)**

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