UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2016/2017

COURSE NAME	:	COMPUTER ALGORITHM
COURSE CODE	:	DAT 13303
PROGRAMME CODE	:	1 DAT
EXAMINATION DATE	:	DECEMBER 2016/ JANUARY 2017
DURATION	:	2 HOURS 30 MINUTES
INSTRUCTION	:	ANSWER **ALL** QUESTIONS

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THIS QUESTION PAPER CONSISTS OF **SIXTEEN (16)** PAGES

SECTION A

Q1 Which of the following is **NOT** the characteristic of an algorithm?

A. General and well ordered.
B. The steps can be interpreted in multiple ways and can be performed without any confusion.
C. Effectively computable operations.
D. Terminate after a finite number of steps.

Q2 Arrange the following steps to solve a problem by using a computer.

I. Execute code.
II. Problem solved.
III. Analyze problem.
IV. Convert algorithm to code.
V. Develop algorithm.

A. I – IV –II- III- V
B. III – V – IV – I – II
C. III – V – II – IV – I
D. V – III – IV – I – II

Q3 Which of the following is **TRUE** about repetition control structure?

A. Conditional expression in while loop is evaluated first and if it is true, the associated statement block is executed.
B. Conditional expression in do-while loop is evaluated first and if it is true, the associated statement block is executed.
C. In while loop the statement block is executed first and then the conditional expression is evaluated.
D. In while loop, the statement block is executed at least once even if the conditional expression is false at first attempt.

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Q4 and Q5 are based on FIGURE Q4 to solve the problem below.

A shop owner wants to develop a program for mega sales season. Each item bought get a 25% discount. The program will calculate and display discount and discounted price.

Q4 Substitute X, Y and Z.

A. X = discounted price, Y = discount, Z = item price
B. X = item price, Y = discount, Z = new price
C. X = item price, Y = discount, Z = item price
D. X = discount, Y = discounted price, Z = item price

Q5 Formulate Z.

A. item price = item price - discount
B. discounted price = discounted price - discount
C. discounted price = discount - discounted price
D. discounted price = item price – discount

Q6 If condition in **FIGURE Q6** evaluates false, the car park charge is _____.

A. RM 3
B. RM 1
C. RM 0
D. RM 2

Q7 Which of the following problem is solved using repetition control structure?

A. Determine whether a given year is a leap year or not.
B. Calculate sum of integers.
C. Keep asking for password until correct password given.
D. Determine whether a number is even or odd.

Q8 Which of the following is an example of primitive data structure?

A. Stack
B. Array
C. Integer
D. Pointer

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Q9 Which of the following application of data structure use First In First Out principle?

A. Memory management.
B. Printing.
C. Dynamic memory management.
D. Folder arrangement.

Q10 "X is a process of identifying the location of a record that contains a specific key value while Y is a process of accessing each record of a data structure exactly once."

Substitute X and Y as described above.

A. X = Inserting, Y = Deleting
B. X = Traversing, Y = Searching
C. X = Searching, Y = Traversing
D. X = Deleting, Y = Inserting

Q11 Identify the purpose of analyzing an algorithm.

I. To discover the characteristics of the algorithm in order to evaluate its suitability for various applications.
II. To identify ways for getting full advantage of the programming environment.
III. To give a better understanding of the algorithm and get some suggestions for improvements.
IV. To discover the characteristics of the algorithm to compare it with other algorithms for the same application.

A. I and II
B. I and III
C. I, II and III
D. All of the above

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Q12 Which statement support resources for analyzing an algorithm?

I. Resources required to execute algorithm are time and memory.
II. Large input sizes can usually be computed instantaneously.
III. Some algorithms perform differently on various inputs of similar size.

A. I and II
B. I and III
C. I, II and III
D. All of the above

Q13 _____ refers to a linear collection of data items.

A. List
B. Tree
C. Graph
D. Edge

Q14 Which of the following is a two way list?

A. Grounded header list
B. Circular header list
C. Linked list with header and trailer nodes
D. List traversed in two directions

Q15 In linked list there are no `NULL` link in _____.

A. single linked list
B. doubly linked list
C. circular linked list
D. none of the above

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Q16 If `top` points to top of stack and `stack[ ]` is the array containing stack elements, which of the following statements correctly reflect push operation for inserting `item` into stack?

