UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2017/2018

COURSE NAME	:	COMPUTER ALGORITHM
COURSE CODE	:	DAT 13303
PROGRAMME CODE	:	DAT
EXAMINATION DATE	:	DECEMBER 2017 / JANUARY 2018
DURATION	:	2 HOURS 30 MINUTES
INSTRUCTION	:	SECTION A - ANSWERS **ALL** QUESTIONS SECTION B - ANSWER **TWO (2)** QUESTIONS ONLY

THIS QUESTION PAPER CONSISTS OF **EIGHT (8)** PAGES

SECTION A

Q1 (a) Define the concept of
(i) Stack
(ii) Queue

(4 marks)

(b) Identify either the following operations are necessary or not, if a stack is implemented by using a pointer and give the reason to support each answer.
(i) Check Top Stack
(ii) Check Stack Empty
(iii) Check Stack Full

(6 marks)

(c) Sketch consequent diagram for implementation of a stack num with size of 4 using static implementation.
Step 1 : create new queue num
Step 2 : push (num, 5)
Step 3 : push (num, 7)
Step 3 : pop ( )
Step 4 : push (num, 9)

(Noted: Show the position of Top for each step and an output of the above operation)
(10 marks)

Q2 (a) Identify and label item 1 to item 4 in **Figure Q2(a).**

(4 marks)

(b) Given the below data:

12	5	18	10	3	17	23

(i) Write a pseudocode to insert operation in Binary Search Tree (BST).

(5 marks)

(ii) Build binary tree using the above data.

(5 marks)

(iii) List down the number by using in-order, pre-order and post-order traversal.

(6 marks)

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Q3 (a) List **ONE (1)** advantage and **ONE (1)** disadvantage of linear search.

(2 marks)

(b) Briefly explain the searching process for number 29 by using the following technique:

18	21	25	29	32

(i) Linear Search
(ii) Binary Search

(8 marks)

(c) Perform data sorting for the elements in (i) and (ii) by using the following technique

(i) Bubble Sort

5	2	4	3	6

(ii) Merge Sort

5	2	4	6	1	3	2	6

(Note : Illustrate step by step process during implementation of sorting technique above.)

(10 marks)

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SECTION B

Q4 (a) Based on **Figure 4Q(a)**, answer following question:

(i) Describe the linked list in **Figure Q4(a).**

(ii) Interpret **Figure Q4(a)** using algorithm. The algorithm will return TRUE if it meets the condition.

(6 marks)

(b) **Figure Q4(b)** shows a queue named `mchar` which is built by using pointer . Write step by step operation required to build queue in **Figure Q4(b)**

(2 marks)

(c) Based on **Figure Q4(b)** above, answer the following question

(i) Analyze which operations involved during transition from **Figure Q4(b)** to **Figure Q4(c).**

(2 marks)

(ii) Illustrate and briefly explain step by step transition diagram in **Figure Q4(c)** for each operation. Shows the diagram before and after operation for each step and the position of `pFront` and `pRear`.

(10 marks)

Q5 (a) **Figure Q5(a)** shows login form of a program. An accepted message will be displayed once user successfully enter the program.

(i) Distinguish input process variable and output variable by using IPO table.

(2 marks)

(ii) Based on IPO table, interpret using a flowchart.

(6 marks)

(b) Flowchart in **Figure Q5(b)** is a step by step process an algorithm named Multiplication Table.

(i) Change flowchart in **Figure 5(b)** into pseudo code.

(10 marks)

(ii) Analyze what need to change if we want the output of program in **Figure 5(b)(i).** State your reason to support your answer.

(2 marks)

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Q6 Based on **Figure Q6**, answer the following question:

(a) Illustrate adjacent matrix.

(2 marks)

(b) Based on graph traversal:

(i) Describe Depth First Search.

(2 marks)

(ii) Illustrate graph traversal using the Breadth First Search technique.

(10 marks)

(c) Consider the following between nodes:

dist(A,B)=5
dist(A,C)=12
dist(B,C)=6
dist(B,D)=16
dist(C,D)=8

Predict the shortest path from A to D. Briefly explain the steps process to get the shortest path.

(6 marks)

Q7 (a) Select **TWO (2)** common functions used for analyzing performance of algorithms.

(2 marks)

(b) Analyze **TWO (2)** common parameters are often used during measure performance of sort algorithm.

(2 marks)

(c) Produce an algorithm to search selected element in the array list.

(6 marks)

(d) Illustrate data sorting for the elements below using insertion sort technique.

