Usman Institute of Technology

Department of Computer Science – Fall 2018

CS-211 Data Structures and Algorithms
Lab Manual

OBJECTIVE:

1. *Enable Students to handle Stack and queue and their operations.*

Name : _____

Roll No. : _____

Semester : _____ Section: _____

Date : _____

Remarks : _____

Signature : _____

Lab 05: Implementation of Stack and queue and their operations

1. **Stack Operations**
   a. Create a class ArrayStack in order to implement Stack operations for integer data.

   b. Create a constructor of class ArrayStack that takes an input argument to set the size of the stack

   ArrayStack(int size)

   c. Create a function Push that takes an integer argument to insert data into the stack. The function must check the **overflow** condition as well.

   void Push(int e)

   d. Create a function IsEmpty() that returns true if the stack is empty, otherwise returns false.

   bool IsEmpty( )

   e. Create a function Pop that removes the element from the stack. The function must check the **underflow** condition as well.

   int Pop( )

   f. Create a function Count() that returns the number of elements in the stack.

   int Count()

   g. Write a function which performs Peek operation onto the stack.

   int PEEK ( )

   h. Create a function Print() to print all elements of the stack.

   void Print( )

2. **Queue Operations**
   a. Create a class ArrayQueue in order to implement Queue operations for integer data

   b. Create a constructor of class ArrayQueue that takes an input argument to set the size of the queue

   ArrayQueue(int size)

   c. Create a function Enqueue that takes an integer parameter and insert the element in the queue. The function must take care of **overflow** condition as well.

   void Enqueue(int x)

d. Create a function Dequeue that removes an element from the queue. The function must take care **underflow** condition as well

int Dequeue( )

e. Create a function IsEmpty that returns true if the queue is empty, otherwise returns false.

bool IsEmpty()

f. Create a function Count that returns the number of elements exist in the queue

int Count()

g. Write a function which performs Peek operation onto the queue.

int PEEK ( )

h. Create a function Print() to print all elements of the stack.

void Print( )

3. Given an expression string exp , write a program to examine whether the pairs and the orders of "{","}","(",")","[","]" are correct in exp. For example, the program should print true for exp = "[()]{}{[()()]()}" and false for exp = "[(])"

4. Write a program to evaluate Postfix notations using Stack. You can use following algorithm for this purpose (taken from Internet)

Following is algorithm for evaluation postfix expressions.
1) Create a stack to store operands (or values).
2) Scan the given expression and do following for every scanned element.
…..a) If the element is a number, push it into the stack
…..b) If the element is a operator, pop operands for the operator from stack. Evaluate the operator and push the result back to the stack
3) When the expression is ended, the number in the stack is the final answer