



**UNIVERSITI KUALA LUMPUR**  
**Malaysia France Institute**

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**FINAL EXAMINATION**  
**JANUARY 2010 SESSION**

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**SUBJECT CODE** : FSB 43503  
**SUBJECT TITLE** : IMAGE PROCESSING  
**LEVEL** : BACHELOR  
**TIME / DURATION** : 9.00am – 12.00pm  
( 3 HOURS )  
**DATE** : 04 MAY 2010

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**INSTRUCTIONS TO CANDIDATES**

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1. Please read the instructions given in the question paper CAREFULLY.
2. This question paper is printed on both sides of the paper.
3. Please write your answers on the answer booklet provided.
4. Answer should be written in blue or black ink except for sketching, graphic and illustration.
5. This question paper consists of FIVE (5) questions. Answer FOUR (4) questions only.
6. Answer ALL questions in English.
7. *Graph paper is appended.*

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THERE ARE 6 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

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**INSTRUCTION: Answer four questions only.**

**Please use the answer booklet provided.**

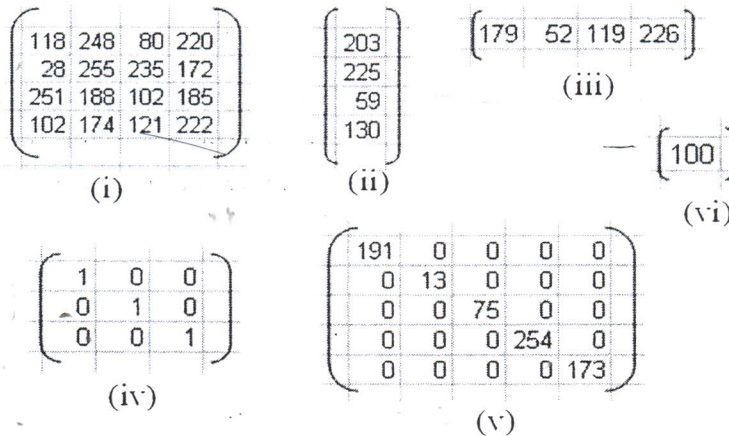
**Question 1**

- (a) List three categories to manipulate an image in image processing.

(4 marks)

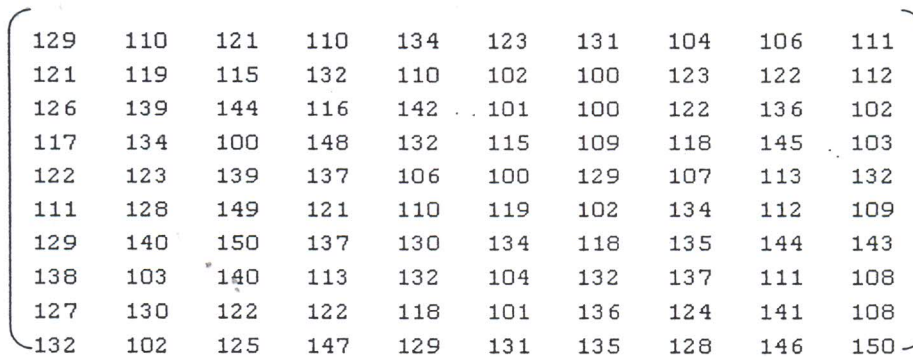
- (b) State the format of matrix images below in Figure 1.

(6 marks)



**Figure 1: Matrix Images**

- (c) Figure 2 shows a matrix image with 10x10 scales. Calculate the mean; variance and standard deviation of the matrix images (make sure your answers are in **3 decimal points**).



**Figure 2: Matrix image of 10\*10 scales**

(10 marks)

- (d) Write the matlab code using **for loop** to transform the image in Figure 3. (The size of image is 291\*240 pixel)



Figure 32: The image of Pout

(5 marks)

**Question 2**

- (a) Briefly explain image histogram.

(5 marks)

- (b) Plot a histogram for the following matrix values in Table 1.

