# 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 – 2015/2016



#### **DURATION:One Hour (1 Hour)**

## Date: 16.10.2016

Time: 1.00 p.m. – 2.00 p.m.

## **Answer All Questions.**

1. Fill in the blanks with appropriate terms.

- a) ..... are generalizations of basic data types (integer, real and so on).
- b) A ..... consists of two components namely the value and pointer.
- c) ..... variables are typically automatic or created a new with each new program.
- d) Variables which are visible to the entire program are known as ..... variables.
- e) The stack ..... condition has to be considered when implementing the pop operation.
- f) A ..... groups a number of program statements into a unit (block of code) and gives a name for it.
- g) The key word ..... allows exiting a loop instantly without waiting to get back to the conditional test.
- h) ..... is the process of going through all the nodes of the list in searching for a desired element.
- i) In a doubly linked list there are ..... pointers in each node.
- j) The method called LIFO (Last In First Out) is used with ..... data structure.
- 2. State whether the following statements are **True** or **False**.
  - a) Information to the function is passed through pointers.
  - b) The malloc(sizeof(int)) allocates storage for an integer and also returns a pointer to the storage it allocates.
  - c) Traversing is the process of appending (Joining) of two lists.
  - d) The next address field of the last node of the list contains NULL indicates the end of the list.
  - e) For circular linked list the pointer of the first node (first -> next) contains the address of the last node.
  - f) Push operation of a stack adds a given node to the top of the stack.
  - g) In circular linked list there are two pointers in each node.
  - h) In array based stacks, s.top = -1 means the stack is empty.
  - i) In array implementation of lists, only one list can be implemented inside an array.
  - j) The logical and physical ordering of data items in a linked list need not be the same.

3.

Pointer implementation of a stack can be declared in C language is as follows. struct node

```
{
    int data;
    struct node *link;
};
struct node *top;
```

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.

```
nodePtr* functionName(nodePtr *list, int data)
{
    nodePtr *curr;
    curr = newNode();
    if(curr == NULL)
    {
        printf("Error: Insufficient Storage.\n");
        exit(1);
    }
    curr->info = data;
    curr->next = list;
    list = curr;
    return (list);
}
```

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 newNode() function in the above coding.

5.

{

Pointer implementation of a doubly linked list can be declared in C language is as follows.

struct node int num; node \*prev; node \*next; };

node nodePtr;

By using the above declaration, answer the following questions.

a) Write the function for insert at the beginning to the doubly linked list using C programming language. Clearly show the required conditions and actions.

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