Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.TECH(ECE)N/SEM-8/EC-803D/2011

2011

DIGITAL 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 any *ten* of the following : 10 × 1 = 10

i) An image is a 2D array of

a) Digital data

b) electrical signals

c) photographic objects

d) light signals.

ii) If a function $f(x, y)$ is real and we have

$F(u, v) = 2DFFT[f(x, y)]$

a) $F(u, v)$ contains only real parts

b) $F(u, v)$ contains only imaginary parts

c) $F(u, v)$ contains both real and imaginary parts

d) None of these.

iii) If a function $f(x, y)$ is finite in the space domain, the Fourier transform of $f(x, y)$ will be

a) finite b) infinite

c) undefined d) zero.

iv) A wavelet transform is a special case of

a) Laplace transform

b) Z-transform

c) Fourier transform

d) none of these.

v) Representation & description almost always follow the output of a

a) Segmentation stage

b) Filtering stage

c) Compression stage

d) All of these.

vi) Coloured Model Names

a) The RGB colour model

b) The CMY & CMYK colour models

c) The HSI colour model

d) (a) & (b) only

e) (a), (c) & (d).

vii) The basic principle of compression matches the principle of

a) Channel coding

b) Line coding

c) Source coding

d) All of these.

viii) Which of the following is not used for image compression ?

a) Block transfer coding

b) Wavelet coding

c) LZW coding

d) Convolution coding.

ix) ..... is not a morphological image processing algorithm.

a) Thinning

b) Skeleton

c) Both (a) & (b)

d) None of these.

x) Digital image processing uses

a) Fuzzy set theory

b) DFT

c) DCT

d) (b) & (c)

e) (a), (b) & (c).

xi) Knowledge of which one of the following is not required for morphological image processing ?

a) Erosion

b) Morphological reconstruction

c) Neural networking

d) Duality & dilation.

xii) Find the odd one out w.r.t. DIP :

a) Arithmetic operation

b) Softwares

c) Vector & matrix operations

d) Image transforms.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. Explain Unsharp masking and High boost filtering. Write the expression of Laplacian operator for an image of two variables. 3 + 2

3. If all the pixels of an image are shuffled, will there be any change in the histogram of that image ? Justify your answer. 1 + 4

4. Explain bilinear interpolation method. 5

5. Explain the operation of a median filter. 5

6. Discuss briefly about the usefulness of discrete cosine transform. 5

GROUP – C

(Long Answer Type Questions)

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

7. a) What is Histogram of an image and why is it used for image processing ? What do you mean by Histogram equalization ?

   b) What is the value of the marked pixel after a 5 × 5 median filtering ?

   2 1 3 4 5

   1 1 0 2 3

   2 0 0 1 2

   5 1 2 3 1

   3 3 1 2 0

   c) Briefly describe the smoothing linear spatial filtering. What is bit plane slicing method ?

8. a) Describe Walsh transform.

   b) What do you mean by global and local thresholding ? What is the basic difference between region growing and split merge technique ?

   c) What is Hough transform and where is it used ?

9. a) Discuss about threshold coding implementation.

   b) Make a comparative study of least square restoration and constrained least square restoration methods.

   c) Give one application of Wiener filter.

10. a) Discuss the global processing via the Hough transform.

    b) Explain the role of Discrete cosine transform in image processing. 8 + 7

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

    a) Lossy compression

    b) Constrained least squares

    c) Hadamard transform

    d) Colour image processing

    e) Error-free compression.