QP Code : **29774**

(3 Hours)   [Total Marks :100

N.B. : (1) Question No. 1 is compulsory.
      (2) Attempt any **four** questions out of remaining **six** questions.
      (3) **Assume** suitable **data** if **necessary** and **justify it.**

1. Justify/ contradict the following statements (any **four**):-
    (a) Unit step sequence is a power signal.   5
    (b) Lossy compression is not suitable for compressing executable files.   5
    (c) Low pass filter is a smoothing filter.   5
    (d) Brightness discrimination in poor at low levels of illumination.   5
    (e) Enhancement process does not add any information to the image.   5

2. (a) List and prove any four properties of DFT.   10
    (b) Find the inverse z-transform of   10

$$x(z) = \frac{z^3 - 4z^2 + 5z}{(z-3)(z-1)(z-2)}$$

      (i) $ROC = |z| > 3$

      (ii) $ROC = |z| < 1$

      (iii) $ROC = 2 < |z| < 3$

3. (a) Name and explain any three zero memory operations.   10
    (b) Compare restoration and enhancement.   5
    (c) Compare Lossless and Lossy Compression.   5

4. (a) Explain segmentation based on dicontinuities.   10
    (b) Explain Edge Linking and Boundary detection via graph theoretic technique. 10

5. (a) Compute the convolution of   10

    $x(n) = \{1, 1, \underset{\uparrow}{0}, 1, 1\}$ and

    $h(n) = \{1, -2, -3, \underset{\uparrow}{4}\}$

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(b) Using 4-point FFT algorithm, calculate 2-D DFT of   **10**

$$f(x,y) = \begin{bmatrix} 0 & 0 & 3 & 1 \\ 1 & 1 & 2 & 2 \\ 2 & 2 & 1 & 3 \\ 1 & 1 & 2 & 4 \end{bmatrix}$$

6. (a) Write 8X8 Hadamard transform matrix and its signal flow graph. Using **10**
        the Butterfly diagram. Compute Hadamard transform for
        x(n) = {1, 2, 3 ,4 1, 2, 1, 2}

    (b) What are the different types of redundancies in digital image? Explain in **10**
        detail, giving example of each.

7. Write short notes on (any **four**):-   **20**
    - (i)   Homomorphic filter
    - (ii)   Histogram Equalization
    - (iii)   4, 8 and m connectivity of image pixels
    - (iv)   Classification of signals
    - (v)   K- L Transform