



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

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- 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).

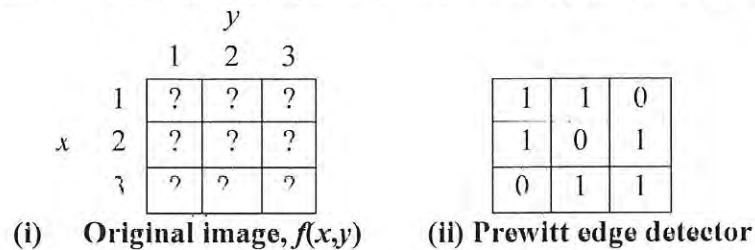


Figure Q1

(15 marks)

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

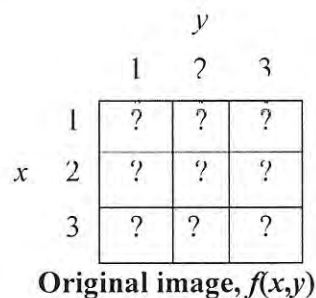


Figure Q2

- (a) Calculate the outputs of a 3×3 minimum filter using zero padding technique at location:
- (1,1), and
 - (2,3)
- (b) Identify the effects of applying minimum filter to the new pixel value at (2,3).

(13 marks)

(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
x	1	?	?	?	?	?
	2	?	?	?	?	?
	3	?	?	?	?	?
	4	?	?	?	?	?
	5	?	?	?	?	?

Original image, $f(x,y)$

Figure Q3

(10 marks)

- Q4** Referring to **Figure Q3**, perform 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:

$$g(x,y) = \begin{cases} 1 & \text{if } f(x,y) > T \\ 0 & \text{if } f(x,y) \leq T \end{cases} \quad \text{Equation Q4}$$

(25 marks)

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

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

Original image, $f(x,y)$

A

		y		
		1	2	3
x	1	1	2	3
	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 -

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