Assignment Test - 1

Page:
Date: 8/9/20

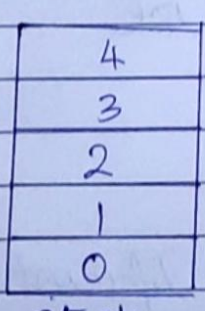
Yash Mohajan Roll No - 04 SE IT-B

Subject - DSA

1. What is a stack ? Explain various operations performed on a stack using array with suitable diagram and functions.

2. What is a linked list ? Draw singly linked list and explain its operations.

Q.1 A stack is a linear data structure which obey's the principle of last in first out (LIFO) which means that the element which is entered at the end will come out first.



← Top

Here 4 will be the first element then 3, then 2 and so on.

There are three major operation that can be performed on a stack.

1) Push operation :-
In push operation an element is inserted at the topmost position of the stack.

If top = ~~Null~~ Max-1 then the stack is full it means overflow.

If top = -1, then it means the stack is empty & it means underflow.

Algorithm :-

Step 1 :- If top = Max-1
write overflow
end if
~~Step 2~~ go to step 4.
Step 2 :- Set top = top+1
Step 3 :- Set stack [top] = val
Step 4 : end

2) Pop operation :-
It is used to remove the topmost element of the stack.
If Top = -1 then the stack is empty and it means underflow.

Yash Mahajan Roll No.:-04 SE ITB

Algorithm :-

Step 1 : If top = -1
write underflow
End if
go to step 4.

~~Step 2 : Set B stack [top] = temp.~~

Step 2 : Set val = stack [top]
Step 3 : Set top = top - 1
Step 4 : End

Peek
3) ~~Top~~ operation :-
It is used to ~~remove~~ view the value of the topmost element present in the stack.
If top = -1, then it means the stack is empty, it means underflow.

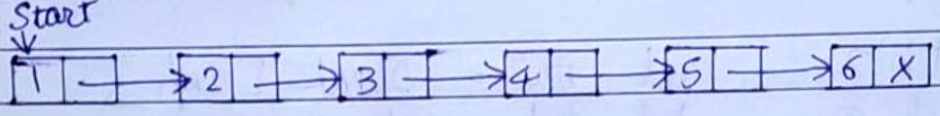
Algorithm :-

step 1 : If top = -1
write underflow
End if
goto step 4
step 2 : Set val = stack [top]
step 3 : write val
step 4 : End.

Yash Mahajan Roll No: 04 SE IT B

Page:
Date: 8/9/20

Q2. A linked list is a dynamic and linear data structure. A linked list is a collection of node with each node pointing to the next node. The node of a linked list contains data elements and the position of the previous or next node.



Here the start points to the position of first node.

A linked list is initialized as:

```
struct node {

    int data;
    struct node * next;

};
struct node * start = NULL;
```

There are various operations that can be performed on a linked list, like traversing a linked list, insertion, deletion.

Traversing a linked list :-
In this function we Traverse the linked list = to from the starting pointer to the last node. It is used to view the elements of a linked list, find the length of linked list etc.

~~The main~~ The traversing is done by a while loop

```
while( ptr != Null )
    ptr = ptr -> next
    //operation on ptr -> data;
```

Eg `printf ("%d", ptr -> data);`

Insertion operation :-
In this operation, elements are inserted in a linked list. Insertion can be done at the begining, or end or in between.

Logic for insertion at begning.

```
ptr  new_node -> next = start -> next
     start = new_node.
```

Deletion operation :-
In this elements of the linked list are deleted. Deletion can be done from the begning, or end or deletion of a given node.

Yash Mahajan SE IT B Roll No-4 Page: Date: 8/9/20

logic for deletion at beginning

ptr = start ~~->~~;
start = start -> next
free (ptr).