A. `top = top+1; stack[top] = item`
B. `stack[top]= item; top= top + 1`
C. `stack[top++] = item`
D. Both A and C are correct.

Q17 If pop operation is performed on an empty stack, then which of the following situations will occur?

A. Overflow
B. Underflow
C. Array out of bound
D. None of the above

Q18 Which of the following is **NOT** an example of stack?

A. Collection of tiles one over another.
B. A set of bangles worn by a lady on her arm.
C. A line up people waiting for the bus at the bus stop.
D. A pileup of boxes in a warehouse one over another.

Q19 Which of the following statements is **NOT TRUE** of queue?

A. It is a linear data structure.
B. It allows insertion or deletion of elements only at one end.
C. It has two ends front and rear.
D. It is based on First-In-First Out principle.

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Q20 If `front` points at the front end of queue, `rear` points at the rear end of queue and `queue[]` is an array containing queue elements, which of the following statements correctly reflects the delete operation?

A. `Item = queue[rear]; rear = rear+1;`
B. `Item = queue[front]; front = front +1;`
C. `Item = queue[++front];`
D. Both B and C are correct

Q21 Which of the following is suitable for implementing a print scheduler?

A. Stack
B. Queue
C. Array
D. None of the above

Q22 If node N is a terminal node in a binary tree then _____.

A. right tree is empty
B. left tree is empty
C. both left and right sub trees are empty
D. root node is empty

Q23 Which of the following is **TRUE** about binary search tree?

A. All items in the left subtree are less than root.
B. All items in the right subtree are greater than or equal to the root.
C. Each subtree is itself a binary search tree.
D. All of the above.

Q24 The property of a binary tree is _____.

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A. the first subset is called left subtree
B. the second subtree is called right subtree
C. the root cannot contain null.
D. the right subtree can be empty

Q25 A binary search tree is generated by inserting the following integers in order:

50, 15, 62, 5, 20, 58, 91, 3, 8, 37, 60, 24

The number of the node in the left sub-tree and right sub-tree of the root, respectively, is _____.

A. (4, 7)
B. (7, 4)
C. (8, 3)
D. (3, 8)

Q26 Which of the following is **TRUE**?

I. A node is a parent if it has successor nodes.
II. A node is child node if out degree is one.

A. I only
B. II only
C. I and II
D. None of the above.

Q27 Any node in the path from the root to a node is called _____.

A. successor node
B. ancestor node
C. internal node
D. none of the above

Q28 A binary tree whose every node has either zero or two children is called _____.

A. complete binary tree
B. binary search tree
C. extended binary tree
D. E2 tree

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Q29 The in-order traversal of _____ will yield a sorted listing of elements of tree.

A. binary tree
B. binary search tree
C. heap
D. none of the above

Q30 Consider binary search tree in **FIGURE Q30**. Suppose we remove the root, replacing it with something from the left subtree. What will be the new root?

A. 1
B. 2
C. 4
D. 5

Q31 The post order traversal of a binary tree is DEBFCA. What is the pre-order traversal?

A. ABFCDE
B. ADBFEC
C. ABDECF
D. None of the above

Q32 The Breadth First Search algorithm is implemented using the queue data structure. One possible order of visiting the nodes of the graph in **FIGURE Q32** is _____.

A. M N O P Q R
B. N Q M P O R
C. Q M N P R O
D. Q M N P O R

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Q33 Consider the graph in **FIGURE Q33.** Which of the below sequences are depth first traversal?

I. a b e g h f
II. a b f e h g
III. a b f h g e
IV. a f g h b e

A. I, II and IV only
B. I and IV only
C. II, III and IV only
D. I, III and IV only

Q34 A set of cities (A, B, C, and D) and distance between every pair of cities (in kilometer) is shown in **FIGURE Q34**. Find the shortest possible route for a travelling salesman that visits every city exactly once and returns to the starting point (A).

A. A-B-D-C-A
B. A-B-C-D-A
C. A-C-B-D-A
D. A-D-C-B-A

Q35 If the number of records to be sorted is small, then _____ sorting can be efficient.

A. merge
B. heap
C. selection
D. bubble

Q36 Which of the following sorting algorithm using divide and conquer steps?

