Sample.

THE OPEN UNIVERSITY OF SRI LANKA
DEPARTMENT OF MATHEMATICS & COMPUTER SCIENCE
B.Sc. DEGREE PROGRAMME : LEVEL 03
CPU1142- DATA STRUCTURES AND ALGORITHMS
NO BOOK TEST I – 2014/2015

DURATION:One Hour (1 Hour)

Date: 02.08.2015 **Time:** 1.00 p.m. – 2.00 p.m.

Answer All Questions.

1. Fill in the blanks with appropriate terms.

   a) The ..... is the basic building block of data structures.
   b) ..... can be considered as a mathematical model with a collection of operations defined on that model.
   c) A ..... is a variable that represents the location of a data item. Such as a variable or an array element.
   d) ..... is the corresponding header file for input and output.
   e) Information from the main program to a function is passed through .....
   f) The operation of inserting a new element to the stack is called ..... operation.
   g) ..... refers to removing the front item from the queue and returning it to the calling entity.
   h) If the front = rear in a circular queue, we considered as the queue is ..... .
   i) The ..... of a node are all the nodes along the path from the root to that node.
   j) The number of sub trees of a node is called its .....

2. State whether the following statements are **True** or **False.**

   a) "scanf( )" and "printf( )" are user defined functions.
   b) The key word "continue" allows exiting a loop instantly without waiting to get back to the conditional test.
   c) The function "free ( )" is used in C to free the storage of a dynamically allocated variable.
   d) In a doubly linked list there are two pointers from each node.
   e) Singly linked lists allow backward traversing.
   f) A stack is known as FIFO, which stands for First In First Out.
   g) The "pop" operation is the action of deleting an element from the top of the stack.
   h) Circular queue can be thought of as an array in a circle, with the first position follows the last.

i) In an empty queue both the front and the rear pointers are point to the first location of the queue.

j) In a binary tree the maximum degree of any node is at most three.

3.

Array implementation of a stack can be declared in C language is as follows.

```
# define, STACKSIZE 100
struct stack {
        int top;
        int items[STACKSIZE];
};

struct stack S;
```

By using the above declaration, answer the following questions.

a) Show the pop operation of the stack using C programming language. Clearly show the required conditions and actions.

b) Show the push operation of the stack using C programming language. Clearly show the required conditions and actions.

4.

Following is a C coding for some operation.

```
void functionName(void){
        nodePtr *ptr;
        if (head == NULL)
        return;
        else if (head -> next ==NULL)
        {
                ptr =head;
                head = tail =NULL;
        }
        else
        {
                ptr =head;
                head = head -> next;
                head -> prev = NULL;
        }
        free(ptr);
}
```

By analyzing the above C coding, answer the following questions.

a) What is the data structure that this coding belongs to?

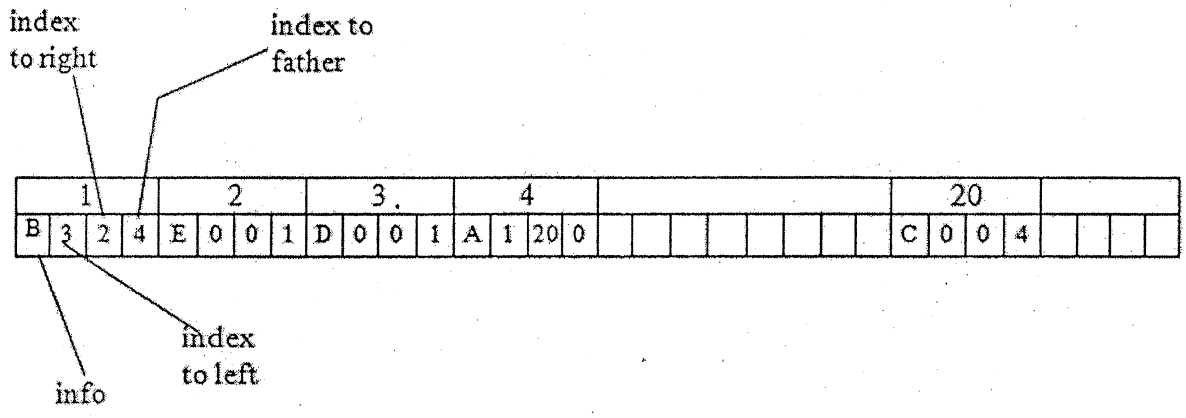
b) What type of implementation method is used to create the above mentioned data structure?

c) Which type of operation can perform using the above C coding?

d) Clearly mention the task of free (ptr) function in the above coding.

5.

Array representation of a binary tree is as follows.



a) Draw the relevant binary tree according to the above array representation.

b) State whether the above binary tree is a strictly binary tree, complete binary tree or both.

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