POKHARA UNIVERSITY

Level: Bachelor Semester: Spring Year : 2019
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) Define digital image. Explain the process of image sampling and quantization in the digital image representation with figures. 8
   b) Write the algorithm and pseudo code for average filtering and apply 2D Average filtering on the given image. Use 3 x 3 sampling window and Keep border values unchanged. 7

1	4	0	1	3	1
2	2	4	2	2	3
1	0	1	0	1	0
1	2	1	0	2	2
2	5	3	1	2	5
1	1	4	2	5	0

2. a) What is histograms equalization? Write the algorithm and pseudo code for histogram equalization with suitable example. 7
   b) Compute the 2-D discrete Walsh–Hadamard transform of the given image block below: 8

5	6	8	10
6	6	5	7
4	5	3	6
7	8	3	5

3. a) What are the usages of derivative based filters. Derive mask for Laplacian second order derivative based. 7
   b) What is Image Restoration? Compare it with image enhancement. 8
4. a) Construct Huffman code for each gray level. 8

Gray (r)	0	1	2	3	4	5	6	7
n(r)	60	100	260	20	150	90	110	234

Where, r = Gray level
n(r) = No. of Pixels having r^{th} gray level

   b) Explain the working principles of lossy predictive coding with necessary block diagram. 7
5. a) What is morphological image processing? With necessary figures, explain the opening and closing. 8
   a) How can you detect edges with gradient filters? Give different first order derivative based (gradient) filters. 7
6. a) What do you mean by image segmentation, give the algorithm for basic adaptive thresholding. 7
   b) Explain Minimum Distance Classifier for Pattern Classification with necessary equations and an example. 8
7. Write short notes on: **(Any two)** 2×5
   a) Shape Numbers
   b) Pattern with Pattern Class
   c) Gray level slicing