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DSA LaB 5 : theory.

Q1. Define. Stack.

→ A stack is an abstract data type that serves as a collection of element. with two main principal operations: Push, which adds an element to the ~~colletion~~ collection and PoP, which removes the most recently added element that was not yet removed.

Q2. What are the diffrent operations that can be performed on a stack?

→ Mainly three operations are performed:

1) Push: Add an item in the stack. If the stack is full, then it is said to be an overflow condn.

2) PoP: Removes and item from the stack.

3) isEmpty: Returns true if stack is empty else false.

4) Peek or Top : Returns top element of stack.

Q3. What are the applications of stack.

→ 1) Balancing of symbols.
2) Infix to Postfix / Prefix conversion.
3) Redo-undo features at many places like editors, photoshop.
3) Forward and backward feature in web browsers
4) Use in many algo. likes Tower of Hanai, tree traversals, Stop span problem, histogram problem.
5) In Graph algo. like ~~Topog~~ Topological sorting and Strongly Connected Components.
6) In memory management any modern Computer uses stack as the primary management for a running purpose.

Q5) Write algo. For Push, POP and PEEK/TOP.

→ a) Push Operation :

```
Step 1: IF Top = Max - 1
            Print "Overflow : Stack is Full" and Exit.
            End IF.
Step 2: Top = Top + 1
Step 3: Stack [TOP] = Element
Step 4: End.
```

b) POP operation.

```
Step 1: IF TOP==-1
            Print " Underflow: Stack is empty"
                                      and Exit
            Endif.
Step 2: Set Del-element = stack [TOP]
Step 3: TOP=TOP-1
Step 4: Del-Element.
Step 5: END.
```

d) PEEK|TOP operation:

```
Step 1: IF TOP =NULL, then
            Print "stack is empty"
            End IF
Step 2: Return stack [TOP]
Step 3: END.
```

Q4. Stack ADT as an Array.

→

- A stack is a collection of elements with certain operation following LIFO (Last in first out) decipliple.
- A stack can be implemented using an array or linked list.
- A stack using an array is easy to implement. memory also saved as pointer not involved.

- When we push() element then it store in array while POP() returns in LIFO order. But stack using array is not dynamic It dosent grow or shrink depending on needs at runtime.