



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/BCA/SEM-6/BCAE-601C/2010**

**2010**

**IMAGE PROCESSING**

Time Allotted : 3 Hours

Full Marks : 70

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words as far as practicable.*

**GROUP – A**

**( Multiple Choice Type Questions )**

1. Choose the correct alternatives for the following :

5 × 2 = 10

- i) If maximum possible gray value of image is 31 then number of bits used to represent a pixel is
- a) 1
  - b) 8
  - c) can not be determined
  - d) none of these.



ii) The following mask detects :

- 1	- 1	- 1
- 1	8	- 1
- 1	- 1	- 1

- a) an isolated point
  - b) a straight line
  - c) centre pixel of an image
  - d) none of these.
- iii) One of the invalid image format is
- a) ppm b) pgm
  - c) rmvb d) hmp.
- iv) Identify the image conversion which is not possible :
- a) Colour to gray b) Gray to colour
  - c) Colour to binary d) Gray to binary.
- v) If the minimum and maximum gray level of an image is respectively 5 and 40, then after contrast stretching their values will be respectively
- a) 5 and 255 b) 0 and 40
  - c) 0 and 255 d) 45 and 85.

**GROUP – B**

**( Short Answer Type Questions )**

Answer any *three* of the following.  $3 \times 5 = 15$

- 2. a) Define digital image.
- b) Name some of the major application areas of image processing.  $2 + 3$
- 3. a) Define entropy.
- b) What is information redundancy ?
- c) Explain how compression ratio correlates them.  $1 + 2 + 2$



4. Illustrate 4-adjacency and 8-adjacency with suitable examples. 5
5. Write an algorithm to construct histogram of a gray level image. 5
6. a) Define image enhancement.  
 b) Explain how first derivative can be used for image enhancement. 3 + 2

**GROUP – C**

**( Long Answer Type Questions )**

Answer any *three* of the following. 3 × 15 = 45

7. a) Illustrate the fundamental components of Image Processing System.  
 b) Write an algorithm to convert a colour image to a gray level image. 9 + 6
8. a) Define brightness and contrast of an image.  
 b) What is contrast stretching ?  
 c) Consider a  $2 \times 2$  gray level image having the following gray values :
- |   |    |
|---|----|
| 8 | 10 |
| 5 | 20 |
- If the gray level range is [ 0, 255 ], what will be the gray values of the image after performing contrast stretching ?
- d) Draw histograms of the following image types :
- i) Dark image  
 ii) High contrast image. 3 + 1 + 6 + 5



9. a) The normalized frequency or probabilities ( $P_i$ ) of each gray-level (i) of an image having 6 different gray-levels are depicted below :

1	2	3	1	5	6
0.4	0.3	0.1	0.1	0.06	0.04

Use binary Huffman coding to construct the probability tree and assign Huffman code to each gray-level accordingly.

- b) What do you mean by contour tracing and coding ?

10 + 5

10. a) Suppose a binary image contains some black horizontal lines on white background. Write an algorithm to find number of such lines the image has got.

- b) Suppose a binary image of white background contains a black irregular shaped object. Write algorithms to

i) find the centre location of that object

ii) change the background to black and the object to white.

7 + ( 5 + 3 )

11. Write short notes on any *three* of the following :

3 × 5

- Region splitting and merging
- Optical illusion
- Line detection
- Robert's and Sobel's operators
- Sampling and Quantization.