Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.TECH (CSE)/SEM-7/CS-704G/2012-13

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 : $10 \times 1 = 10$

i) The process of extracting information from the image is called as

a) image enhancement b) image restoration

c) image analysis d) image compression.

ii) The initial step in any image processing technique is

a) segmentation b) masking

c) image acquisition d) normalization.

iii) An image is considered to be a function of $a(x, y)$ where a represents

a) height of image b) width of image

c) amplitude of image d) resolution of image.

iv) Which is the image processing technique used to improve the quality of image for human viewing ?
   a) Compression b) Enhancement
   c) Restoration d) Analysis.

v) Which type of enhancement operations are used to modify pixel values according to the value of the pixel's neighbours ?
   a) Point operations b) Local operations
   c) Global operations d) Mask operations.

vi) Which of the following is a lossy coding ?
   a) Run length coding
   b) Huffman coding
   c) Uniform quantizer
   d) Predictive coding without quantizer.

vii) Quantization in which image processing technique is used to eliminate electronic noise by maternatical process is
   a) digitizing the co-ordinate value (x, y)
   b) digitizing the amplitude value
   c) digitizing the intensity value
   d) digitizing the pixel value.

viii) The amount of noise decreases by ..... of number of frames averaged.
   a) division b) square root
   c) linear d) none of these.

ix) Segmentation is process that partitions image into
   a) blocks b) regions
   c) pixels d) vertices.

x) Image compression is
   a) making image look better
   b) sharpening the intensity-transition regions
   c) minimizing degradation over image
   d) reducing the redundancy of the image data.

GROUP – B

(Short Answer Type Questions)

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

2. a) Define Digital Image.

   b) Explain components of Image Processing System. 1 + 4

3. a) Write the properties of 2D Fourier Transform.

   b) What are the applications of Transformation ? 3 + 2

4. In aspects of Digital Image, explain the terms 'Adjacency' and 'Connectivity'.

5. a) What is Image Negative ?

   b) Compare Mean Filtering with Median Filtering. 2 + 3

6. a) Why is Edge Detection the most common approach for detecting discontinuities ?

   b) What are the featurs of GIS system ? 2 + 3

GROUP – C

(Long Answer Type Questions)

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

7. a) Explain how the edge detection is obtained by Prewiit and Sobel operators and compare the two techniques.

   $2\frac{1}{2} + 2\frac{1}{2} + 2$

   b) Discuss how edge linking is done by local processing.

   8

8. a) Discuss about the model of the image degradation / restoration process. 4

   b) Discuss the PDF of impulse, Gaussian and Uniform noise. 2 + 2 + 2

   c) What are Arithmetic, Harmonic and Geometric mean filters ? 5

9. a) What is the difference between GPS and GIS ? 3

   b) What is vectorization and why is it required in GIS ? 5

   c) What do you mean by neighbours of a pixel ? Define 4, 8 and *M* adjacency of pixels in a gray scale image. 2 + 5

10. a) Discuss run length and bit plane encoding technique with example. 10

    b) Compare between lossless and lossy image compression techniques. 5

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

    a) Image negatives

    b) Huffman Coding

    c) Haar Transform

    d) Walsh-Hadamard Transform (WHT)

    e) Histogram Equalization

    f) Image subtraction and Image averaging.