(10 marks)

Table 1: Matrix image of 10\*10 scales

	1	2	3	4	5	6	7	8	9	10
1	154	151	151	151	152	154	154	151	157	157
2	151	156	150	152	158	155	152	155	156	153
3	158	151	151	157	160	154	151	154	157	157
4	155	156	156	155	160	151	153	154	155	152
5	153	155	155	158	159	152	150	155	156	159
6	150	155	152	152	156	155	160	159	151	158
7	154	159	156	159	152	155	152	152	159	155
8	151	156	156	157	150	150	152	157	156	158
9	157	150	154	152	151	157	152	156	155	152
10	151	154	155	151	153	158	157	159	153	151

(c) Based on question 2(b), redraw the Table 1 in your answer booklet and sketch the area of intensity value based on the coordinate given and put the Roman number based on question given.

i. (5,5)

(1 mark)

ii. (6,6:7)

(2 marks)

iii. (3:5,2)

(3 marks)

iv. (2:3,8:9)

(4 marks)

### Question 3

(a) Briefly explain on image enhancement and why we need to enhance an image?

(6 marks)

(b) Discuss the two techniques of image enhancement.

(4 marks)

(c) Figure 4 shows image enhancement using median filter, write the matlab code involved to remove the noise by using this filter (assume you need to add the noise using salt and paper techniques and the filename is "ceiling.tif")

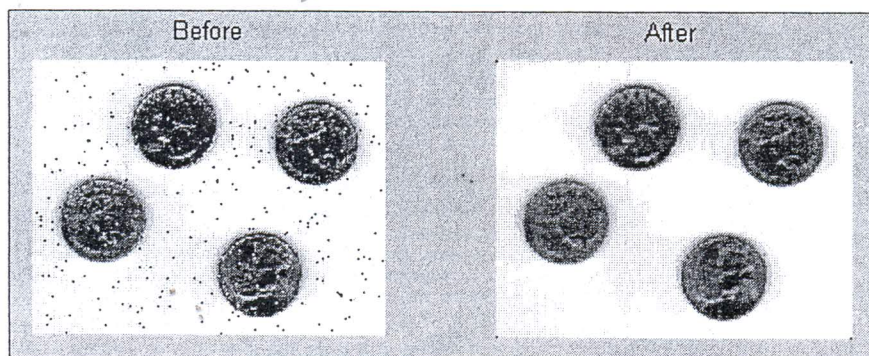


Figure 4: Image enhancement using median filter

(8 marks)

- (d) State the three techniques to detect the edge in image processing. (3 marks)
- (e) Write the steps to detect the edge in Figure 5. (Assume the name of the file is "rice.png" and it is in grayscale image)

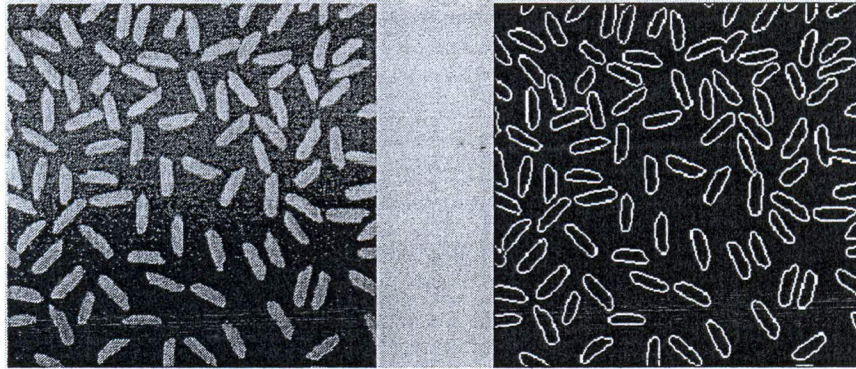


Figure 5: Image of rice

(4 marks)

**Question 4**

Figure 6(a) and 6(b) show the histogram and image of Lena that have been enhanced using the equalization techniques.

