



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
(ONLINE)
SEMESTER II
SESSION 2020/2021**

COURSE NAME : IMAGE PROCESSING
COURSE CODE : BEC 42203
PROGRAMME CODE : BEJ
EXAMINATION DATE : JULY 2021
DURATION : 3 HOURS
INSTRUCTION : ANSWERS ALL QUESTIONS.
OPEN BOOK EXAMINATION

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THIS QUESTION PAPER CONSISTS OF FOUR (4) PAGES

- Q1** Figure Q1 shows the image corrupted by a type of noise. Analyze the noise characteristics in the image. Then answer the following questions.



(a) Original "Barbara" image



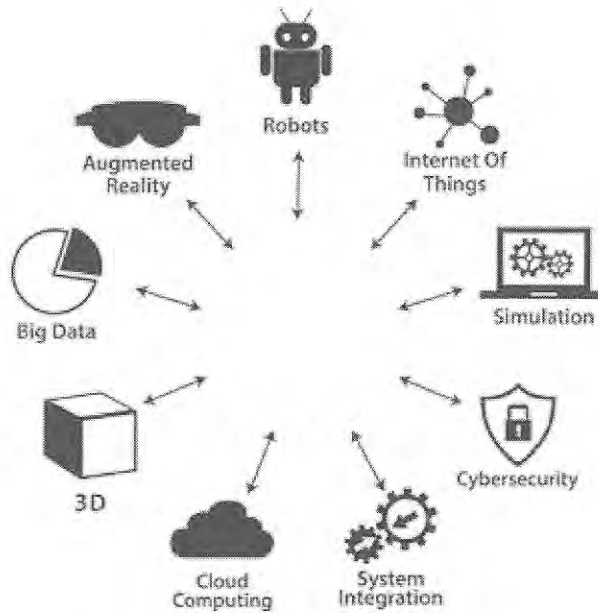
(b) Corrupted "Barbara" image

Figure Q1

- (a) Suggest a technique/filter to remove the noise in **Figure Q1**. (2 marks)
- (b) Justify why do you suggest the filter in Q1(a). (4 marks)
- (c) What are the expected effects to the output result after applying the suggested technique/filter in Q1(a)? (2 marks)
- (d) Provide an example of the noise existence in an image represented by pixel intensity values, which sized 5 x 5 pixels. Draw a matrix consisting of the combination of 0, any integer from your hand phone number and 255. (15 marks)
- (e) Discuss the effect of applying suggested technique/filter in Q1(a) to the pixel intensity values for the matrix in Q1(d). (2 marks)

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Q2 Figure Q2 shows the Industrial Revolution 4.0 (IR 4.0) elements. Future workflow can be improved as part of IR 4.0. Human efficiency can be enhanced through intelligent machine vision systems via smaller, lighter and high-precision industrial cameras integrated into helmets, garments and tools.



PRINCIPLE OF 4.0 INDUSTRIAL REVOLUTION

Figure Q2

- (a) Provide 2 examples of image reconstruction application related to IR 4.0. Elaborate briefly your answers for both examples. (10 marks)

- (b) What are the potentials of image processing growth in Internet-of-Things (IOT) field? Provide 2 ideas and elaborate briefly your answers for both suggestions. (15 marks)

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Q3 Figure Q3 shows the process of fingerprint detection.

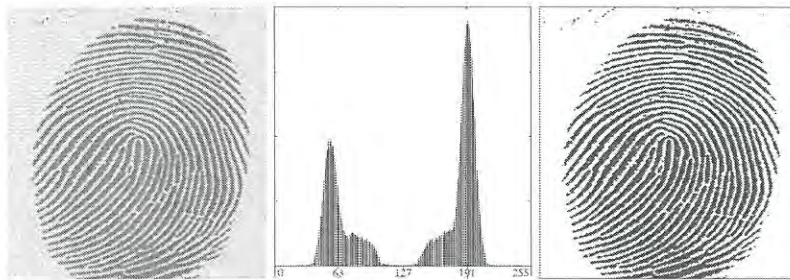


Figure Q3

- (a) Based on **Figure Q3**, identify what are the techniques involved in this process. (4 marks)
- (b) Explain the step-by step process (including related equation) to obtain the output result in **Figure Q3**. (11 marks)
- (c) Provide and elaborate 2 applications that utilize fingerprint recognition. (10 marks)

Q4

- (a) Suggest a morphological technique that can be used to obtain similar effects for fingerprint output image as in **Figure Q3**. Explain in terms of equation, processes and effects of the processing. (15 marks)
- (b) WhatsApp provides a function to share image among its users. **Figure Q4** shows the effects resulted from image resizing in the WhatsApp. Analyze the characteristics of the image Then answer the following questions.



(b) Original sender image



(b) Output receiver image

Figure Q4

- (i) Explain the purpose of image resizing performed in WhatsApp. (5 marks)
- (ii) Propose a way how to ensure sent images will have the same quality as the original image if you want to share it through WhatsApp. (5 marks)

– END OF QUESTIONS –

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