

**Answer the following questions**

**Question (1)**

Answer with true or false

(12 Marks)

- a) An image with low contrast has wide histogram distribution
- b) The idea behind contrast stretching is to increase the dynamic range of the gray levels in the image being processed.
- c) A Degradation is defined at points for which  $H(u,v)$  is down to a certain fraction of its maximum value
- d) Convolution is the same as correlation expect that , the filter is first rotated by 180 degree
- e) Power-law function maps a narrow range of low gray-level values in the input image into a wider range of output levels.
- f) Laplacian filter replaces the pixel value by the median value in the neighborhood
- g) The number of bits used to quantize the image is known as intensity resolution.
- h) When using the contraharmonic filter positive values of  $Q$  eliminates the pepper noise.

**Question (2)**

(12 Marks)

Suppose that you have the 3-bit 4x4 image shown in the figure.

- a) Show the output image as a result of histogram equalization.
- b) Find the average(mean) intensity and the standard deviation using the pdf distribution

0	0	0	4
1	1	1	5
1	2	2	7
2	2	2	7

**Question (3)**

(13 Marks)

- a) Explain the types of noise in terms of their probability characteristics
- b) The image given below is a 3 X 3 image. What will the value of the center Pixel change to when this image is passed through
  - a. Arithmetic mean filter
  - b. Geometric mean filter
  - c. Harmonic mean filter

1	7	5
6	2	3
1	4	2

**Question (4)**

(13 Marks)

- a) Consider the simple 4X8, 8-bit image:
  - a. Compute the entropy of the image:
  - b. Compress the image using Huffman coding
  - c. Compute the compression achieved and the effectiveness of the Huffman coding

21	160	21	95	169	245	255	100
21	160	21	95	169	245	255	100
21	160	21	95	169	245	255	100
21	160	21	95	169	245	255	100

< Good Luck >