**Lab No. 1: Programming Basics**

**Objective:**

The objective of this lab is to implement the basics of programming constructs in C language.

**Scope:**

In this lab, notion of different data types usage, variable declaration and initialization, format specifiers, escape sequences, width & precisions in output and arithmetic operators will be discussed with examples.

**Example 1:**

This program shows variable declaration, initialization, output controlled with width and precision.

#include<stdio.h>

void main()

{

int a,b;

float c,d;

a = 15;

b = a / 2;

printf("%d\n",b);

printf("%3d\n",b);

printf("%03d\n",b);

c = 15.3;

d = c / 3;

printf("%3.2f\n",d);

}

**Example 2:**

This program demonstrates usage of format specifiers, escape sequences, output managed with width and precision.

#include<stdio.h>

void main()

{

printf("The color: %s\n", "blue");

printf("First number: %d\n", 12345);

printf("Second number: %04d\n", 25);

printf("Third number: %i\n", 1234);

printf("Float number: %3.2f\n", 3.14159);

printf("Hexadecimal: %x\n", 255);

printf("Octal: %o\n", 255);

printf("Unsigned value: %u\n", 150);

printf("Just print the percentage sign %%\n", 10);

}

**Example 3:**

This program shows arithmetic operators usage, unary operators and another way for writing arithmetic expressions.

#include<stdio.h>

void main ()

{

int i;

printf ("Assignment Operators\n\n");

i = 10; /\* Assignment \*/

printf("i = 10 : %d\n",i);

i++; /\* i = i + 1 \*/

printf ("i++ : %d\n",i);

i += 5; /\* i = i + 5 \*/

printf ("i += 5 : %d\n",i);

i--; /\* i = i = 1 \*/

printf ("i-- : %d\n",i);

i -= 2; /\* i = i - 2 \*/

printf ("i -= 2 : %d\n",i);

i \*= 5; /\* i = i \* 5 \*/

printf ("i \*= 5 :%d\n",i);

i /= 2; /\* i = i / 2 \*/

printf ("i /= 2 : %d\n",i);

i %= 3; /\* i = i % 3 \*/

printf ("i %%= 3 : %d\n",i);

}

**Example 4:**

This program demonstrates postfix and prefix arithmetic operations over variables.

#include <stdio.h>

void  main()

{

       int    a, b;

       a  =  b  =  5;

printf("postfix mode and prefix mode example\n");

       printf("initial value, a = b = 5\n");

       printf("\npostfix mode, a-- = %d  prefix mode, --b = %d", a--, --b);

       printf("\npostfix mode, a-- = %d  prefix mode, --b = %d", a--, --b);

       printf("\npostfix mode, a-- = %d  prefix mode, --b = %d", a--, --b);

       printf("\npostfix mode, a-- = %d  prefix mode, --b = %d", a--, --b);

       printf("\npostfix mode, a-- = %d  prefix mode, --b = %d", a--, --b);

   }

**Practice Exercise 1:**

Declare and initialize two variables e.g. A, B and perform the arithmetic operations e.g. addition, subtraction, multiplication, division and remainder, format your output upto three places in width and two places in precision.

**Practice Exercise 2:**

Write a simple program to convert temperature from Fahrenheit to Celsius given by formula ***c = f-32\*5/9***. Declare two variables C and F (Celsius and Fahrenheit). Initialize variable F with some temperature value and output temperature in Celsius.

**Homework**

1. Write a simple program to calculate factorial of a number. Declare the variable Factorial and initialize it with a value 6. Output the factorial result.
2. Write a program to swap (exchange the values of two variables) two numbers. Declare and initialize two variables A and B such that A = 5 and B = 8. Output the swap results as A = 8 and B = 5.
3. Declare a variable Subject and initialize it with a value 20 (which shows the student’s marks in subject). Find the percentage of student in this subject if total marks are 30.
4. Write a simple program to convert a student weight from kilograms to pounds. Declare two variables Kg and Pound. Initialize the variable Kg with a value 70 and output the converted weight in Pounds by using formula ***Pound = Kg \* 2.2***
5. Find the area of a rectangle. Declare and initialize two variables length and width such that length = 20 and width = 30. Output the area of rectangle using formula ***area = length \* width***.