Atal Bihari Vajpayee Indian Institute of Information Technology & Management, Gwalior

IT402: Digital Image Processing

Major Examination (Session 2023–24)

Maximum Time: 3 Hours   Max Marks: 60

Note: Answer all questions. Numerical problems must show intermediate steps.

1. (a) Explain image formation and sensing. (b) Discuss the role of pixel neighborhood relationships in image analysis. (8 Marks)

2. (a) Describe spatial filtering. Implement a 3×3 averaging filter on the following 1D sequence: $[10, 20, 30, 40, 50, 60, 70]$. (b) Compare linear and non-linear filters with examples. (10 Marks)

3. (a) Explain the concept of edge detection. Discuss Sobel and Canny edge detectors. (b) Show how Canny edge detection improves over gradient methods. (10 Marks)

4. (a) Define image segmentation. Compare region growing and thresholding methods. (b) Apply Otsu's method on a binary image histogram with two distinct peaks. (10 Marks)

5. (a) Explain the basics of morphological image processing. (b) Demonstrate erosion and dilation operations on a binary image matrix. (10 Marks)

6. Short Notes (any two): (i) Color models (RGB, HSV) (ii) Image compression techniques (iii) Applications of DIP in biometrics (12 Marks)