UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
(ONLINE)
SEMESTER I
SESSION 2020/2021

COURSE NAME	:	IMAGE PROCESSING
COURSE CODE	:	BEC 42203
PROGRAMME CODE	:	BEJ
EXAMINATION DATE	:	JANUARY / FEBRUARY 2021
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS. **OPEN BOOK EXAMINATION**

THIS QUESTION PAPER CONSISTS OF THREE (3) PAGES

Q1 Referring to **Figure Q1,** propose a new set of pixel values for original image, $f(x,y)$. Compute the output of the 3 × 3 Prewitt edge detector as shown in **Figure Q1** at pixel location (2,2).

x \ y	1	2	3
1	?	?	?
2	?	?	?
3	?	?	?

(i) Original image, $f(x,y)$

1	1	0
1	0	1
0	1	1

(ii) Prewitt edge detector

Figure Q1

(15 marks)

Q2 Referring to **Figure Q2**, propose a new set of pixel values for original image, $f(x,y)$.

x \ y	1	2	3
1	?	?	?
2	?	?	?
3	?	?	?

Original image, $f(x,y)$

Figure Q2

(a) Calculate the outputs of a 3 × 3 minimum filter using zero padding technique at location:
(i) (1,1), and
(ii) (2,3)

(13 marks)

(b) Identify the effects of applying minimum filter to the new pixel value at (2,3).

(2 marks)

Q3 Referring to **Figure Q3**, propose a new set of pixel values for original image, $f(x,y)$. Distinguish the output of a 5 × 5 average filter at (3,3).

		y = 1	2	3	4	5
	1	?	?	?	?	?
	2	?	?	?	?	?
x	3	?	?	?	?	?
	4	?	?	?	?	?
	5	?	?	?	?	?

Original image, $f(x,y)$

Figure Q3

(10 marks)

Q4 Referring to **Figure Q3, p**erform a global thresholding to **Figure Q3**, where T= 3. Generate the new image pixel values matrix, g(x,y). Given the equation is as follows:

$$g(x,y) = \begin{cases} 1 & if\ f(x,y) > T \\ 0 & if\ f(x,y) < T \end{cases}$$

Equation Q4

(25 marks)

Q5 Referring to **Figure Q5**, propose a new set of pixel values for original image, $f(x,y)$.

		y = 1	2	3
	1	?	?	?
x	2	?	?	?
	3	?	?	?

Original image, $f(x,y)$

A

		y = 1	2	3
	1	1	2	3
x	2	4	5	6
	3	7	8	9

B

Figure Q5

(a) Find the output pixel value for the erosion of ***A*** and ***B*** for pixel location at location at (1,1) with using padding technique.

(19 marks)

(b) Find the output pixel value for the erosion of ***A*** and ***B*** for pixel location at (1,1) without using padding technique.

(10 marks)

(c) Based on result in **Q5(a) and Q5(b)**, which of technique provide darker image result? Justify your answer.

(6 marks)

-END OF QUESTIONS –