(3 hours)   **Total Marks: 80**

N.B.   1. Question **No. 1** is compulsory
        2. Attempt any **three** out of remaining
        3. Assume suitable data if **necessary** and justify the assumptions
        4. Figures to the **right** indicate full marks

Q1   Answer the following   20
      [a] Every image has unique histogram but vice-versa is not true. Justify the
          statement.
      [b] List various steps in Digital Image Processing.
      [c] Explain unitary matrix by giving example.
      [d] Give any two objective fidelity criteria.

Q2   A   For the given 4 bpp image apply   10
         [i] Digital Negative operation
         [ii] Contrast stretching operation with r1 = 4, r2=12, s1=8 and s2 = 12

4	5	9	14
4	6	11	14
3	6	5	11
3	8	8	9

     B   What is segmentation explain (i) Region Growing (ii) Region Splitting and   10
         (iii) Thresholding

Q3   A   Explain Chain code with example and show that how first difference makes chain code   10
         rotation invariant.

     B   Find the DFT of the following image.   10

5	4	3	2
5	4	3	2
5	4	3	2
5	4	3	2

Q4   A   Explain Thickening along with example.   10

     B   Explain with example graph theoretic technique used for image segmentation.   10

Q5   A   Write 8x8 Hadamard transform matrix and its signal flow graph. Using   10
         butterfly diagram, compute Hadamard transform for x(n)={1, 2, 3, 4, 1, 2, 3, 4}.

     B   Explain Arithmetic coding with example.   10

Q6   Write a short note on   20
         [a] Hough Transform
         [b] Vector Quantization
         [c] Differential PCM
         [d] Morphological Boundary Extraction Method

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