M.E. Sem I (Rev.) Image Processing 13/12/08

Etrx:

Con. 5597-08. **(REVISED COURSE)** **BB-8213**

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

N.B. (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions from remaining **six** questions.
(3) Assume **suitable** data if **necessary**, with proper **justification**.

1. (a) Explain uniform and non-uniform sampling. **20**
(b) List the applications of IP and explain any two in detail.
(c) Explain with Isopreference curves — 'How Quality of picture varies as a function of the number of pixels and number of gray levels that represent the picture'.
(d) Explain Region splitting and merging.

2. (a) Suppose that 8 × 8 pixel image is represented by 4 bits/pixel has the following gray level distribution. **8**

Gray level	0	1/7	2/7	3/7	4/7	5/7	6/7	7/7
No. of pixel	4	16	17	11	8	4	4	0

Modify the above histogram such that the desired distribution is as follows :—

Gray level	0	1/7	2/7	3/7	4/7	5/7	6/7	7/7
No. of pixel	2	6	8	10	12	11	9	6

(b) Explain convolution in the spatial domain and the frequency domain. Derive the relationship between the two domains. **6**
(c) Explain in brief frequency domain enhancement techniques. **6**

3. (a) Using 4-point FFT algorithm, evaluate 2-D DFT of the following image :— **10**

0	1	2	1
1	0	1	2
2	1	0	1
1	2	1	0

(b) Explain Fast Hadamard transform. **10**

4. (a) Detect the boundary and segment of the given image using graph theoretical approach. Also draw the graph for the given image. **8**

$$\text{Image} = \begin{pmatrix} 7 & 2 & 2 \\ 5 & 7 & 2 \\ 5 & 1 & 0 \end{pmatrix}$$

(b) Write short note on Hough transform. **8**
(c) Explain a threshold finding algorithm for Global tresholding. **4**

5. (a) Explain in detail image compression using LZW method. 8
   (b) Explain Fidelity Criteria w.r.t. image compression. 4
   (c) Briefly explain the following variable length codes : 8
      (i) Truncated Huffman
      (ii) B_2 code
      (iii) Binary shift
      (iv) Huffman shift.

6. (a) Explain how skelton of a region can be obtained via. Medial Axis Transformation, with suitable algorithm. 8
   (b) Find the medial axis of — 4
      (i) a circle (ii) an equilateral triangle.
   (c) Explain morphological Hit or Miss transform with a suitable example. 8

7. Write short notes on :— 20
   (a) Bit plane slicing with one application
   (b) Karhunen-Loeve Transform
   (c) JPEG encoder and decoder
   (d) Lossy predictive coding.