B.E.(Cmpn) Sem 7 (Rev.)
Elective-I – Image Processing
28/12/07

Con. 5652-07. **(REVISED COURSE)** **CD- 7140**

(3 Hours) **[Total Marks : 100**

N. B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** out of remaining **six** questions.
(3) Figures to **right** indicate **full** marks.
(4) Assume **suitable** data if **necessary**.

1. (a) Define :— **10**
   (i) Spatial Resolution
   (ii) Intensity Resolution
   (iii) PSF (Point Spread Function)
   (iv) Dilation
   (v) Image Restoration.

   (b) (i) Brightness discrimination is poor at low levels of illuminations. **10**
   (ii) The first difference of Chain Code normalise it to rotation.
   (iii) Enhancement process do not change the information content of image.
   (iv) Quality of picture depends on the number of pixels and arey levels that represents the picture.
   (v) For digital image having salt pepper noise, median filter is the best filter.

2. (a) Write a note on Discrete Cosine Transform and its application in Image processing. **10**
   (b) Write 8 x 8 Haar transform matrix and its signal flow graph. Using this Butterfly diagram. **10**
   Compute Haar transform for x(n) = { 1, 2, 3, 4, 1, 2, 3, 4 }.

3. (a) Define and explain Moments, Normalised moments and Central moments. **10**
   (b) What are Morphological operations ? For a region, explain Boundary extraction operation and then region filling operation on the extracted boundary. **10**

4. (a) What is impulse response of each filter ? **10**
   (i) Transfer function is

$$H(Z_1, Z_2) = 1 - a_1 z_1^{-1} - a_3 z_1^{-1} \cdot z_2^{-1} - a_4 z_1 \cdot z_2^{-1}$$

   (ii) Frequency response is :

$$H(w_1, w_2) = 1 - 2\alpha \cos w_1 - 2\alpha \cos w_2$$

   (b) Discuss Enhancement Technique in spatial domain used for images. **10**

5. (a) Write an expression for a 2—D DFT. What is its relationship with one dimension DFT ? How one-dimensional FFT algorithms can be used to compute two dimensional DFT of an digital image. 6

(b) Using 4 point FFT algorithms. Calculate 2–D, DFT of. 8

$$f(x,y) = \begin{bmatrix} 0 & 0 & 3 & 1 \\ 1 & 1 & 2 & 2 \\ 2 & 2 & 1 & 3 \\ 1 & 1 & 2 & 4 \end{bmatrix}$$

(c) Illustrate opening and closing operations with suitable example. 6

6. (a) What are different types of redundancies that can be present in a digital image and state which method can be used to remove/reduce them. 8

(b) What is Morphology ? Name and explain the basic operations in morphology. 8

(c) Write a short note on Wavelet transform. 4

7. Write a short notes on (any **five**) :— 20

(a) Texture
(b) Arithmatic Coding
(c) Hit or Miss Transform
(d) Fourier Descriptors
(e) RGB Colour model
(f) Run length coding
(g) Uniform and Non-uniform sampling.