(13) 00663

THE OPEN UNIVERSITY OF SRI LANKA
DEPARTMENT OF COMPUTER SCIENCE
B.Sc. DEGREE PROGRAMME : LEVEL 03
CSU3302- DATA STRUCTURES AND ALGORITHMS
NO BOOK TEST – 2017/2018

DURATION:One Hour (1 Hour)

Date: 13.01.2019 **Time: 1.00 p.m. – 2.00 p.m.**

Answer All Questions.

1. Fill in the blanks with appropriate terms.

a) The variables, which are visible to the entire program is called as ..... variables.
b) ..... is the corresponding header file for input and output in C language.
c) The data structure ..... is a logically first in first out type of a list.
d) In a ..... linked list there are two pointers for each node.
e) ..... is the process of going through all the nodes of the list in searching for a derived element.
f) The unique feature of ..... is insertions and deletions can process only at one end.
g) ..... function allocates storage for the required data type and also returns a pointer to the storage it allocates.
h) The key word ..... allows exiting a loop instantly without waiting to get back to the conditional test.
i) The number of subtrees of a node is called as it's .....
j) If every non-leaf node in a binary tree has non-empty left and right subtrees, we called it as ..... binary tree.

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

a) A circular linked list is just a singly linked list in which the link field of the first node contains the address of the last node of the list.
b) One pointer links the successor node of a given node while the other links the predecessor node in a doubly linked list.
c) Pop operation adds a given node to the top of the stack leaving previous nodes below.
d) Datatype of a pointer tells what type of data that it points to.
e) The array implementation is an example for the dynamic data structures.
f) In a queue, items are inserted at one end known as the rear end and the existing elements are deleted from the other end called the front end.
g) Nodes that have degree zero are called non terminal nodes.
h) A tree with no nodes is called as a null tree.

i) The output of a function is returned through **arguments** specified when the function is called.

j) The line drawn from one node to another node is called as an edge in tree structures.

3.

Array implementation of a stack can be declared in C language 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 (int data)
{
        nodePtr *node;
        node = getNode();

    if(node == NULL){
        printf("Error: Insufficient Storage.\n");
        exit(1);
    }
    else{
          node->val = data;
          if (last == NULL)
          {
                    last = node;
                last -> next = last;
          }

          else
          {
               node -> next = last -> next;
               last -> next = node;
          }
   }
}
```

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 be performed using the above C coding?

5.

Following is a C coding for some operation.

```
void functionname (int item)
{
        nodePtr *ptr;
        ptr = getNode();
        ptr -> info = item;
        if (tail ==NULL)
        {       ptr -> prev =ptr-> next =NULL;
                head =tail =ptr;
        }
        else
        {       ptr -> next =NULL;
                ptr -> prev = tail;
                tail -> next = ptr;
                tail = ptr;
        }
}
```

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) Show all the steps of the above mentioned operation by using a diagram.