

Master of Computer Science & Engg. 1st Year 1st Sem. Examination, 2025
Image Processing

Full marks: 100

Time: 3 hours

Attempt any five questions

1. a) What are the roles of sampling and quantization in the digital image? 5
 b) Define neighbours of a pixel and a path. 4
 c) Consider an array stores a binary image where object pixels and background pixels are marked as 1 and 0 respectively. Write down the code snippet in C to produce the output image with only the object boundaries marked as 1. 6
 d) Write down transformation matrix for scaling and rotation of a 2D image. 5

2. a) Write down the steps for histogram equalization for a digital image. 4
 b) For a grayscale image the intensity values are within the range of 60 to 150. Those are to be linearly transformed to 20 to 200. How will you do it? 4
 c) Write short notes on gamma correction. 4
 d) What is median filter? Compare it with mean filter. 4
 e) Convolve a 3x3 mean filter kernel with itself and find the output. 4

3. a) Describe homomorphic filter and bilateral filter. 7+8
 b) Explain unsharp masking. 5

4. a) Compare 1st and 2nd derivative in the context of discontinuity detection. 4
 b) Define a line. Write down the kernels for detecting horizontal, vertical and diagonal lines. 2+4
 c) Find out the expression for LOG. How can it be used for edge detection and how will you find out the zero crossing point? 3+7

5. a) State the objectives of canny edge detection technique and describe the steps. 8
 b) Describe the SLIC algorithm. 8
 c) What is the basic principle of OTSU algorithm for threshold selection? 4

6. a) What is chain code? Specify the problems of such representation and state the remedies. 3+7
 b) Given an object. How will you find out its centre of mass? 4
 c) Describe how GLCM can be formed and texture can be represented using the same. 6

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7. a) Describe the different types of redundancies that can be exploited in compression.
How do Huffman coding and RLE help? 4+4
- b) Describe the basic principles of BTC and find the reduction in size. 6
- c) In JPEG compression, what are the purposes of chroma subsampling and zigzag scanning? 3+3
8. Write short notes on the following:
- a) Hough Transform
- b) HSV model
- c) Region growing
- d) max-min and min-max filter 7+5+4+4