



Digital Image Processing
Course Code: CSE395
Spring Semester Exam.



BME Program - Level 300
Exam Date: 31-3- 2018
Allowed Time: 1 Hour

Attempt all questions. Assume any missed data. Full mark is 20

Q.1) Give a detailed answer to each of the following questions:

[12 Marks]

i. Define each of the following terms:

image restoration – spatial resolution – bit planes

ii. "We can perform lightening or darkening of an image by addition, subtraction, multiplication, and division". Sketch the characteristics of a grey-scale image if we add 128 and if we divide by 2. Give MATLAB command required for this operation.

iii. "Suppose we wish to convolve an image M with a spatial filter S ". Write the main steps proposed by the convolution theorem to get the result.

iv. Define the following terms for an image:

frequency - high frequency component – low-pass filter (give a numeric example).

Q.2.a) Given a 5x5 image 'X' and a mask 'H' given by:

$$X = \begin{bmatrix} 15 & 12 & 175 & 14 & 15 \\ 14 & 16 & 170 & 15 & 15 \\ 18 & 17 & 170 & 15 & 15 \\ 17 & 18 & 175 & 14 & 14 \\ 18 & 17 & 170 & 14 & 14 \end{bmatrix}, \quad H = \begin{bmatrix} -1 & 0 & 1 \\ -1 & 0 & 1 \\ -1 & 0 & 1 \end{bmatrix}$$

Apply the filter to the image? Adjust all values to the range [0 – 255]. Select a threshold to transform the output image into a binary one **[6 Marks]**

Q.2.b) Suppose a 3-bit grey-scale image has the following grey values distribution:

Grey scale	0	1	2	3	4	5	6	7
Frequency	60	30	80	250	210	160	190	20

i. Sketch the histogram of this image. What do you expect about the image appearance?

ii. Use histogram equalization to improve the image. Sketch the result.

[6 Marks]

☺ **Best wishes** ☺

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