Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/BCA/SEM-6/BCAE-601C/2012

2012

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 : 10 × 1 = 10

   i) If maximum possible gray value of image is 31 then number of bits used to represent a pixel is
      a) 4
      b) 8
      c) can not be determined
      d) none of these.

   ii) Larger the gray level variation of the image
      a) higher the perceived brightness
      b) higher the perceived contrast
      c) lower the perceived brightness
      d) lower the perceived contrast.

   iii) The following mask detects

– 1	– 1	– 1
– 1	8	– 1
– 1	– 1	– 1

      a) an isolated point
      b) a straight line
      c) center pixel of an image
      d) none of these.

iv) One of the invalid image format is

a) ppm b) pgm

c) rmvb d) bmp.

v) Information gained by traversing an image contour is called

a) entropy b) erosion

c) convolution d) masking.

vi) An invalid colour component is

a) RGB b) YCbCr

c) HSV d) BMP.

vii) Identify the image conversion which is not possible

a) colour to gray b) gray to colour

c) colour to binary d) gray to binary.

viii) One of the basic differences between edge and boundary is

a) edge is local concept, boundary is global concept

b) edge is global concept, boundary is local concept

c) edge is determined by gray level difference but boundary is not

d) edge is a subset of boundary and boundary is a superset of edge.

ix) 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 35.

x) To observe the change occurred in two randomly captured image we should use

a) image addition b) image subtraction

c) image multiplication d) none of these.

GROUP – B
(Short Answer Type Questions)

Answer any *three* of the following. 3 × 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. Write an algorithm to construct histogram of a gray level image.

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 × 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.

9. 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	4	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. (ii) What do you mean by contour tracing and coding ?

10 + 5

10. (i) 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. (ii) Suppose a binary image of white background contains a black irregular shaped object. Write algorithms to (a) find the centre location of the object (b) 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

a) Region splitting and merging

b) Optical illusion

c) Line detection

d) Roberts and Sobels operators

e) Sampling and quantization.