Government College University, Lahore

Department of Computer Science

Programming Fundamentals

Lab – 05

This Lab will help you to understand how loops helps us to simplify our program where things are required to be repeated.

NOTE: for all the task where validation is required use loop to validate value and program will ask for new value whenever a wrong input is given

Startup (01) (Print Numbers with While Loop)
Type the following program in your editor and observe the results

```
#include <iostream>
using namespace std;
main(){

      int x=1;

      while ( x <= 10 ){
      cout<<x<<endl;
      x++;
      }
}
```

Task-01 (Reverse a Number)

Write a program to reverse any given integer number.

Input: 12345
Revers: 54321

Task-02 (Sum of digits)

Write a program to sum the digits of any given integer number.

Input: 459
Sum: 18

Task-03 (Sum of Numbers)

Write a program that ask user to enter a positive number (do not accept –ve number). The program should use a while loop to sum all the numbers from 1 up to the number entered.

Task-04 (Ocean Level)

Assuming the oceans level is currently rising at about 1.5 millimeters per year, write a program that displays a table showing the number of millimeters that the ocean will have risen each year for the next 25 years. Assuming the starting year is 2018.

Task-05 (Sum the geometric series)

Write a program that sums the first n items in a geometric series using a while loop. User will input the n. use the following formula or use your previous knowledge.

$$a + ar + ar^2 + ar^3 + \cdots, \text{ with } r = \frac{1}{2} \text{ and } a = \frac{1}{2}.$$

Task-06 (Population)

Write a program that predicts the size of a population of organisms. The program should ask the user for the starting number of organisms, their average daily population increase (as percentage), and the number of days they will multiply. A loop should display the size of the population for each day.

Input Validation : Do not accept a number less than 2 for the starting size of population. Do not accept a negative number for average daily population increase. Do not accept a number less than 1 for the number of days they will multiply.

Task-7 (Hotel Occupancy)

Write a program that calculates the occupancy rate for a hotel. The program should start by asking the user how many floors the hotel has. A loop should then iterate one for each floor. In each iteration, the loop should ask the user for the number of rooms on the floor and how many of them are occupied. After all the iterations, the program should display how many rooms the hotel has and the percentage of rooms that are occupied.

Input validation: the program should not accept the number less than 1 for the number of floors and do not accept a number less than 10 for number of rooms on each floor.

Task-8 (Palindrome)

Modify task-11 of lab 3 so it may accept integers of any length to determine whether its palindrome or not.

Task-9 (Binary to Decimal Conversion)

Modify Task 12 of Lab-03 so it may accept binary numbers of any bits and convert it into decimal numbers using loop.

Task-10 (Saving Account Balance)

Write a program that calculates the balance of a saving account at the end of a period of time. It should ask the user for the annual interest rate, the starting balance, and the number of months that have been passed since the account was established. A loop should then iterate once for every month, performing the following.

A. Ask the user the amount deposited into the account during the month. (Do not accept the negative numbers). This amount should be added to the balance

B. Ask the user for the amount withdrawn from the account during the month. (Do not accept negative numbers). This amount should be subtracted from the balance.

C. Calculate the monthly interest rate. The monthly interest rate is the annual interest rate divided by the twelve. Multiply the monthly interest rate by the balance and add the result to the balance.

After the last iteration the program should display the ending balance, the total amount of deposits, the total amount of withdraws, and the total interest earned.

If a negative balance is calculated at any point, a message should display indicating that account has been closed and the loop should terminate.