(Time: 3 Hours) [Total Marks: 80]

N.B. **(1) Question No. 1 is compulsory.**

(2) Attempt any three questions from remaining.

(3) All questions carry equal marks.

(4) Assume suitable data wherever necessary.

1. Answer any **four** of the following:

(a) Explain the various steps involved in digital image processsing. 5

(b)Compare Huffman and Arithmetic coding. 5

(c) Give 3X3 masks for Laplacian filter,horizontal,vertical,$+45^0$ and -45^0 line detectors 5

(d) Median filter is effective to remove salt and pepper noise .Justify your answer. 5

(e)Explain Region Growing with an example. 5

2. a) Perform Histogram Equalization for the given 3 bits per pixel image and plot the 10

histograms of the original and equalized images.

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

b) Apply the following Image Enhancement techniques for the given 3 bits per pixel 10
image segment.

$$I = \begin{bmatrix} 3 & 1 & 4 & 1 & 0 \\ 5 & 1 & 7 & 3 & 2 \\ 2 & 3 & 1 & 3 & 7 \\ 1 & 1 & 4 & 6 & 3 \\ 1 & 4 & 2 & 3 & 4 \end{bmatrix}$$

(i) Digital Negative
(ii) Bit plane Slicing
(iii) Thresholding with T=4
(iv) Intensity level slicing with background and without background
assuming r1=3 and r2=5

3. a) Explain discontinuity based image segmentation in detail. . 10

b) With suitable examples explain the following morphological operations: 10

i) Dilation ii) Erosion

4. a) An image segmented has resulted in the following edge points : (1,0),(2,1),(4,3) 10

and (2,0).Find the equation of the line that passes through maximum number of points

using Hough Transform

4. b) Explain transform based image compression with the help of block diagram. 10

5 .a) Obtain the discrete cosine transform matrix for N=4. 10

   b) Explain in detail Differential Pulse Code modulation technique. 10

6 . Write short notes on any **four** of the following: 20

(a) Fourier Descriptors

(b)Hit or Miss Transformation

(c)Run length coding

(d)Connectivity of pixels

(e)Discrete Wavelet Transform

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