QP Code : 6205

Duration 3 hours   Max marks: 80

Note the following instructions.

    (a) Question No.1 is compulsory
    (b) Total 4 questions need to be solved
    (c) Attempt any three questions from remaining five questions.
    (d) Assume suitable data wherever necessary, justify the same

1.a   Consider the image segment shown below   [4]

$$
\begin{array}{cccc}
3 & 1 & 2 & 1\,(q) \\
2 & 2 & 0 & 2 \\
1 & 2 & 1 & 1 \\
(p)\,1 & 0 & 1 & 2
\end{array}
$$

Compute the length of the shortest 4, 8 and m path between p and q for $V = \{1, 2\}$.

1.b   Explain separability property of 2D-DFT.   [4]

1.c   How many unique Huffman codes are possible for a 3 symbol source?   [4]
Construct these codes.

1.d   Explain the process of high boost filtering mathematically.   [4]

1.e   Explain morphological thinning operation with example.   [4]

2.a   Explain following morphological operations with suitable examples   [10]
i. Dilation   ii. Erosion   iii. Opening   iv. Closing

2.b   Perform LZW coding and decoding for the following sequence.   [10]
    ababababa

3.a   Gray level histogram of an image is given below   [10]

Gray level (r)	0	1	2	3	4	5	6	7
No. of pixels (n)	220	140	50	60	70	170	130	160

Compute gray level histogram of the output image obtained by enhancing the input by histogram equalization technique.

3.b   With neat block diagram, explain fundamental steps in digital Image processing.   [10]

MD-Con. 11744-15.   **[TURN OVER**

4.a   Describe in short the following point processing image enhancement   [10] techniques.

     i.   Log Transformation   ii. Power-Law transformation

     iii.   Contrast Stretching   iv. Gray Level slicing

4.b   Explain the following Boundary Descriptors   [10]

     i. Shape Numbers   ii. Fourier Descriptors

5.a   Give the steps involved in Homomorphic Filtering   [5]

5.b   What are the basic steps for filtering in frequency domain enhancement?   [5]

5.c   Describe basic principles of detecting following in the images   [10]

     i. Point's   ii. Lines   iii. Edges

     Give 3 x 3 masks for each of them to explain their operation

6.a   Draw and explain the block diagram of JPEG encoder and decoder.   [10]

6.b   Obtain 2D DFT of following 3 x 3 image   [6]

$$f(x,y) = \begin{bmatrix} 1 & -1 & 1 \\ -1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$$

6.c   Explain Bit plain coding technique.   [4]