(2 hours)   **[Total Marks: 50]**

N. B.: (1) **All** questions are **compulsory**.
         (2) Make **suitable assumptions** wherever necessary and **state the assumptions** made.
         (3) Answers to the **same question** must be **written together**.
         (4) Numbers to the **right** indicate **marks**.
         (5) Draw **neat labeled diagrams** wherever **necessary**.
         (6) Use of **Non-programmable** calculators is **allowed**.

1.   **Attempt _any two_ of the following:**   **10**
a.   Describe in brief the process of sampling and quantization used to convert continuous sensed data to digital format.
b.   Explain image smoothing in the frequency domain using Gaussian low pass filters.
c.   What is Fidelity criteria? Why fidelity criteria is used? Explain the types of criteria used for assessment.
d.   What are slope chain codes? Explain with an example.

2.   **Attempt _any two_ of the following:**   **10**
a.   Summarize the fundamental steps in digital image processing with a labelled diagram.
b.   State the purpose of image interpolation. Explain the various methods used for image interpolation.
c.   Discuss any two basic intensity transformations with a diagram.
d.   What are spatial filters? Explain the mechanics of linear spatial filtering.

3.   **Attempt _any two_ of the following:**   **10**
a.   Derive Discrete Fourier transform of two variables.
b.   Write a note on the following
     1) Gaussian Noise   2) Erlang Noise
c.   State the algorithm of Adaptive Median filters. What are the objectives of adaptive mean filters?
d.   Explain in brief Slant transforms.

4.   **Attempt _any two_ of the following:**   **10**
a.   Explain smoothening in color images.
b.   Discuss the various types of data redundancies. Hence define relative data redundancy and compression ratio.
c.

39	39	126	126
39	39	126	126
39	39	126	126
39	39	126	126

     Consider the above 4 * 4 image. Perform LZW coding on the given image
d.   Discuss the hole filling morphological algorithm with an example.

5.   **Attempt _any two_ of the following:**   **10**
a.   Summarize Otsu's algorithm for optimum global thresholding.
b.   Explain Segmentation using morphological watersheds.
c.   Write a short note on Active Contours
d.   What are Shape Numbers? Explain with an example.

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