POKHARA UNIVERSITY

Level: Bachelor | Semester – Spring | Year: 2020

Program: BE | Full Marks: 70

Course: Image Processing and Pattern Recognition | Pass Marks: 31.5

Time: **2** hrs.

Candidates are required to answer in their own words as far as practicable.
The figures in the margin indicate full marks.

Attempt all the questions.

Group - A: (5×10=50)

Q. N. 1 Consider the following image with the new pixel at (2,2) if the smoothing is done using a 3x3 bit neighbourhood finding. 10

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

a) Mean Filter
b) Weighted average filter
c) Median Filter
d) Min Filter
e) Max Filter

Q. N. 2 Explain the components of digital image processing. How many images of size 1920*1720 with 8-bit gray value can be stored in a 512 MB storage space? 10

OR

Compare between Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT) with reference to Digital Image Processing. Derive the equations of FFT algorithm for one dimensional case.

Q. N. 3 Using the concept of Hit, Fit and Miss, and taking a structural element of your choice, explain erosion and dilation with pictorial examples. 10

Q. N. 4 "Edge linking is used in boundary detection of an image? Justify. Explain the method of edge linking using Hough Transform in detail with suitable figures. 3+7

Q. N. 5 Differentiate between lossless & lossy compression? Consider the source with 8 message to design Huffman code and efficiency for intensity values in following normalized histogram. 4+6

Gray Level (r_k)	0	1	2	3	4	5	6
$P(r_k)$	0.25	0.25	0.125	0.125	0.125	0.0625	0.0625

Group - B: (1×20=20)

Q. N. 6

a) What is time and frequency domain transformation? 2

b) Compute the DFT of f(x) = {1, -1, 3, 2} 8

c) How do you convert special domain into frequency domain? 4

d) Apply contrast stretching technique on 3-bit gray level image of size 4x4. 6

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