



Name :

Roll No. :

Invigilator's Signature :

CS/BCA/SEM-6/BCAE-601C/2013

2013

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.

Graph sheet, if required, will be supplied by the institution.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct answers for the following : $10 \times 1 = 10$
 - i) By the term 'pixel' we mean
 - a) picture elements
 - b) co-ordinates of any curve
 - c) only the black dots of a binary image
 - d) none of these.
 - ii) If the gray level intensities of a colour image at a pixel is (0, 0, 255) then the pixel is
 - a) pure red
 - b) pure green
 - c) reddish
 - d) none of these.



- iii) Digitizing the coordinate value of an image is called
- a) sampling
 - b) quantization
 - c) restoration
 - d) none of these.
- iv) If the gray level range of an image is [0, 255] then after performing image negation , its gray value 0 will become
- a) 0
 - b) - 255
 - c) any value between 0 to 255
 - d) none of these.
- v) Sum of all components of normalized histogram is equal to
- a) 0
 - b) 1
 - c) 255
 - d) none of these.
- vi) Image averaging is used to
- a) take the average of all pixel values
 - b) reduce noise from an image
 - c) segmenting an image
 - d) none of these.

vii) The square or rectangular sub-image area centered at the point (x , y) used for defining a neighbourhood about (x , y) is called

- a) filter b) mask
- c) both (a) and (b) d) none of these.

viii) The transformation kernel that consists of an alternating plus and minus 1's arranged in a check board pattern is called

- a) discrete Fourier b) discrete Cosine
- c) Walsh-Hadamard d) none of these.

ix) 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.

x) The following mask

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

detects :

- a) an isolated point
- b) a straight line
- c) centre pixel of an image
- 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) What is Fourier series ?

b) What is Fourier transform ?

c) How can we apply discrete Fourier transform in image processing ? 1 + 1 + 3

4. a) What is run length coding ?

b) Illustrate it with a suitable example. 1 + 4

5. Write an algorithm to construct histogram of a gray level image.

6. Illustrate 4-adjacency and 8-adjacency with suitable examples.



GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) Illustrate the fundamental steps required in Image Processing.
- b) Write an algorithm to convert a colour image to a gray level image. $8 + 7$
8. a) Explain the phenomenon of inverse filtering in brief.
- b) Discuss the following masks :
- (i) Roberts (ii) Prewitt (iii) Sobel.
- c) Write an algorithm to produce a chess-board like structure in gray image. $3 + 6 + 6$
9. 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. 3 + 1 + 6 + 5

10. a) State the importance of Huffman coding in Image Processing.

- b) Perform a complete Huffman coding on the following data set :

Symbol	a1	a2	a3	a4	a5	a6
Probability	1	4	0.06	0.1	0.04	0.3

- c) State the importance of objective fidelity criteria.

2 + 10 + 3



11. Write short notes on any *three* of the following : 3 × 5

- a) Region splitting and merging
 - b) Mean filtering
 - c) Line detection
 - d) Histogram equalization
 - e) Sampling and Quantization.
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