ACADEMY OF TECHNOLOGY

Lab Assignment (Day 1)

Paper name: Design and Analysis of Algorithms Lab

Code: PCC-CS494 **Semester: 4^{th}**

Discipline: CSE **Time: 2 Hours**

Date: April 15, 2021

1. Write a menu driven program in C or C++ to implement the following functions of a stack using array.
   a. ***void push(int)*** to add an item in the stack.
   b. ***int pop()*** to removes an item from the stack.
   c. ***int peek()*** to return top element of stack.
   d. ***int isFull()*** returns **1** if stack is full, else **0**.
   e. ***int isEmpty()*** returns **1** if stack is empty, else **0**.
   f. ***void print()*** to display the items in the stack.

2. Write a menu driven program in C or C++ to implement the following functions of a queue using array.
   a. ***void insert(int)*** to add an item in the queue.
   b. ***int del()*** to removes an item from the queue.
   d. ***int isFull()*** returns **1** if queue is full, else **0**.
   e. ***int isEmpty()*** returns **1** if queue is empty, else **0**.
   f. ***void print()*** to display the items in the queue.

3. Write a menu driven program in C or C++ to implement a queue using stack using array.

   A queue can be implemented using two stacks. Let queue to be implemented be ***Q*** and stacks used to implement be ***S1*** and ***S2***. Queue ***Q*** can be implemented in two ways: 1: by making delete operation costly and 2: by making insert operation costly.

   An implementation of a queue ***Q***, using two stacks ***S1*** and ***S2***, is given below (by making delete operation costly):

```
1 void insert(Q, x) {
2    push (S1, x);
3 }
```

```
1  void delete(Q){
2     if(isEmpty(S2)) then
3        if(isEmpty(S1)) then {
4            print("Queue is empty");
5            return;
6        }
7        else while (!(isEmpty(S1))){
8            x=pop(S1);
9            push(S2,x);
10       }
11    x=pop(S2);
12 }
```

Example: