

Seventh Semester B.E. Degree Examination, Dec.2024/Jan.2025

Digital Image Processing

Time: 3 hrs.

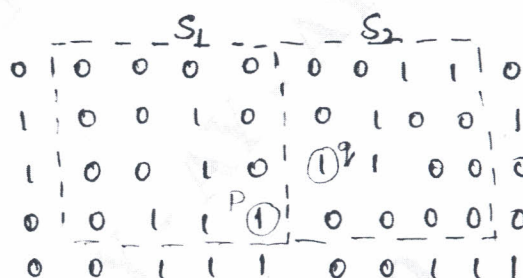
Max. Marks: 100

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 two image subsets S_1 and S_2 as shown in Fig. 1(b) for $V = \{1\}$. Determine whether these two subsets are i) 4 adjacent ii) 8 adjacent and iii) m adjacent. (06 Marks)

Fig. Q1(b)



- c. Explain any two example fields where digital Image processing is used. (04 Marks)

OR

- 2 a. Explain the concept of Image sampling and quantization with necessary diagrams. (10 Marks)
 b. Explain the different components of Image processing system with a neat diagram. (10 Marks)

Module-2

- 3 a. Explain the different grey level transformations in detail. (10 Marks)
 b. Consider a 3 bit image ($L = 8$) of size 64×64 pixels ($MN = 4096$) with the intensity distribution given in the Table Q3(b). Perform histogram equalization. (10 Marks)

GRAY LEVELS (rk)	0	1	2	3	4	5	6	7
No. of Pixels (nx)	790	1023	850	656	329	245	122	81

Table. Q3(b)

OR

- 4 a. Explain the different filters used for spatial filters used for Image smoothing. (10 Marks)
 b. Describe the use of second order derivative in image sharpening. (10 Marks)

Module-3

- 5 a. Explain any five properties of two dimensional DFT. (10 Marks)
 b. Explain the steps involved in Image filtering in frequency domain. (10 Marks)

OR

- 6 a. Discuss two dimensional DFT and its inverse. (10 Marks)
 b. What is DCT? Explain in brief. (05 Marks)
 c. Explain the basic concepts of Frequency domain filtering. (05 Marks)

Module-4

- 7 a. Explain how point and line can be detected in a digital image. (10 Marks)
 b. Explain Region growing and split and merge strategy in image segmentation. (10 Marks)

OR

- 8 a. Explain Hough transform used in edge linking with necessary diagrams. (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 Huffman compression technique and obtain the Huffman code for the following data given in Table Q9(b). Also compute the average length of the code. (10 Marks)

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)

OR

- 10 a. Explain coding redundancy by taking suitable example. (10 Marks)
 b. Explain the following :
 i) Transform coding
 ii) LZW coding. (10 Marks)

* * * * *