CBCS SCHEME

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17CS753

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

1 a. Consider an image segment V = {1, 2}, shown below, compute the lengths of shortest 4, 8 and m path between 'p' and 'q'. If path does not exists between 'p' and 'q' explain why?

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

(08 Marks)

b. Explain steps in image processing with neat diagram. **(08 Marks)**

c. Let 'P' and 'Q' are two pixels at coordinates (100, 120) and (130, 160) respectively. Find : (i) Chess board (ii) City Block distance. **(04 Marks)**

OR

2 a. Define 4 adjacency, 8 adjacency and m adjacency. **(06 Marks)**

b. Explain the applications of image processing. **(08 Marks)**

c. Let the set of gray levels to define connectivity be {94, 95, 96, 97} and compute the shortest D_4 and D_8 distances between pixels p and q for the given image.

(P)	96	97	94	97
	98	98	100	96
	99	97	98	95
(Q)	97	96	97	96

(06 Marks)

Module-2

3 a. Explain applications of arithmetic and Logical operations in digital image processing. **(08 Marks)**

b. Apply histogram mapping to the following image (8*8)

R_K	0	1	2	3	4	5	6	7
P_K	8	10	10	2	12	16	4	2

Target histogram is given below

R_K	0	1	2	3	4	5	6	7
P_K	0	0	0	0	20	20	16	8

(08 Marks)

c. Explain vector representation of linear filtering. **(04 Marks)**

OR

4 a. Perform histogram equalization of an image whose pixel intensity distribution is given below:

Gray Levels	0	1	2	3	4	5	6	7
No. of Pixel	790	1023	850	656	329	245	122	81

(08 Marks)

b. Explain the following transformation:
   i) Contrast stretching
   ii) Intensity level slicing
   iii) Bit plan slicing. (08 Marks)

c. Explain the use of image negatives. (04 Marks)

Module-3

5 a. Apply Discrete Fourier transform for the following image

2	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0

(08 Marks)

b. Explain the properties of 2D Discrete Fourier Transform is frequency domain filtering. (08 Marks)

c. Explain Bandpass filter is Notch filter. (04 Marks)

OR

6 a. Explain 2D convolution theorem of Discrete Fourier Transform frequency domain filtering. (10 Marks)

b. Find the DFT of the following sequence using matrix and verify whether DFT works correctly X = {1, 2, 8, 9}. (10 Marks)

Module-4

7 a. Explain Local processing in edge linking. (10 Marks)

b. Explain Otsu's method used in image segmentation. (10 Marks)

OR

8 a. Explain Hough transform in edge linking. (10 Marks)

b. Explain region splitting and merging algorithm with example image. (10 Marks)

Module-5

9 a. Code the following message using arithmetic coding algorithm. "SWISS" (10 Marks)

b. Code the message "ABBABAS" using LZW and encode the same. (10 Marks)

OR

10 a. Construct arithmetic coding for the string CBAC using the following table :

Symbol	A	B	C
Probability	0.3	0.3	0.4

(10 Marks)

b. Compress the following 8 bit image using Huffman coding.

21	21	21	95	169	243	243	243
21	21	21	95	169	243	243	243
21	21	21	95	169	243	243	243
21	21	21	95	169	243	243	243

(10 Marks)

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