POKHARA ENGINEERING COLLEGE

Level: Bachelor Semester – Spring Year : 2025
Programme: BE (6th) 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 digital Image? Explain the process of image sampling and quantization in the digital image representation with figures. 8
   b) What is zooming? Illustrate with an example by interpolation and replication. 7
2. a) Compute the histogram equalization from the given data 7
   Input Image: 4×4

2	3	3	2
4	2	4	3
3	2	3	5
2	4	2	4

   b) Write an algorithm of Hadamard Transform. Compute the Hadamard Transformation for the Order N=2 8
3. a) What are low-pass and high-pass filters? Explain their types. 8
   b) What is entropy? Generate the code word and also find the compression ratio and efficiency of the system.

Grey Level	0	1	2	3	4	5	6	7
Frequency	400	1350	659	2034	816	2500	250	1500

   7
4. a) Define Image Noise. Explain different types of order statistics filters. 7

   OR

   Explain Adaptive Median Filter.
   b) How does lossless predictive coding differ from lossy predictive coding? 8
5. a) Given an image, "A" represents its pixel position. If A* is the starting pixel, write down the 8-chain code and find the shape number of it. 8

			A*	A		
		A			A	
		A		A		
	A				A	
		A		A		
			A	A		

7

   b) Explain the stages in edge detection.
6. a) Perform Region Splitting for the following given image. 8
   Threshold (T)=3

F=

6	5	6	6	7	7	6	6
6	7	6	7	5	5	4	7
6	6	4	4	3	2	5	6
5	4	5	4	2	3	4	6
0	3	2	3	3	2	4	7
0	0	0	0	2	2	3	6
1	1	0	1	0	3	4	4
1	0	1	0	2	3	5	4

   b) What is multi-layer perception on neural network? Explain the application of neural network in pattern recognition. 7

   OR

   What do you mean by scale invariant feature transform. Explain the step for SIFT algorithm.
7. Write short note on **any two:** 2×5
   a) Fourier Descriptor
   b) Steps of pattern recognition system
   c) Discrete Cosine Transform