

Con. 5857-07.

[REVISED COURSE]

CD-7206

(3 Hours)

[Total Marks : 100]

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

- 1) Justify / Contradict following statements (Any five) 20
- a) For digital Image having salt & pepper noise median filter is the best.
- b) Continuous Image histogram can be perfectly equalized, but it may not be so for Digital Image.
- c) Run Length coding always gives data compression.
- d) Quality of picture depends on number of pixels & gray levels that represent the picture.
- e) All Image compression techniques are invertible.
- f) Magnitude & determinant of unity Transform is unity.

- 2) (a) Gray Level Histogram of an image is given below 10

Gray Levels	0	1	2	3	4	5	6	7
No of Pixels	0	0	26	39	16	84	20	0

Compute Gray Level histogram of the output image obtained by enhancing the input by histogram equalization technique.

- (b) Assume that edge starts in the first row and ends in the last row for the following gray image 10

5 6 1
 6 7 0
 7 1 3

Sketch all possible paths & determine edge corresponding to minimum cost path.

- 3)(a) Explain basic principles of detecting following in the images 10
 (i) Lines (ii) Points (iii) Edges
 Give 3×3 mask for each of them & explain their operation.

- (b) Find Huffman code for the following six symbols. The symbols & their probabilities are given in tabular form 10

Symbol	A1	A2	A3	A4	A5	A6
Probability	0.1	0.4	0.06	0.1	0.04	0.3

- 4(a) Explain the following techniques 10
 (i) Arithmetic Coding (ii) Bit Plane Coding
 (b) Explain method of Segmentation of Images by region splitting & merging 10
- 5)(a) Explain Replication & Linear Interpolation method of zooming. Apply these techniques to following image & obtain zoomed image 10

40	60	55	50	30
45	62	57	48	35
20	24	27	30	34
02	06	08	07	10
07	06	40	45	48

- (b) Show that 2D-DCT of an image can be computed by row & column passes with 1D DCT algorithm. 10
- 6)(a) For 2×2 Transform A & Image U 10

$$A = \frac{1}{\sqrt{2}} \begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix} \quad U = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$$

Calculate Transformed Image V & the basis Image

- (b) Prove two dimensional Energy Conservation relation 10

$$\sum_x \sum_{y=0}^{N-1} |f(x, y)|^2 = \sum_u \sum_{v=0}^{N-1} |F(u, v)|^2$$

where $f(x, y)$ represent 2D Image signal and $F(u, v)$ represent transform image

- 7 Write short notes on. (Any Four) 20
 (i) Uniform & non uniform sampling
 (ii) Fourier Descriptor
 (iii) Chain Code
 (iv) Discrete Fourier Transform
 (v) Connectivity of pixels