UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2011/2012

COURSE NAME	:	DATA STRUCTURE AND ALGORITHMS
COURSE CODE	:	BIT 1073 / BIT 10703
PROGRAMME	:	BACHELOR OF INFORMATION TECHNOLOGY
EXAMINATION DATE	:	JUNE 2012
DURATION	:	2 HOURS AND 30 MINUTES
INSTRUCTION	:	ANSWER **ALL** QUESTIONS.

THIS QUESTION PAPER CONTAINS **EIGHT (8)** PAGES

SECTION A

Instruction: State whether each of the following statement is **TRUE** or **FALSE**.

Q1   The Towers of Hanoi problem is best solved with a recursive algorithm.

Q2   An `if` statement is a selection statement.

Q3   A linked list must always have a head pointer.

Q4   A linked list must have at least one pointer pointing to the first node.

Q5   Inserting data into a queue which has existing data, the rear pointer will point to the new data.

Q6   Deleting an element in queue is known as pop.

Q7   Breadth First Search was applied inorder method in Binary Search Trees.

Q8   A binary tree is a tree in which no node can have more than two subtrees.

Q9   Searching for a group of sorted data is longer than the unsorted data.

Q10   To add an edge, if the graph is a digraph, one vertex must be specified as the source, and one as the destination.

(10 marks)

SECTION B

Instruction: Choose the **BEST** answer.

Q11   Every recursive call must either solve a part of the problem or _____.

    A. reduce the size of the problem
    B. increase the size of the problem
    C. call itself again
    D. check if a base case has been reached

Q12   The operation for adding an entry to a stack is commonly called _____ .

    A. add
    B. append
    C. insert
    D. push

Q13   The malloc( ) function is used to _____ .

    A. release the memory
    B. allocate memory
    C. unlink the node
    D. flush the memory

Q14   Which of the following stack operations could result to stack underflow?

    A. isEmpty()
    B. pop()
    C. push()
    D. None of the above

Q15 The following sequence of traversing is called _____ .

```
Traverse the left sub tree in inorder
Visit root node
Traverse the right sub tree
```

A. inorder
B. postorder
C. preorder
D. pre-postorder

Q16 This statement may be used to stop a loop's current iteration and begin the next one.

A. break
B. return
C. continue
D. default

Q17 If the tree is not empty, the first node is called the _____ .

A. head
B. root
C. front
D. trunk

Q18 In linked list implementation of queue class, how could a new entry be inserted?

A. At the head.
B. At the tail.
C. After all other entries that is greater than the new entry.
D. After all other entries that is smaller than the new entry.

Q19 What is the output of the following program segment?

```
n = 0;
do
    printf("%d ",n++);
while (n < 5);
```

A. 0 1 2 3 4
B. 0 1 2 3 4 5
C. 1 2 3 4
D. 1 2 3 4 5

Q20 Quick sort is most efficient when the pivot is located _____ of the array.

A. in the beginning
B. in the middle
C. in the end
D. in the second to last position

(10 marks)

SECTION C

Instruction: Answer **ALL** questions.

Q21 State whether the following data structure is **STATIC** or **DYNAMIC**.

    (a)   Queues

    (b)   Arrays

    (c)   Linked Lists

    (d)   Records

    (e)   Files

(5 marks)

**Q22** Refer to the array statement below:

```
char player[5] = {'c','i','s','s','e'};
```

    (a)   What is the index of ' s' ?

(1 mark)

    (b)   Write a statement in C Language to refer ' e' in the array.

(1 mark)

    (c)   What is the index for the last data in the array?

(1 mark)

    (d)   Write a statement in C Language to print out all data in the array.

(2 marks)

Q23 Build the recursive function based on the factorial formula below.

$$f(n) = \begin{cases} 1 & n = 0 \\ n * f(n-1) & n > 0 \end{cases}$$

(5 marks)
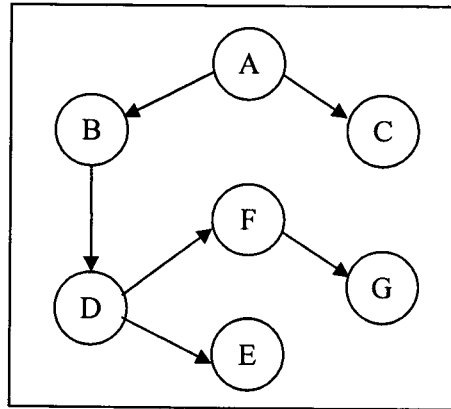
Figure Q24

Q24 Based on **Figure Q24,** give the traverse result using Breadth First Search starting from:

(a) vertex A

(b) vertex D

(5 marks)

Q25 Based on the following queues declaration.

```
typedef struct QUEUES
{
  int data;
  struct QUEUES *next;
} queues;
```

(a) Write a statement in C Language for data insertion.

(5 marks)

(b) Write a statement in C Language for deletion operation.

(5 marks)

Q26 Refer to the list and statement below:

```
int data[] = {4, 3, 45, 13, 67, 34, 55, 78, 99, 10};
```

(a) Describe the steps to produce ascending data using Bubble Sort.

(4 marks)

(b) Write a segment of C Language to apply Bubble Sort.

(4 marks)

(c) Describe a process to search for number 25 after the data is sorted in ascending order.

(2 marks)

Q27 Based on **Figure Q27**.

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Figure Q27

(a) Write a statement in C Language using linked list.

(15 marks)

(b) Write a segment of C Language to search DShahreen.

(5 marks)

Q28 Based on a list {D,B,G,E,A,I,H,C,F},

(a) Draw a Binary Search Tree.

(6 marks)

(b) Based on **Q28 (a)**, write sequences of nodes using inorder, preorder and postorder method.

(6 marks)

(c) Draw a new Binary Search Tree after inserting 'J' and 'K' in the list.

(4 marks)

(d) Draw a new Binary Search Tree after deleting 'B' and 'G' from the list.

(4 marks)