(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2716 Roll No. | | | | | | | | | | |

B. Tech.

(SEM. VII) THEORY EXAMINATION 2011-12

DIGITAL IMAGE PROCESSING

Time : 3 Hours *Total Marks : 100*

Note :– Attempt **all** questions.

1. Attempt any **four** parts : **(4×5=20)**

   (a) Draw the diagram and explain about the various components of an Image Processing System.

   (b) Explain how an image is formed in the human eye and how it adapt and discriminate brightness level ?

   (c) Explain with help of an example sampling and quantization.

   (d) Compare the basic frequency domain filters :

   (i) Ideal low pass

   (ii) Butterworth low pass

   (iii) Gaussian low pass.

   (e) Explain the homomorphic filter.

   (f) What are blurring and ringing effects ? How can they be avoided ?

2. Attempt any **four** parts : **(4×5=20)**

(a) Explain the following :

(i) Contrast Stretching

(ii) Histogram Specification.

(b) Obtain the digital negative of the following 8-bit per pixel image :

139	205	105
141	252	99
201	15	76

(c) Describe Image Subtration and Image Averaging.

(d) Two images f (x, y) and g (x, y), have histogram h_f and h_g. Give the conditions under which the histogram of f (x, y) + g (x, y) and f (x, y) × g (x, y) can be determined in terms of h_f and h_g ?

(e) Compare and contrast the smoothing and sharpening filters.

(f) What is meant by unsharp and crisping ? Explain with suitable figures.

3. Attempt any **two** parts : **(2×10=20)**

(a) What is Image Restoration ? Draw and explain the basic block diagram of the restoration process. Give two areas where restoration process can be applied ?

(b) Given below is a 3×3 image. What will the value of the centre pixel change to when this image is passed through

(i) Arithmetic mean filter

(ii) Geometric mean filter

(iii) Harmonic mean filter

(iv) Max-filter

(v) Min- filter ?

5	1	7
6	2	3
4	2	1

given 3×3 image

(c) Explain Bandpass Filter Technique for noise reduction. Also explain in detail Minimum Square Error Filtering.

4. Attempt any **two** parts : **(2×10=20)**

(a) What is morphology ? Explain in detail the two basic morphological algorithms :

(i) Region Filling

(ii) Convex Hull.

(b) Explain the following in detail :

(i) Dilation and Erosion

(ii) Opening and Closing.

(c) Explain in detail the following :

(i) Geometric transformation and its type

(ii) Stereo Imaging.

5. Attempt any **two** parts : **(2×10=20)**

(a) Explain the thresholding approach of segmenting of an Image.

(b) Discuss the technique with example used for the following :

(i) Line Detection

(ii) Edge Detection.

(c) Explain the term image segmentation. Also explain segmentation based on discontinuities and segmentation based on similarities.