Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/MCA/SEM-5/MCAE-501B/2010-11

2010-11
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

(Very Short Type Questions)

1. Answer any *five* of the following : 5 × 2 = 10

   i) Is histogram equalization operation idempotent ?

   ii) What is the difference between a high pass filter and a high frequency emphasis filter ? How does this difference affect the resultant image ?

   iii) What is the bit plane ?

   iv) What is compass operator ?

   v) What is vanishing point in perspective projection ?

   vi) What is the need for transformation in digital image processing ?

   vii) What is the importance of wavelet transform in image processing ?

GROUP – B

(Short Answer Type Questions)

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

2. Write down the main properties of a median filter.

3. What is the difference between image enhancement and image restoration ? What do they have in common ? 3 + 2

4. Can two different images have the same histogram ? Justify your answer.

5. Write down the procedure for histogram equalization of a digital image.

6. Write down the four different reasons for degradation of a digital image.

GROUP – C

(Long Answer Type Questions)

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

7. a) Discuss one important image enhancement technique in spatial domain.

   b) Define the Fourier transform in 2D.

   c) Write down properties of Fourier Transform.

   d) What is band pass filtering in image processing ?

   5 + 3 + 4 + 3

8. a) A photography is taken out of a side window of a car moving at a constant velocity of 80 km/hour. Why is it not possible to use an inverse or Wiener filter in general to restore the blurring in this image ?

   b) State the problems associated with Hough transformation when slope intercept form of equation of straight line is considered. Why is the problem reduced when normal form is considered ?

   c) Explain, why property (R) : Variance $\{ g (r, c) \} \leq \theta$ cannot be good property for image segmentation using region growing techniques. 5 + 5 + 5

9. a) Define the following operators :

   i) Roberts

   ii) Prewitt

   iii) Sobel

   iv) Compass

   v) 4 nbd operators.

b) Define the following terms :

i) Binary image

ii) Gray image

iii) Histogram. 8 + 7

10. a) Distinguish between image segmentation based on thresholding with image segmentation based on region growing techniques.

b) Explain the principle of the following region based segmentation procedures :

i) Region growing

ii) Region splitting

iii) Split and merge. 8 + 7

11. a) Discuss briefly about Huffman code with suitable example.

b) Explain Haar transform indicating its properties.

c) Describe Hough transform and its use. 6 + 5 + 4