A. Bubble sort
B. Insertion sort
C. Merge sort
D. Selection sort

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Q37 Select the worse sorting technique when dealing with large data.

A. Bubble sort
B. Insertion sort
C. Merge sort
D. Selection sort

Q38 Which of the following is **NOT** the required condition for binary search algorithm?

A. The list must be sorted.
B. There should be the direct access to the middle element in any sub list.
C. There must be mechanism to delete and/or insert elements in list.
D. Number values should only be present.

Q39 Identify the complexity of linear search algorithm.

A. O (n)
B. O (logn)
C. O (n2)
D. O (n logn)

Q40 Choose the characteristic of data that binary search uses but linear search ignores.

A. Order of elements.
B. Length of list.
C. Maximum value in list.
D. Type of elements in list.

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SECTION B

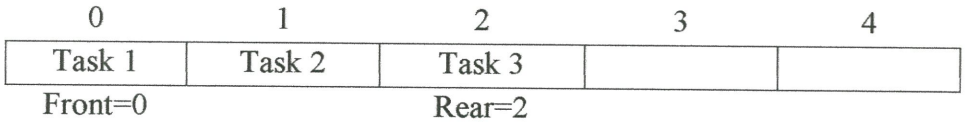
Q41 Illustrate diagram by diagram, state of a stack after the following operations implemented using linked list:

```
Create Stack R
Push (R, A)
Pop (R)
Push (R, F)
Push (R, B)
Pop (R)
```

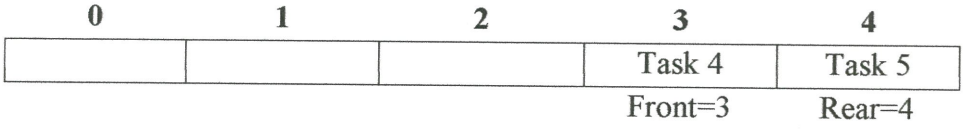
(5 marks)

Q42 A queue named Q is implemented using an array with size 5 as shown below. Consider the following two states of the queue.

State 1:



State 2:



Write a series of queue operations that will transition Q from State 1 to State 2.

(5 marks)

Q43 (a) Draw a binary search tree by inserting node using the following sequence:

C, O, M, P, U, T, E

(4 marks)

(b) Based on binary search tree drawn in (a), insert node A, D, N into the tree and show the updated binary search tree.

(3 marks)

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Q44 Consider **FIQURE Q44** where S is the starting node. Traverse the graph using:

(a) Depth First Search

(5 marks)

(b) Breadth First Search

(3 marks)

Q45 (a) Discuss **FOUR (4)** advantages and **TWO (2)** disadvantages of linear search.

(6 marks)

(b) Consider the list of numbers:

3 62 34 32 67 13 67 13 24 45 78 35 69 91 5

Show phase by phase of finding number 78 using binary search technique.

(5 marks)

Q46 (a) Explain selection sort algorithm.

(4 marks)

(b) Show step by step how the unsorted list below is sorted using selection sort technique.

Unsorted list: 3 9 6 1 2

(5 marks)

(c) Consider the following series of numbers:

-2 45 0 11 9

Show the stages to sort the numbers using bubble sort technique.

(5 marks)

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- **END OF QUESTION** -

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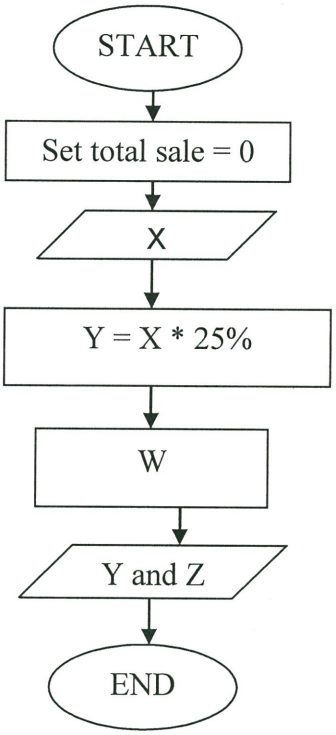

