

B.E. (Information Technology) Eighth Semester (C.B.S.)  
**Elective - III : Digital Image Processing**

P. Pages : 2

Time : Three Hours



**TKN/KS/16/7706**

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.

1. a) Explain fundamental steps in digital Image processing. With its block diagram. **7**
- b) What is digital image acquisition process? Explain with diagram. **7**

**OR**

2. a) What is image sampling & quantization? Explain with diagram. **7**
- b) Consider two image subsets  $S_1$  and  $S_2$  shown below, for  $v = \{1\}$ , determine whether these two subsets are 4-adjacent or 8-adjacent. **7**

	$S_1$	$S_2$	
0	0 0 0 0	0 0 1 1	0
1	0 0 1 0	0 1 0 0	1
1	0 0 1 0	1 1 0 0	0
0	0 1 1 1	0 0 0 0	0
0	0 1 1 1	0 0 1 1	1

3. a) Explain following gray-level transformations. **7**
- i) Image negatives.
  - ii) Log Transformation.
  - iii) Power-law Transformations.
  - iv) Contrast-stretching.
- b) State and explain the conditions necessary for transformation function in histogram equalization. **6**

**OR**

4. a) Describe following with respect to spatial filtering. **7**
- i) Filter
  - ii) Mask
  - iii) Kernel
  - iv) Window
  - v) Template.
- b) Differentiate among smoothing filters and sharpening filters. **6**

5. a) Explain the model of image restoration process. (degradation) 7  
b) Compare and contrast mean filters and Adaptive filters. 6

**OR**

6. a) Explain spatial transformations as a part of geometric transformations. 7  
b) How individual elements are divided in inverse filtering? Explain in detail. 6
7. a) Explain basic formulation of edge detection. 7  
b) What is the role of Hough transform in edge linking? 6

**OR**

8. a) Explain following with respect to region based segmentation. 7  
i) Region growing.  
ii) Region Splitting & Merging.
- b) How segmentation is performed using morphological water sheds? 6
9. a) Explain Huffman coding algorithm. Perform Huffman coding for following. 7  
Symbols :  $a_2$   $a_6$   $a_1$   $a_4$   $a_3$   $a_5$   
Probability : 0.4 0.3 0.1 0.1 0.06 0.04
- b) Draw and explain lossless predictive coding model with its encoder & decoder. 6

**OR**

10. a) What is vector quantization? Explain with example. 7  
b) What are different JPEG standards of image compression. 6
11. a) Explain boundary based description and region based description. 7  
b) Describe the recognition based on decision theoretic methods. 7

**OR**

12. Write short note **any two**. 14
- i) Tree search. ii) Graph Matching.  
iii) Clustering. iv) Topological Attributes.

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