

(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 Subtraction 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 $f(x, y) \times g(x, y)$ 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 crispering ? 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.