

Name :

Roll No. :

Invigilator's Signature :

CS/B.TECH(CSE)/SEM-7/CS-704G/2011-12
2011

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) In the following figure which of the operation are true ?

		q	
	p		

- a) $q \in N_4 (p)$ b) $q \in N_D (p)$
c) $q \in N_8 (p)$ d) Both (b) and (c).



ii) The points of $N_8(P)$ is equal to

- a) $N_8(P) = N_4(P) \cap N_D(P)$
- b) $N_8(P) = N_4(P) \cup N_D(P)$
- c) $N_8(P) = N_4(P) * N_D(P)$
- d) $N_8(P) = N_4(P) \% N_D(P)$

iii) Logical operation is performed in

- a) Only gray level image b) Only binary image
- c) Both (a) and (b) d) None of these.

iv) Spatial Domain Technique works on

- a) Direct manipulation of pixels
- b) Indirect manipulation of pixels
- c) Modified Fourier coefficients of an image
- d) All of these.

v) Histogram are used for

- a) Image enhancement b) Image compression
- c) Image segmentation d) All of these.



- vi) After Averaging operation the middle pixel is replaced by

10	12	11
11	23	12
10	14	15

- a) 15.33 b) 13.11
- c) 13 d) None of them.
- vii) Contrast stretching is done for handling
- a) Non-uniform lighting condition
- b) Non-linearity
- c) Small dynamic range of imaging sensors
- d) All of these.
- viii) Estimation of degradation Model
- a) By Observation
- b) By Experimentation
- c) By Mathematical Modelling
- d) All of these.



- ix) Image segmentation technique is based on
- a) Discontinue based b) Region based
 - c) Both (a) and (b) d) none of these.
- x) Linking of edge point is based on
- a) Local processing b) Global processing
 - c) Both (a) and (b) d) None of these.

GROUP – B

(Short Answer Type Questions)

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

2. a) Define Digital Image. 1 + 4
- b) Explain Image Acquisition System. 1 + 4
3. a) Write the properties of two dimensional Fourier Transform. 3 + 2
- b) What are the applications of Transformation ? 3 + 2
4. a) How is a 2-D Gaussian averaging filter separable ? 3 + 2
- b) What is High Boost filter ? 3 + 2
5. a) Define Gray-level Interpolation. 2 + 3
- b) Why the restoration is called as unconstrained restoration ? 2 + 3
6. a) Why is edge detection the most common approach for detecting discontinuities ? 2 + 3
- b) What are the features of GIS System ? 2 + 3



GROUP – C

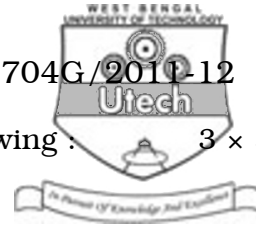
(Long Answer Type Questions)

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

7. a) What transformation function is used to create an image negative ? 1
- b) Explain the fundamental Steps of Digital Image Processing. 4
- c) A unit cube with vertices at $(0, 0, 0)$, $(0, 0, 1)$, $(0, 1, 0)$, $(0, 1, 1)$, $(1, 0, 0)$, $(1, 0, 1)$, $(1, 1, 0)$ and $(1, 1, 1)$ is scaled using the scale factors $S_x = 2$, $S_y = 3$, $S_z = 4$
- What are the vertices of the transformed figure ? 3
- d) What is the requirement of image sampling and quantization ? 3
- e) Explain the uniqueness and convolution properties of Fourier transform. 4
8. a) Differentiate between spatial domain enhancement and frequency domain enhancement. What do you understand by blurring ? $3 + 2$



- b) Show that the Fourier transform and its inverse are linear process. 5
- c) Give short descriptions on smoothing spatial filtering and sharpening spatial filtering. 5
9. a) What is image segmentation ? 1
- b) Explain global processing via Hough transform. 4
- c) How do the relative size of object and background regions influence threshold detection ? 2
- d) What are the differences between Line and Edge Detection ? 3
- e) Why second derivative operation is not normally used for Edge detection ? 2
- f) How to choose the seed points for region growing operation ? 3
10. a) Give the definition of GIS. 2
- b) Explain how the degradation process is modelled with the help of degradation function. 4
- c) Explain the three principal ways to estimate the degradation function for use in Image Restoration. 3
- d) Why does the degradation matrix become circulant ? 2
- e) Discuss the major application areas of GIS. 4



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

- a) Contrast Stretching
- b) Restoration by Homomorphic Filtering
- c) Optimal Threshold
- d) Region Splitting & Merging
- e) GIS data feeds.

