



विश्वजीवनमृतं ज्ञानम्

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

IT402: Digital Image Processing

Major Examination (Session 2024–25)

Maximum Time: 3 Hours

Max Marks: 70

Note: Attempt all questions. Case study questions must be answered logically with suitable assumptions.

1. (a) Discuss the basic steps in digital image processing. (b) Explain how image sensors affect the quality of acquired images. (8 Marks)
2. (a) Derive the 2D Fourier Transform and discuss its applications in frequency domain filtering. (b) A satellite image has strong periodic noise. Suggest a filtering approach and justify. (12 Marks)
3. Compare Sobel, Prewitt and Canny edge detectors. Which one is most suitable for detecting road boundaries in autonomous vehicle navigation? Why? (10 Marks)
4. (a) Define morphological operations. Demonstrate dilation and erosion on a 5×5 binary matrix. (b) Explain how morphology is applied in text recognition. (10 Marks)
5. ****Case Study:**** A medical X-ray has low contrast, contains noise, and requires highlighting of bone structures. Propose a ****complete processing pipeline**** using DIP techniques (enhancement, filtering, segmentation, feature extraction). Draw a flowchart. (15 Marks)
6. Write short notes (any three): (i) Image compression standards (JPEG, JPEG2000) (ii) Color image processing (iii) Watershed segmentation (iv) DIP applications in biometrics and security (15 Marks)