

B.E. (Computer Technology) Eighth Semester (C.B.S.)
Elective – IV : Digital Image Processing

P. Pages : 3

Time : Three Hours



TKN/KS/16/7692

Max. Marks : 80

- Notes :
1. All questions carry marks as indicated.
 2. Solve Question 1 OR Questions No. 2.
 3. Solve Question 3 OR Questions No. 4.
 4. Solve Question 5 OR Questions No. 6.
 5. Solve Question 7 OR Questions No. 8.
 6. Solve Question 9 OR Questions No. 10.
 7. Solve Question 11 OR Questions No. 12.
 8. Due credit will be given to neatness and adequate dimensions.
 9. Assume suitable data whenever necessary.
 10. Illustrate your answers whenever necessary with the help of neat sketches.
 11. Use of non programmable calculator is permitted.

1. a) Explain with block diagram, the fundamental steps in image processing. **7**
- b) Explain the need of sampling and quantization. How it is implemented in digital image processing system. **7**

OR

2. a) Elaborate on the components of an image processing system. **7**
- b) Differentiate between
- i) Photopic vision and Scotopic vision **2**
 - ii) Luminance and reflection **2**
 - iii) Spatial resolution and gray-level resolution **3**
3. a) What do you mean by spatial and gray level resolution? Explain their effect on digital images. Represent the following 8 bit image in 3 and 5 bit. **7**

240 180 60 110
138 33 99 225
45 78 128 23
75 86 54 150

- b) Perform histogram equalization for the 8 x 8 image shown in table **6**
Image gray level distribution

Gray level (V_k)	0	1	2	3	4	5	6	7
Number of Pixels (P_k)	8	10	10	2	12	16	4	2

OR

4. a) Starting with a PDF of a continuous functions, derive the discrete transformation for histogram linearization 7
- b) Explain the following process giving their corresponding transformation functions
- i) Gray-level slicing 2
- ii) Bit-plane slicing 2
- iii) Digital negative 2
5. a) Explain the significance of sharpening filters. Elaborate on the behaviour of first and second order derivative in the areas of constant gray levels, at the onset and end of discontinuity, and along gray-level ramp. 8
- b) Explain homomorphic filtering approach to image enhancement. 5

OR

6. a) Explain on unsharp masking and high boost filtering. 4
- b) What are different order statistics filters? Apply 3 x 3 medium filter to the image shown. 9
- | | | | |
|---|---|---|---|
| 7 | 4 | 0 | 1 |
| 6 | 5 | 2 | 3 |
| 4 | 2 | 7 | 5 |
| 0 | 1 | 6 | 2 |
7. a) Describe a general model for image compression. Explain the source encoder and decoder in detail. 8
- b) Consider a 4-pixel line of gray-scale data, {118, 239, 135, 244}, which has been uniformly quantized with 8bit accuracy. Constant its 4-bit IGS code. Use the Hamming (7, 4) code to encode this IGS quantized data. 6

OR

8. a) Elaborate in detail about **any two**.
- i) Lossy predictive coding. 3
- ii) Fidelity criteria. 3
- iii) Transform coding. 3
- b) Explain Dilation and Erosion in image processing. 8
9. a) What is segmentation? Elaborate on its significance. Explain techniques for detecting the gray-level discontinuities-points, lines and edges. 8
- b) Write short note on segmentation using thresholding. 5

OR

10. a) Explain Edge detection algorithm in brief. 6
b) Write short note on region oriented segmentation. 7

11. a) What do you understand by chain code, shape number and order of a shape number? For the image segment shown in fig. Q. 11. (a), generate the shape number and compute its order. Dot indicates starting point. 6

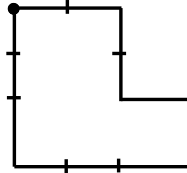


Fig. Q.11 (a)

- b) Explain boundary descriptor in brief. 7

OR

12. a) What is chain code? How it is useful to represent image segment. Find chain code for following image segment fig. Q. 12 (a). 7

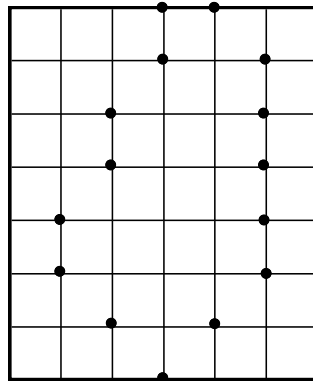


Fig. Q.12 (a)

- b) Explain in brief various image file formats. 6
