CBCS SCHEME

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

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. With a neat diagram, explain the fundamental steps in Digital Image Processing. **(10 Marks)**

b. Consider the image segment shown in Fig Q1(b). i) Let V = {0, 1} and compute the length of the shortest 4, 8 and m-path between p and q ii) Repeat for V = {1, 2}

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

Fig Q1(b) **(10 Marks)**

OR

2 a. Explain the concept of sampling and quantization with necessary diagrams. **(10 Marks)**

b. Explain the different distance measures between the pixels in an Image. **(05 Marks)**

c. List any five example fields that use digital image processing. **(05 Marks)**

Module-2

3 a. Explain the following gray level transformations with a neat graph i) Log Transformation ii) Power Law Transformations. **(10 Marks)**

b. Describe how the first order derivatives are used for Image Sharpening. **(10 Marks)**

OR

4 a. Explain the different spatial filters used for Image Smoothing. **(10 Marks)**

b. What is image histogram? Discuss histogram equalization for Image enhancement. **(10 Marks)**

Module-3

5 a. Obtain the equation for one dimensional Discrete Fourier Transform and its inverse from the continuous transform of sampled function of one variable. **(10 Marks)**

b. Explain the steps involved in Image filtering in frequency domain. **(10 Marks)**

OR

6 a. Explain any five properties of two dimensional DFT. **(10 Marks)**

b. Discuss about two dimensional DFT and its inverse. **(10 Marks)**

Module-4

7 a. Discuss the procedure of obtaining the segmented regions using split and merge strategy with example. **(10 Marks)**

b. Explain the technique for detecting three basic types of gray level discontinuities in a digital Image. **(10 Marks)**

OR

8 a. Describe the procedure of detecting lines using Hough Transform. **(10 Marks)**

b. Discuss Image segmentation using Thresholding in detail. **(10 Marks)**

Module-5

9 a. What is Image compression? Describe the general Image compression models with a neat block diagram. **(10 Marks)**

b. Explain the Huffman compression technique obtain the Huffman code for the following data given in Table Q9(b). Also compute the average length of the code.

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

Table Q9(b) **(10 Marks)**

OR

10 a. Explain Arithmetic coding technique. Calculate arithmetic code for the message $a_1\ a_2\ a_3\ a_3\ a_4$. Probability and subinterval of each source symbol in given below in Table Q10(a).

Source symbol	Probability	Initial subinterval
a_1	0.2	[0.0, 0.2]
a_2	0.2	[0.2, 0.4]
a_3	0.4	[0.4, 0.8]
a_4	0.2	[0.8, 0.1]

Table Q10(a) **(10 Marks)**

b. Explain coding Redundancy by taking suitable example. **(10 Marks)**

* * * * *