

QP Code : 15790

(3 Hours)

[Total Marks : 100]

- NB: 1. Question no.1 is compulsory.
2. Solve any four from remaining.

- Q.1 (a) Justify / Contradict: Quality of picture depends on number of pixels and gray levels that represent the picture. 05
 (b) What is K-L transform? Why it is called as method of principle components? 05
 (c) Explain Log transformation and power law transformation. 05
 (d) Explain following method of data compression indicating clearly whether they are lossy or lossless. Also state the type of redundancy they can minimize : 05
 (i) Huffman coding
 (ii) Transform coding
 (iii) Adaptive Delta Modulation
 (iv) Differential Pulse code Modulation
 (v) Run length coding on bit planes.
- Q.2 (a) Explain the method of segmentation of image by region splitting and merging. 10
 (b) Draw and explain a model of the image degradation/restoration process. 10
- Q.3 (a) State and explain the properties of 2-D Fourier transform. (Any five) 10
 (b) Explain with block diagram basic steps for filtering in frequency domain. 10
- Q.4 (a) Generate Huffman code for following table in which eight symbol with corresponding probabilities are given: 10
- | Symbol | A0 | A1 | A2 | A3 | A4 | A5 | A6 | A7 |
|-------------|------|-------|-------|------|------|------|------|------|
| Probability | 0.05 | 0.008 | 0.022 | 0.06 | 0.18 | 0.13 | 0.07 | 0.48 |
- (b) Obtain Hadamard matrix $H(8)$ from simple second order matrix $H(2)$ and draw flow diagram for $H(8)$. Define frequency and find it for $H(8)$. 10
- Q.5 (a) Histogram of a digital image with eight quantization level is shown below. Perform histogram equalization. 10
- | Gray Level | R | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-------------------|-------|-----|-----|----|----|----|-----|-----|-----|
| No. of gray level | h_r | 220 | 140 | 50 | 60 | 70 | 170 | 130 | 160 |
- (b) Explain principal techniques to estimate the degradation function for use in image restoration. 10
- Q.6 (a) Explain the following techniques:- 10
 (i) Arithmetic coding
 (ii) Bit Plane Coding

[TURN OVER

- (b) For the 3-bit 4X4 size image, perform the following operations: 10
- (i) Negation
 - (ii) Thresholding with $T=4$
 - (iii) Intensity level slicing with background $r_1=2$ and $r_2=5$
 - (iv) Bit plane slicing for MSB and LSB planes
 - (v) Clipping with $r_1=2$ and $r_2=5$

1	2	3	0
2	4	6	7
5	2	4	3
3	2	6	1

- Q.7 Write short notes on: (Any two) :-
- (a) Connectivity of pixels 10
 - (b) 2D-DCT computation by row and column passes with 1D-DCT algorithm 10
 - (c) Wiener filtering 10