



**Digital Image Processing
Spring Semester Exam.**



**Mansoura University
Faculty of Engineering**

Biomedical Engineering Program - Level 300

Exam Date: 13-5-2018

Allowed Time: 2 Hours

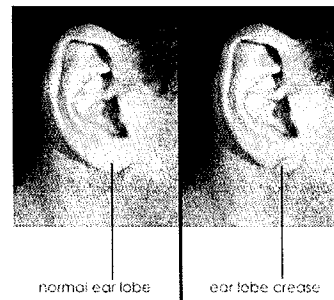
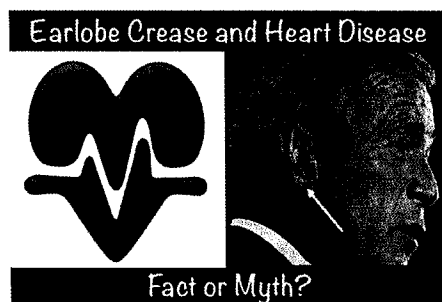
Attempt all questions. Assume any missed data. Full mark is 50

Q.1) Use neat sketches to compare between each of the following [12 Marks]

- CCD camera and flat-bed scanner
- The characteristics of a grey-scale image if we add 100 and the characteristics obtained if we multiply by 2.
- Block diagram of unsharp masking and block diagram of transform processing using discrete Fourier transform.
- Color image processing using RGB components and color image processing using intensity component.

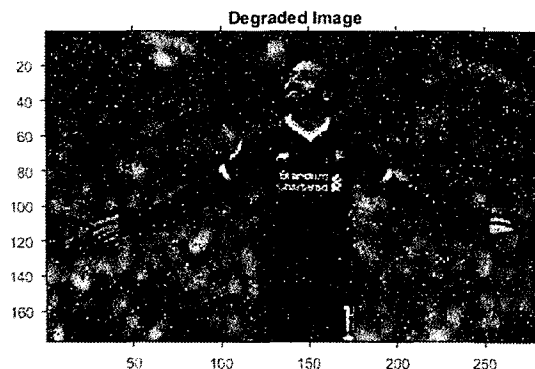
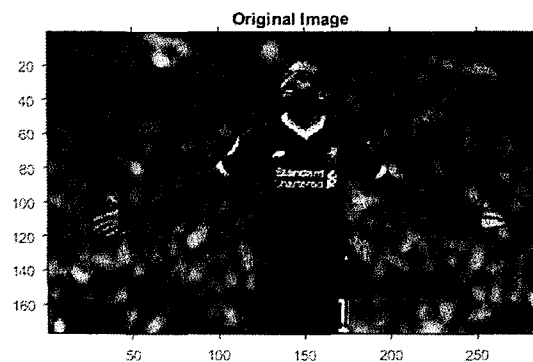
Q.2) Give a short answer to each of the following questions: [12 Marks]

- "Does having an earlobe crease mean you're destined to have a serious heart condition?" How can image processing help to answer this question?



- "Inverse filtering may lead to errors in the filtered image". Explain the concept of inverse filtering and the procedures that must be followed to overcome its disadvantages.
- "Thresholding can be useful in many situations". Justify this statement. In which situations will adaptive thresholding be applied?
- "A color model is a method for specifying colors in some standard way". Discuss the main three color models that are commonly used. Write down the MATLAB commands which can be used to transform between these models.

Q.3.a) Given an original image 'Mo_Salah.jpg' and a degraded version as shown in figure. What does the second image suffer from? Suggest a solution and write a well commented MATLAB code. Enhance the original image using unsharp masking. [6 Marks]



Q.3.b) Derive the parametric form of a straight line in an image. Use the Hough transform to detect the two strongest lines in the binary image shown below. **[12 Marks]**

		X						
		0	1	2	3	4	5	6
y	0	1	0	0	0	0	0	1
	1	1	1	0	0	0	1	0
	2	0	0	0	0	0	0	0
	3	0	0	0	1	0	0	0
	4	1	0	1	0	0	0	0
	5	0	1	0	0	0	0	0
	6	1		0	0	0	0	0

Q.4.a) Consider the filtered image shown below:

0	15	15	15	15	15	15	0
15	-30	-15	-15	-15	-15	-30	1
10	-15	0	0	0	0	-15	10
10	-15	0	0	0	0	-15	10
10	-30	-15	0	0	0	-15	10
0	15	30	-15	0	0	-15	15
0	0	15	-30	-15	-15	-30	15
0	0	0	15	15	15	15	0

Apply "zero crossing" to obtain the edges of this image.

[6 Marks]

Q.4.b) Suppose a 4 bit grey-scale image has the following grey values:

[6 Marks]

i	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
n_i	0	0	0	0	0	100	150	80	90	30	50	0	0	0	0	0

- Sketch the histogram of this image. What do you expect about the appearance of this image?
- Use histogram equalization to improve the appearance of the image. Sketch the result.

☺ **Best wishes** ☺

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