CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐

15CS753

Seventh Semester B.E. Degree Examination, Feb./Mar. 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. What is digital image processing? Explain the fundamental steps in digital image processing with neat diagram. **(08 Marks)**

  b. Briefly explain Neighbours and Adjacency of pixels. **(04 Marks)**

  c. List and discuss applications of image processing. **(04 Marks)**

OR

2 a. Explain with necessary diagram, the concept of image sampling and quantization. **(08 Marks)**

  b. Consider the image segment given in Fig.Q2(b). Let V = {2, 3, 4}, compute the lengths of the shortest 4, 8 and m-path between 'P' and 'Q'. If path does not exist, explain why?

$$
\begin{array}{ccccc}
3 & 4 & 1 & 2 & 0 \\
0 & 1 & 0 & 4 & 2 \ (Q) \\
2 & 2 & 3 & 1 & 4 \\
(P)\ 3 & 0 & 4 & 2 & 1 \\
1 & 2 & 0 & 3 & 4 \\
\end{array}
$$

Fig.Q2(b) **(04 Marks)**

  c. Discuss the components of an image processing system with diagram. **(04 Marks)**

Module-2

3 a. Define histogram and normalized histogram, discuss histogram equalization for contrast enhancement. **(08 Marks)**

  b. Explain image enhancement using arithmetic and logic operation. **(04 Marks)**

  c. In the given 5×5 image, the boxed element denotes the centre pixel. Apply
  i) Smoothing filter
  ii) Laplacian filter of size 3×3 and 5×5 on the centre pixel.

1	1	0	6	5
2	3	1	2	5
1	2	**8**	5	4
1	2	6	5	2
2	3	5	7	3

(04 Marks)

OR

4 a. Explain basic intensity transformation function. **(08 Marks)**

  b. Explain the Laplacian second derivatives for spatial enhancement. **(06 Marks)**

  c. Example image smoothing order statistic (Non-linear) filters in spatial domain. **(02 Marks)**

Module-3

5 a. Explain any four properties of two dimensional discrete Fourier transform. **(08 Marks)**

  b. Explain image smoothing and sharpening in frequency domain. **(08 Marks)**

OR

6 a. Define and explain 1D and 2D discrete cosine 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 how line can be detected in a digital image give masks for detection of vertical line,
      horizontal line, left diagonal line and right diagonal line. **(08 Marks)**
   b. Explain concept of edge linking by local processing. **(08 Marks)**

OR

8 a. Explain detection of isolated points. **(04 Marks)**
   b. Discuss region splitting and merging technique. **(08 Marks)**
   c. With the help of mask, discuss Prewitt and Sobel edge detection methods. **(04 Marks)**

Module-5

9 a. Explain general compression system model with a neat diagram. **(08 Marks)**
   b. List the applications arithmetic coding, explain arithmetic coding with example. **(08 Marks)**

OR

10 a. Explain coding redundancy. **(04 Marks)**
   b. Explain sub-image size selection. **(04 Marks)**
   c. What is lossy and lossless compression? Explain lossy predictive coding with a neat block
      diagram. **(08 Marks)**

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