M.Sc. (IT) (Sem-II)   July-2023

Information Technology : Paper-IV - Image Processing (R-2020)

(2½ Hours)   **[Total Marks: 75]**

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

Q1. Attempt the three of the following.   15 Marks

    A. Explain different approaches to image sensing and acquisition.
    B. Write a short note on Image Sampling and Quantization.
    C. What is filtering? How do you define spatial filtering?
    D. Provide an overview of point processing and its application in contrast enhancement.
    E. Present a brief explanation of smoothing filters and their role in image enhancement.

Q2. Attempt three of the following   15 Marks

    A. Highlight the differences and similarities between spatial domain and frequency domain.
    B. Present a brief note on selective filtering and its applications.
    C. Enumerate the properties of DFT (Discrete Fourier Transform).
    D. Enumerate the diverse sources of noise in image processing.
    E. Explain the following filters:
          1. Arithmetic Mean Filter
          2. Geometric Mean Filter

Q3. Attempt three of the following.   15 marks
    A. What is the concept of color image segmentation?
    B. Provide a brief overview of the Slant Transform and its applications
    C. Write a short note on a) Coding Redundancy b) Interpixel Redundancy c) Psychovisual
       Redundancy
    D. Briefly describe digital image watermarking
    E. With an example, describe the Huffman coding.

Q4. Attempt three of the following.   15 marks
- A. Explain Morphological Image Processing. Describe Erosion and Dilation.
- B. How can morphological image processing be used for edge detection or feature extraction?
- C. Explain the concept of opening and closing in morphological image processing?
- D. What is thresholding? Explain about global thresholding
- E. Explain about Region Splitting and Merging with an example.

Q5. Attempt three of the following.   15 marks

- A. What are the drawbacks of classical methods for image segmentation?
- B. Can you provide an explanation of level sets in the context of image segmentation?
- C. How can features be represented and described after the extraction process?
- D. What is the concept of chain codes, and could you provide an example to illustrate their usage?
- E. Could you provide a brief overview of SIFT (Scale-Invariant Feature Transform) and its significance in image processing?

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