National University of Computer and Emerging Sciences



Laboratory Manual

for

Programming Fundamentals

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# Lab Manual 02

# Introduction

## Objectives

After performing this lab, students shall be able to:

Write C++ programs with understanding of arithmetic operators and data types.

## Problems / Assignments

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| Problem 1: |  |

**Part(a):** Declare 3 variables of integer data type (int) in a single statement (use appropriate variable names), assign a hard coded value in the range of 1 to 100 to each variable. Now calculate the average and store it in a variable of type float. Print the values, and the average on console.

Do you think it is a generic code? In future we will design software for clients where they will provide the input so make it generic by taking input from user.

**Part(b):** A minor change in part(a). Instead of assigning hard coded values, now take the input from user in all the variables using a single cin statement. Don’t forget to display a proper input message before taking the input.

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| Problem 2: |  |

Write a C++ Program to convert the temperature from Celsius to Fahrenheit and vice versa.

The program sequence should be exactly like following structure i.e., it first asks for the input of temperature in Celsius, convert the temperature in Fahrenheit using the given formula, and display the output on console. Then it asks for the input of temperature in Fahrenheit, convert the temperature in Celsius, and display the output on console.

**Program structure:**

Enter Temperature in Celsius: 5 //(input)

Temperature in Fahrenheit: 41

Enter Temperature in Fahrenheit: 80 //(input)

Temperature in Celsius: 26.667

**Formula for conversion: T(°C) = (T(°F) - 32) × 5/9**

**Perform reverse engineering to determine the temperature in Fahrenheit.**

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| Problem 3: |  |

Write a program that asks the user to enter the lengths of sides a, b, and c of a triangle. Your task is to calculate cos b. Use the formula: b^2 = a^2 + c^2 -2\*a\*c\*cos b. You can use CMATH library to for cos function. Use **pow** function to calculate the square.

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| Problem 4: |  |

Write a program that takes gross monthly salary of a user and do the following tasks:

1. Calculate the 5% provident fund, and 16% government sales tax (GST) of the gross monthly salary.
2. Now calculate his net monthly salary after deduction of provident fund and GST.
3. Calculate the gross and net annual salary.
4. It is the policy of organization to make the provident fund amount double at the end of each year. Calculate the amount of provident fund at end of the year.
5. Calculate the gross salary for next 2 years with each year 3% increment and 1.5% tax deduction.

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| Problem 5: |  |

Write a program that should display following menu on console.

* Zinger: Rs 386.57
* J&J Special Wrap: Rs 524.43
* Fries: Rs 186.72
* Large Kebab stuffed Pizza: Rs 2497.95
* Regular drink: Rs 78.32

The above-mentioned prices are for single item. Now get the order from the user by asking the quantity against each of these items. Calculate and display a detailed bill to the user.

1. each items total price like 3 zingers: 386.57 \* 3 = 1159.71,
2. the subtotal of the sale,
3. the amount of sales tax, assume the sales tax is 16%.
4. and the total: Total bill = Subtotal of Sale + Sales Tax

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| Problem 6: |  |

Write a program that ask the user to enter a two-digit number. Your task is to calculate the sum of digits, product of digits, subtract the sum of digits from the product of digits raise to the power of product of unit and tens digit.

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| Problem 7: |  |

Write a program that takes the radius of a circle from user and calculate the area.

Note: Area = pi r^2

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| Problem 8: |  |

Write a program that takes the Base and height from user and calculate the area of a triangle,

Note: area = **½ base\*height**