

CONFIDENTIAL



UTHM

Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2018/2019**

COURSE NAME : IMAGE PROCESSING
COURSE CODE : BIM 33203
PROGRAMME CODE : BIM
EXAMINATION DATE : JUNE / JULY 2019
DURATION : 3 HOURS
INSTRUCTION : ANSWER ALL QUESTIONS

THIS QUESTION PAPER CONSISTS OF THREE (3) PAGES

TERBUKA

CONFIDENTIAL

- Q1** (a) State any **TWO (2)** reasons for performing image enhancement. (4 marks)
- (b) Given a simple gray-scale image, explain how its histogram can be constructed. (4 marks)
- (c) Write a simple algorithm for your answer in **Q1(b)**. (7 marks)

- Q2** (a) Explain how a smoothing linear filter functions. (3 marks)
- (b) **Figure Q2** shows a 3 x 3 kernel for performing a smoothing linear filter operation. Calculate and draw the results after performing the operation. (12 marks)

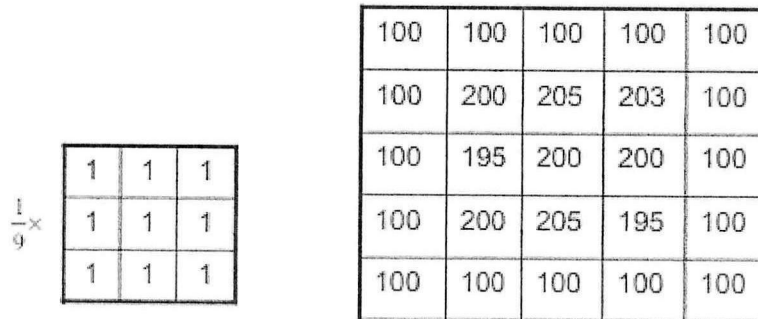


Figure Q2

- Q3** (a) Explain what is meant by ‘salt and pepper’ noise. (3 marks)
- (b) You are assigned to restore an image corrupted with salt and pepper noise. Various types of filters can be used to remove the salt and pepper noise. Identify **ONE (1)** filter that you will use and justify the reasons for your selection. (6 marks)
- (c) Given the following scenario.

A skilled medical technician is assigned the job of inspecting a certain class of images generated by an electron microscope. In order to simplify the inspection task, the technician decides to use digital image enhancement and, to this end, examines a set of representative images and finds the following problems: (1) bright, isolated dots that are of no interest; (2) lack of sharpness; and (3) not enough contrast in some images.

Propose a sequence of processing steps that the technician can follow to correct these problems.

(6 marks)

TERBUKA

Q4 (a) List any **TWO (2)** basic data redundancies that can be identified and exploited in image processing. (2 marks)

(b) Consider the simple 8-bit image:

21	21	21	95	169	243	243	243
21	21	21	95	169	243	243	243
21	21	21	95	169	243	243	243
21	21	21	95	169	243	243	243

(a) Compute the entropy of the image. (6 marks)

(b) Compress the image using Huffman coding. (8 marks)

Q5 (a) Elaborate the term ‘image segmentation’ and its importance. (6 marks)

(b) Discuss **TWO (2)** basic properties of intensity values whereby segmentation algorithms are generally based on. (6 marks)

(c) **Figure Q5** shows an image of size pixels 834 X 114, with intensity values scaled to the range [0, 1]. Suggest the best method to perform edge detection. Give reason for your selection and state the algorithm to perform the detection.

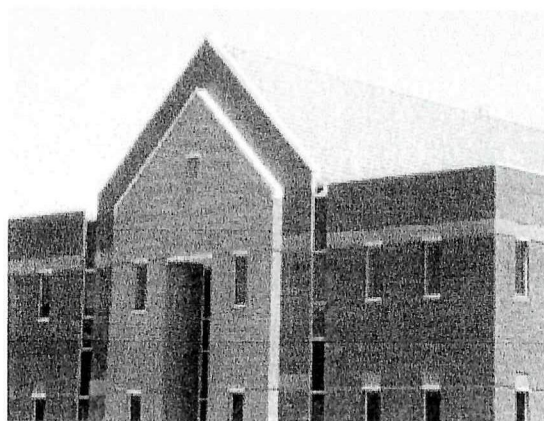


Figure Q5

(7 marks)

- END OF QUESTION -

TERBUKA