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

PAPER ID : 2883 **Roll No.** □□□□□□□□□□

B. Tech.

(SEM. VII) THEORY EXAMINATION 2011-12

DIGITAL IMAGE PROCESSING

Time : 3 Hours   *Total Marks : 100*

Note :– Attempt **all** the questions. All questions carry equal marks.

1. Attempt any **four** of the following :   **(5×4=20)**

   (a) What are the components of an image processing workstation ?

   (b) Define connectivity. What is the difference between 8-connectivity and m-connectivity ?

   (c) What would be the effect of repeated application of histogram equalization to an image ? Is this repeated operation helpful in any way ?

   (d) Define resolution. What is meant by sampling and quantization ?

   (e) How many gray levels will a half toned image have ? Explain.

2. Attempt any **two** of the following :   **(10×2=20)**

   (a) Explain the concept of aliasing for two dimensional signals. How does one avoid aliasing ?

(b) Compare and contrast average filtering and median filtering.

(c) Explain the power law transformation.

3. Attempt any two of the following : (10×2=20)

(a) Explain in detail the stages of edge detection algorithms. How are they present in edge operators ?

(b) Code the following message using arithmetic coding algorithm :

S W I S S

(c) Perform image enhancement for the 8 × 8 image distribution shown in the following table :

r_k	0	1	2	3	4	5	6	7
p_k	8	10	10	2	12	16	4	2

4. Attempt any two of the following : (10×2=20)

(a) Perform histogram equalization on the following image :

$$\begin{pmatrix} 1 & 3 & 5 \\ 4 & 4 & 3 \\ 5 & 2 & 2 \end{pmatrix}$$

(b) Prove that Hadmard transform works for the following image :

$$F = \begin{pmatrix} 2 & 2 \\ 2 & 1 \end{pmatrix}$$

(c) How to convert a colour image to a gray scale image and vice versa ? What is the need for gamma correction ? Convert following RGB triplet to CMY and YIQ :

$$(1 \quad 0 \quad 1)$$

5. Explain any **four** of the following : (5×4=20)

(a) Difference between image enhancement and image restoration.

(b) Inverse filtering.

(c) Predictive coding.

(d) Effect of size and shape of the mark on the filtering process.

(e) Significance of image entropy.