CCS2300 - Data Structures and Algorithms

Tutorial 1 - Stacks

Question 1

a) Consider the following Stack and draw the Stack frames after executing each statement given below.

int a = 22, b = 44;

i) theStack.push(2);

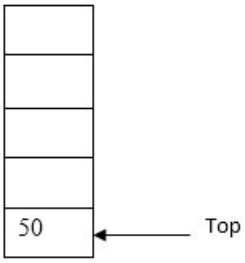
ii) theStack.push(a);

iii) theStack.push(a + b);

iv) theStack.pop();

v) theStack.push(b);

vi) theStack.push(a –b);



Question 2

Consider the stackX class given below.

int top int maxSize int stackArr[]

StackX(int size) void push(int no) int pop() boolean isEmpty() boolean isFull() int getCount()

i) Implement isEmpty() and isFull() methods of the stack class.

ii) Implement getCount() method to return the no of items in the stack.

Question 3

Constructor of the stack class is implemented as follows,

```
public StackX()
{
   stArr = new double[10];
   maxSize = 10;
   top = -1;
}
```

i) Mention one disadvantage of having the above constructor.

ii) Rewrite the constructor to avoid the disadvantage mentioned above.

Question 4

i. A stack class has already been implemented with push() , pop() and peek() methods. It is
   a. used to store characters. Write a code segment to insert following characters to a 'myStack' object created from the stack class.
   b. 'g' , 't', 'o', 'p'

ii. Write code segment to display all the values in a stack by removing them.

iii. What is the result of section ii) above?

Question 5

Fill in the following blanks.

i) Most popular data structure is _____

ii) The process of retrieving the element at the top of a stack without removing it is called _____

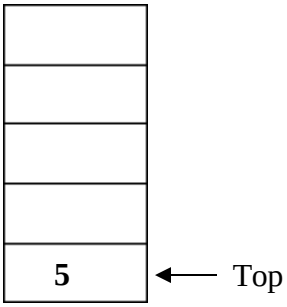
iii) A stack can be implemented using _____or _____

iv) In a stack, if the "top" pointer is equal -1, then the stack is _____

v) The time complexity of the push and pop operations on a stack implementation are; push - _____and pop - _____

Question 6

Consider the initial stack frame of a stack given below.



Below stack frames are obtained after executing three operations one after another to the above stack frame. Write down the operations.