POKHARA UNIVERSITY

Level: Bachelor | Semester: Spring | Year : 2021
Programme: B[redacted]
Course: Image Processing and Pattern Recognition | Full Marks: 100 | Pass Marks: 45 | Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) Explain basic relationships like- neighbours, connectivity and distance measures between pixels in any digital image with suitable examples 7

   b) Define intensity level slicing. How can you use histogram equalization technique for contrast enhancement? Explain with suitable example. 8

2. a) Consider the following image with the new pixel at (2,2) if the smoothing is done using a 3x3 bit neighbourhood. Find 8

   i. Mean Filter
   ii. Weighted average filter
   iii. Median Filter
   iv. Min Filter
   v. Max Filter

1	2	1	3	8
3	8	8	5	1
5	7	5	4	4
2	2	1	8	6
6	5	3	3	6

   b) Explain Haar Transform with its algorithm for the order N=2. 7

3. a) What are the main sources of noises in digital image? How can you use harmonic and contra-harmonic mean filters to remove noise in an image? 8

b) Define structuring elements. Explain opening and closing in morphological image processing with suitable examples. 7

4. a) Define psychovisual redundancy. Employ Huffman Coding algorithm to determine the bits required for encoding the message 'mississippi'. 8

b) Listout the different methods of selecting Threshold value for Image Segmentation. Explain any two of them in brief. 7

5. a) Explain region splitting and region growing in image segmentation with essential pseudocode and algorithms. 8

b) Explain, how you can use Hamming neural network for object recognition. Explain the process of single layer perceptron. 3+4

6. a) Define Chain codes. Explain 4 and 8-connectivity segments to explain chain codes with suitable examples. 8

b) What is pattern recognition? Briefly explain the various steps of pattern recognition. 7

7. Write short notes on: (**Any two**) 2×5

a) Discrete Cosine Transform

b) Differentiate lossless and Lossy Compressions.

c) Periodic Noise Reduction