Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/M.SC.(INFO.SC.)/SEM-4/MI-402/2012

2012

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 the following : $10 \times 1 = 10$

   i) Define spatial resolution.
      a) Related with space and atmosphere
      b) It can be measured as a line pairs per unit distance
      c) It can be measured as dots pairs per unit distance
      d) Both (b) and (c).

   ii) What do you mean by the term neighbor of a pixel at (x, y) ?
      a) Pixels at $(x-1, y-1), (x-1, y), (x-1, y+1)$
      b) Pixels at $(x, y-1), (x, y+1)$
      c) Pixels at $(x+1, y-1), (x+1, y), (x+1, y+1)$
      d) All of these.

   iii) Where Fidelity criteria is used ?
      a) In image restoration b) In image smoothning
      c) In image compression d) None of these.

iv) What is tomography ?

a) It is related with measurement on intensity of light

b) The process for generating two-dimensional image of a slice or section through a three-dimensional object

c) It is one kind of computer architecture

d) None of these.

v) Define the area where image smoothing is applied.

a) Image segmentation

b) Image filtering

c) Image restoration

d) None of these.

vi) Explain entropy of an image.

a) Image entropy is a quantity which is used to describe the 'business' of an image, i.e. the amount of information which must be coded for by a compression

b) Resolution of an image and number of bits per pixel

c) It is the technique in which an image is stored

d) None of these.

vii) Threshold in the arena of Digital Image processing is used in

a) image restoration b) image segmentation

c) image filtering d) image enhancement.

viii) What is CMYK ?

a) It is a color model

b) It is used in AI

c) It is another name of RGB color model

d) None of these.

ix) What do you mean by the palette number of an image ?

a) It defines image resolution

b) It decides image brightness

c) It is a set of colours in a particular order

d) None of these.

x) In which field of application of image processing, LZW coding is used ?

a) Image restoration b) Image compression

c) Image filtering d) Image enhancement.

GROUP – B

(Short Answer Type Questions)

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

2. Write a short note on Electro Magnetic Spectrum and its subdivisions.
3. What are the components of Image Processing System ? Give your answer with proper diagram.
4. Write brief note on different techniques of image sensing and acquisition.
5. What is Run-Length coding ? Give proper example to explain.
6. Explain Image segmentation and its applications.

GROUP – C

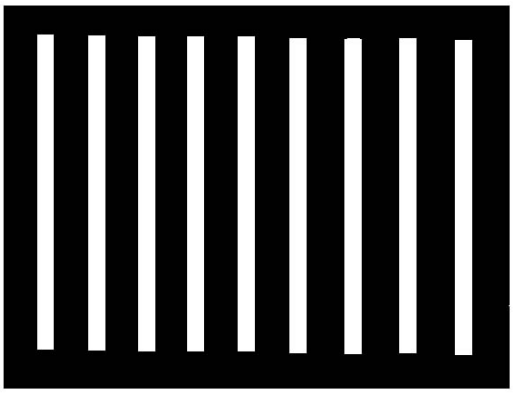
(Long Answer Type Questions)

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

7. Explain sampling and quantization with proper diagram. Draw and explain iso-preference graph. 5 + 5 + 5
8. What is transformation ? Why do we require this ? Explain DCT with proper explanation. 5 + 4 + 6
9. Write a short note on point detection technique and edge detection technique. Explain your answer with proper example and mathematical calculation. 7 + 8

10. What is image compression ? Why do we require this ? Explain the role of Huffman's coding in this particular application. 5 + 4 + 6

11. What is image filter and why so we require it. The white bars in the test pattern shown are 7 pixels wide and 210 pixels high. the separation between bars is 17 pixels. What would this image look after application of
    a) A 3 × 3 arithmetic mean filter ?
    b) A 5 × 5 arithmetic mean filter ?
    c) A 9 × 9 arithmetic mean filter ?



6 + 3 + 3 + 3

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