15	33	29	8	35

(Note: Illustrate step by step process during implementation of above technique)

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(10 marks)

END OF QUESTIONS

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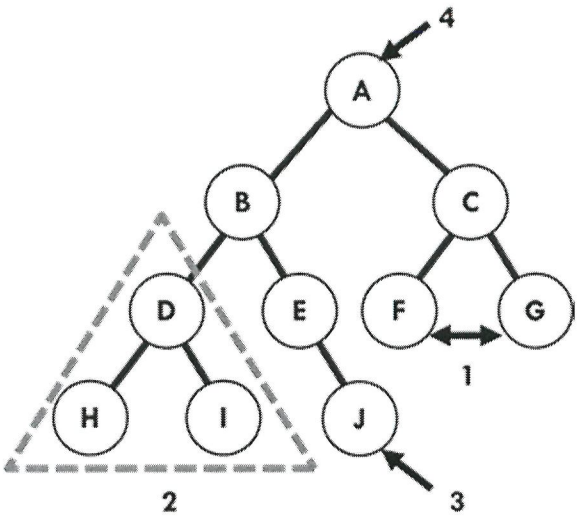

Figure Q2(a)

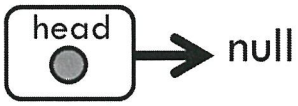

Figure Q4(a)

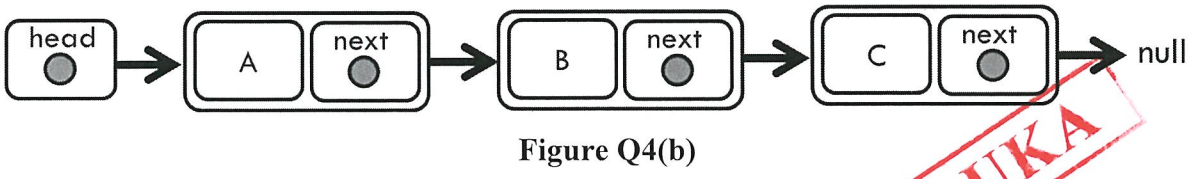

Figure Q4(b)

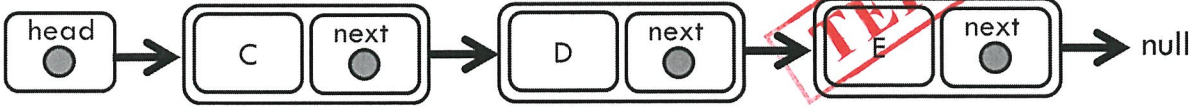

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Figure Q4(c)

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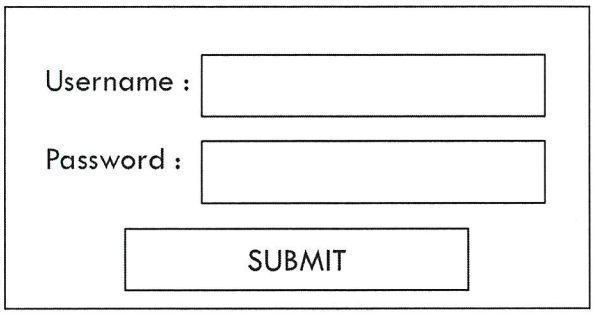

Figure Q5(a)

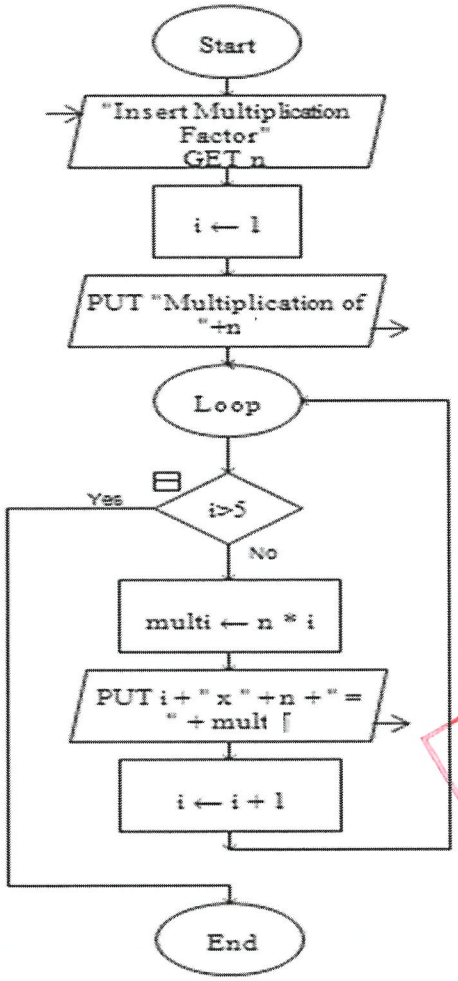

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Figure Question 5(b)

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1 x 2 = 2
2 x 2 = 4
3 x 2 = 6
4 x 2 = 8
5 x 2 = 10
6 x 2 = 12
7 x 2 = 14
8 x 2 = 16
9 x 2 = 18
10 x 2 = 20
11 x 2 = 22
12 x 2 = 24

Figure Q5(b)(i)

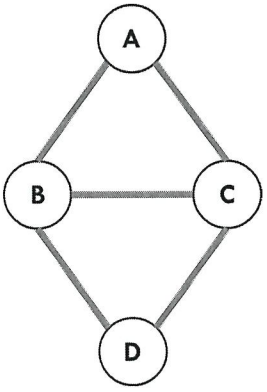

Figure Q6

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