

# CBCS SCHEME

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20ECS321

## Third Semester M.Tech. Degree Examination, June/July 2023 Advances in Image Processing

Time: 3 hrs.

Max. Marks: 100

*Note: Answer any FIVE full questions, choosing ONE full question from each module.*

### Module-1

- 1 a. Explain the concept of sampling and quantization of an image and explain how images are digitally represented. (10 Marks)
- b. Explain in detail about image representation a few concepts, with the continuous image function. (10 Marks)

OR

- 2 a. Briefly explain the following terms:
- i) Distance Measures
  - ii) Neighbours
  - iii) Adjacency
  - iv) Contrast
  - v) Acuity. (10 Marks)
- b. Define color. Explain in detail about color perceived by humans. (10 Marks)

### Module-2

- 3 a. What is meant by pixel brightness transformation? Explain in detail about the two classes of pixel brightness transformation. (10 Marks)
- b. Define geometric transformations. What are the two basic steps of geometric transform? Explain in detail about pixel coordinate transformations. (10 Marks)

OR

- 4 a. Mention the two groups of local pre-processing. Briefly describe the algorithm for smoothing using a rotating mask and efficient median filtering. (10 Marks)
- b. Explain the following:
- i) Zero crossing of second order derivative
  - ii) Prewitt operator
  - iii) Kirsh operator
  - iv) Sobel's operator. (10 Marks)

### Module-3

- 5 a. Define Thresholding. Explain in detail about Otsu's threshold detection. (10 Marks)
- b. Explain the algorithm that provides inner boundary tracing and outer boundary tracing. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

OR

- 6 a. Define Hough transform. Explain the algorithm of curve detection using Hough transform and generalized Hough transform. (10 Marks)
- b. Explain the following:
- Region merging via boundary melting.
  - Split and Merge algorithm
  - Effluent Watershed segmentation. (10 Marks)

**Module-4**

- 7 a. What is meant by region identification? Explain the algorithm that provides 4-neighborhood and 8-neighborhood region labeling. (10 Marks)
- b. Explain the following:
- Boundary length
  - Curvature
  - Bending energy
  - Signature. (10 Marks)

OR

- 8 a. Explain the concept of B-spline representation. (10 Marks)
- b. Explain in detail about Region-based shape representation and description. (10 Marks)

**Module-5**

- 9 a. Explain four morphological principles with necessary equations. (10 Marks)
- b. Explain in detail about binary dilation and erosion. Also mention the differences between Erosion and Dilation. (10 Marks)

OR

- 10 a. Explain the role of Markers in morphological segmentation. Why would an attempt to perform watershed segmentation without markers lead to over segmentation? (10 Marks)
- b. Explain the following:
- Geodesic transformation
  - Morphological reconstruction. (10 Marks)

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