POKHARA UNIVERSITY

Level: Bachelor | Semester: Fall | Year : 2021
Programme: BE | Full Marks: 100
Course: Image Processing and Pattern Recognition | 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) What is brightness adaptation and discrimination? Explain the various key stages in digital image processing with essential features associated with each. 7

   b) What is zooming? Illustrate with an example by interpolation and replication. 8

2. a) What are the uses of histogram processing? Perform the histogram equalization on the following 8-bit gray level image and also scale the intensity from 1 to 20. 8

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

   b) What are the steps involved in frequency domain filtering? Explain the essential properties of 2-D Discrete Fourier Transform. 7

3. a) Write algorithm of Haar Transform. Compute the Haar Transformation for the order N=2. 7

   b) Compare image enhancement and image restoration. Explain different noise models in an image with their probability density functions? 8

4. a) Define psychovisual redundancy. Find Huffman code and calculate the coding efficiency of the following 6 x 6 image: 8

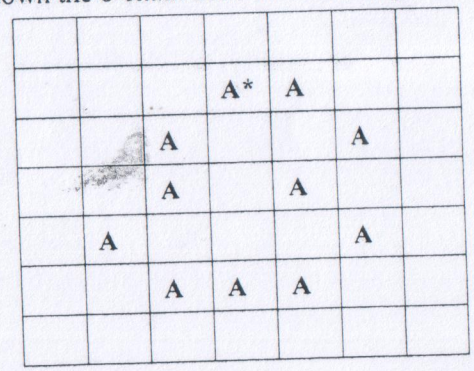
254	254	100	100	12	12
254	254	100	100	12	12
254	254	100	100	12	12
254	254	100	100	12	12
50	50	50	50	50	50
254	254	100	100	12	12
254	254	100	100	12	12
254	254	100	100	12	12

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

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

   b) Define image segmentation. What are the problems associated with the first and second order derivative filters for edge detection during segmentation? Explain with suitable solutions. 7

6. a) Given an image, "**A**" represents its pixel position. If A* is the starting pixel, write down the 8-chain code and find shape number of it. 8



   b) How can we use various neural network techniques for object recognition in image processing? Explain. 7

7. Write short notes on: (**Any two**) 2×
   a) Steps of Pattern recognition system
   b) Lossy image compression
   c) Discrete Cosine Transform