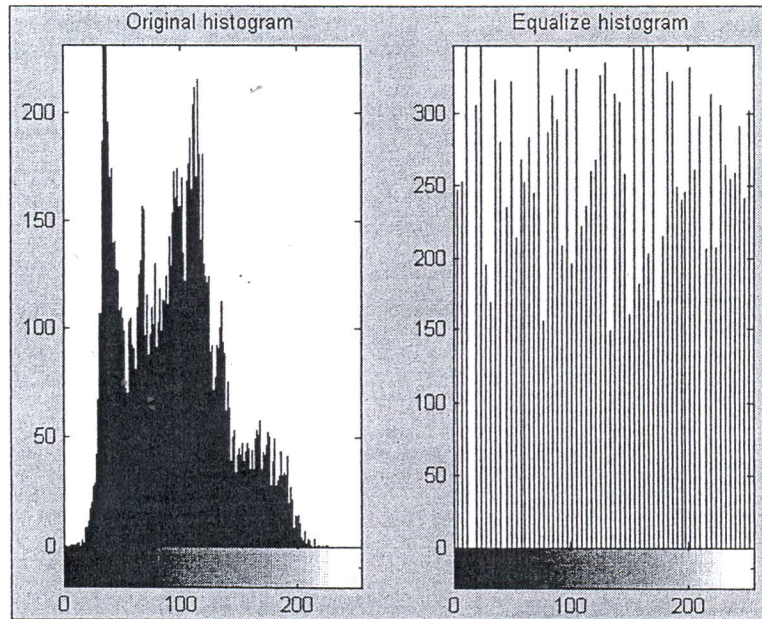


Figure 6(a): Histogram of Lena.jpg

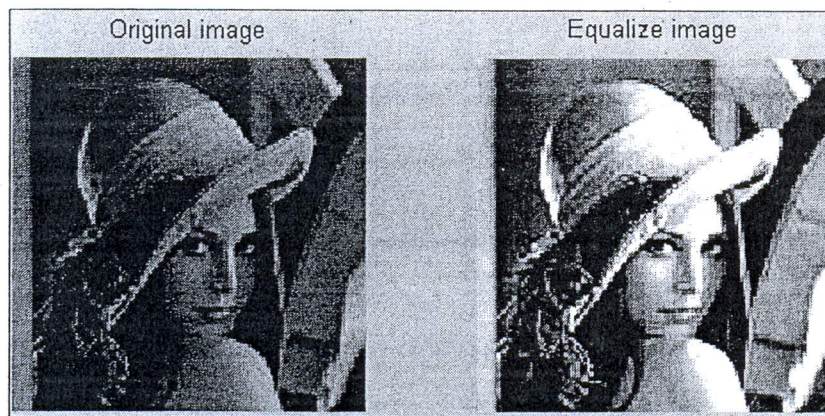


Figure 6(b): Image of Lena.jpg

- (a) State the processes involved to enhance the image in Figure 6(a) and 6(b). (5 marks)
- (b) Write the code to read the image. (Assume the image is in color) (4 marks)
- (c) Write the code to display the histogram of the original image. (2 marks)
- (d) Write the code to equalize the image. (2 marks)
- (e) Write the code to display the histogram of both images. (6 marks)
- (f) Write the code to display both images. (6 marks)

**Question 5**

- (a) What is the main aim of pre-processing? (3 marks)

- (b) Briefly explain image restoration. (5 marks)
- (c) There are many different models for the image noise term  $\eta(x, y)$ . State three of them. (3 marks)
- (d) Explain the rationale behind the use of histogram equalization (4 marks)
- (f) Briefly explain the steps to rotate the image in Figure 7. (Assume the image given is RGB) (5 marks)

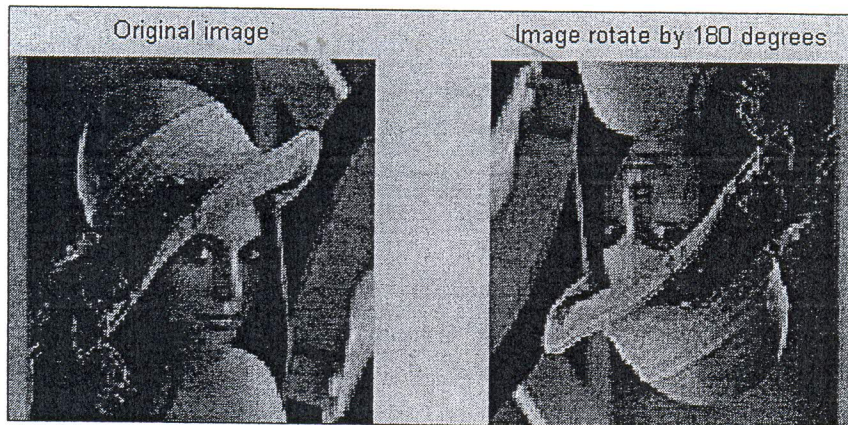


Figure 7: Image of Lena.jpg

- (g) Base on the answer in question 5(f), write the matlab code. (Assume the filename is "Lena.jpg") (5 marks)

END OF QUESTION