

M.Sc. IT Sem - II 75: 25 dt. 15/01/25

Time: (2½ Hours)

[Total Marks: 75]

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.

Q1. Attempt the three of the following.

15 Marks

- a. Define spatial filtering in image processing and discuss the types of spatial filters used for sharpening images.
- b. Outline and discuss the various stages involved in digital image processing.
- c. Write a brief note on image sampling and quantization.
- d. Describe the process of histogram equalization and its significance.
- e. Discuss the concepts of image negative transformation and log transformation.

Q2. Attempt the three of the following.

15 Marks

- a. What are the key steps in filtering an image in the frequency domain?
- b. Explain different types of low-pass filters used in the frequency domain.
- c. Provide an overview of harmonic filtering.
- d. List any five noise-reducing filters and explain them in detail.
- e. Explain the model of image degradation and reconstruction with a diagram?

Q3. Attempt the three of the following.

15 Marks

- a. Discuss pseudocolor image processing and its applications.
- b. Write a short note on the Haar transform.
- c. Explain color image segmentation and its techniques.
- d. Describe run-length coding with an illustrative example.
- e. Provide a brief note on the following: i) Coding redundancy ii) Interpixel redundancy

Q4. Attempt the three of the following.

15 Marks

- a. Write a concise note on the concepts of opening and closing operations in morphology.
- b. Explain the Top-Hat and Bottom-Hat transformations and their use cases.
- c. Provide a brief note on thinning and thickening in image processing.
- d. Which derivative operators are essential for image segmentation? Discuss their role in segmentation.
- e. What is thresholding in image processing? Elaborate on global thresholding.

Q5. Attempt the three of the following.

15 Marks

- a. Discuss boundary descriptors in detail.
- b. List and explain various region feature descriptors.
- c. What are chain codes? Provide examples to explain their usage.
- d. Write a brief note on the Scale Invariant Feature Transform (SIFT).
- e. Discuss whole image features in detail.