FIGURE Q4

```
Begin
Set charge = 0
Input the entry time, exit time
Period = exit time – entry time
    If period > 1 hour (60 minutes) Then
        Charge = RM 2 + (period * RM 1)
    Else
            Charge = RM 2
    End if
End
```

FIGURE Q6

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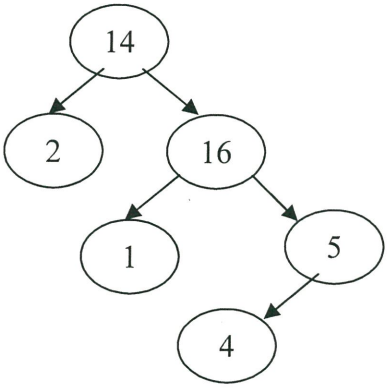

FIGURE Q30

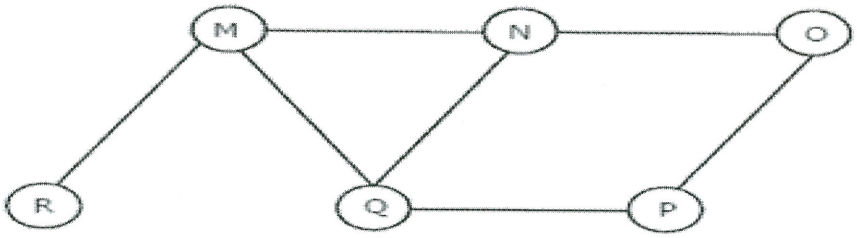

FIGURE Q32

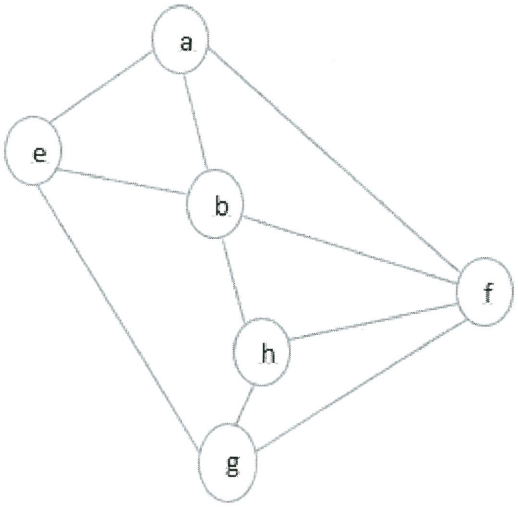

FIGURE Q33

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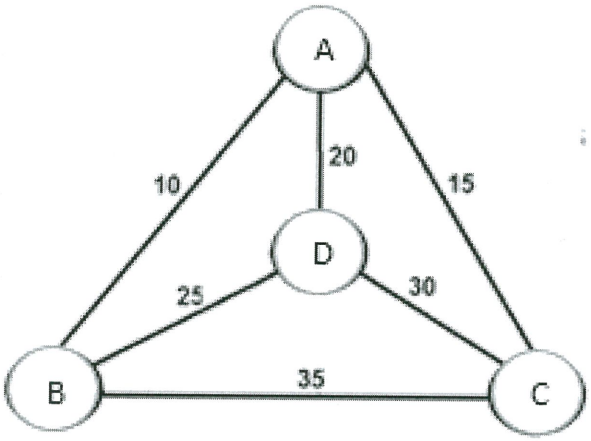

FIGURE Q34

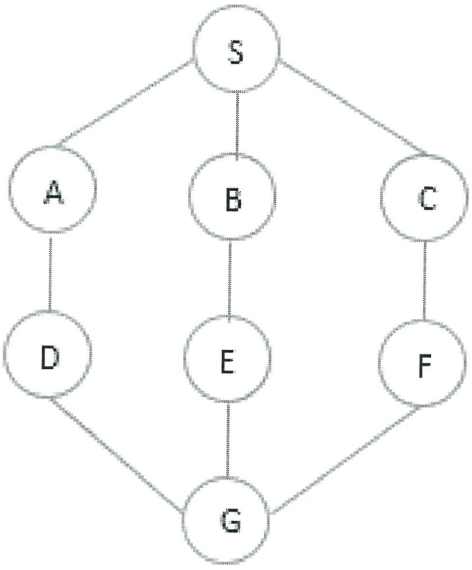

FIGURE Q44

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