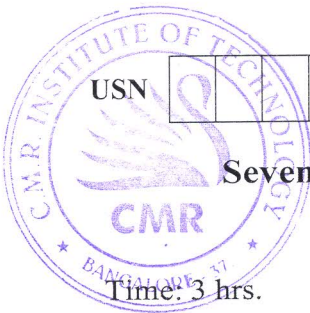


CBCS SCHEME

18CS741



USN

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Seventh Semester B.E. Degree Examination, Feb./Mar. 2022

Digital Image Processing

Max. Marks: 100

Time: 3 hrs.

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)

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. 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 a₁ a₂ a₃ a₄. Probability and subinterval of each source symbol is 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)

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