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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (AI&ML / CSE / AI&DS) (Sem.–7)

COMPUTER VISION

Subject Code :BTAI ML-701-20

M.Code : 94006

Date of Examination : 20-11-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

- a) What is the Euclidean distance between two pixels at coordinates (x_1, y_1) and (x_2, y_2) ?
- b) What is the main objective of sharpening spatial filters?
- c) State the separability property of the 2D DFT.
- d) Define salt-and-pepper noise.
- e) What is the purpose of colour transformations?
- f) How does multiresolution analysis help in image processing?
- g) What is morphological erosion in image processing?
- h) Define disparity in a stereo image pair.
- i) What is epipolar geometry in stereo vision?
- j) Name two common object recognition methods.

SECTION - B

2. Define sampling and quantization in digital image processing. How do these processes affect image resolution and quality?
3. Explain the concept of frequency domain filtering and how it differs from spatial domain filtering.
4. How is smoothing performed in a color image? Explain the process using the RGB color space.
5. What is Structure-from-Motion? Describe how camera motion and 3D structure are recovered from a sequence of images.
6. Define pattern and pattern classes in the context of object recognition. How do feature vectors help in distinguishing different pattern classes?

SECTION - C

7. Explain the image degradation/restoration model. Compare additive and multiplicative noise with examples. How do their properties impact restoration methods?
8. Derive the mathematical expressions for the 1-D Discrete Fourier Transform (DFT) and its inverse. Discuss the importance of DFT in the context of signal and image processing, highlighting its practical applications.
9.
 - a) Derive the discrete formulation of Laplacian filter and explain how it works for image sharpening.
 - b) What are image pyramids? Explain how Gaussian and Laplacian pyramids are constructed.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.