

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

PAPER ID : 2883

Roll No.

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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 Hadamard 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 0 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.