(2) Attempt any **four** questions out of remaining **six** questions.

(3) **Figures** to the **right** indicate **full** marks.

(4) Assume **suitable** data if **necessary**.

1. Justify the following statements :–   **20**
   - (a) Laplacian is not a good edge detector.
   - (b) Poorly illuminated images connot be easily segmented.
   - (c) Median filtering perform well in images corrupted by impulse noise.
   - (d) First derivate of a chain code normalizes it to rotation.
   - (e) The entropy of an image is maximized by histogram equalization.

2. (a) Define and explain Dilation and Erosion operations. Explain how boundary extractions   **10**
       is achieved using these operations.
   (b) What is the most typical problem of edge based segmentation ?   **5**
   (c) Explain why a prior information about edge detection may increase the speed of Hough   **5**
       Transform based image segmentation.

3. (a) Write expression for 1–D and 2–D. Discrete Cosine Transform. State its usefullness in   **8**
       Image Processing.
   (b) Using the above diagram compute Haar Cofficidents of following sequences.   **12**
       $$f(n) = \{1\ 2\ 3\ 4\ 4\ 3\ 2\ 1\}$$
       Evaluate the Energy in each of the Transform Cofficidents.

4. (a) What is image compression ? Explain different types of redundancies.   **8**
   (b) Explain in detail different types of image compression methods.   **12**

5. (a) Explain operation and application of each of following filter. Give 3×3 mask wherever   **9**
       applicable :
       - (i) Low pass filter
       - (ii) Median filter
       - (iii) Laplacian of a Gaussian.
   (b) Given below is 5×5 image. Operate on the central 3×3 pixels by low pass and high   **11**
       pass filter masks and obtain 3×3 images as outputs :

6	5	12	12	3
14	12	13	10	9
10	15	4	10	6
8	3	7	4	7
8	3	10	8	5

   Using these outputs verify that original image = Low pass output + High pass output.
   In case of discrepancy explain the reasons.

6. Write short notes on :–   **20**
   - (a) Moments   (b) K–L Transform
   - (c) Fourier Descriptors   (d) Signature
   - (e) Chain Codes.

7. Write short notes :–   **20**
   - (a) Hit or Miss transform   (b) Image compression standard
   - (c) Discrete Cosine Transform   (d) Compression using Transform method

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