# Department of ICT
# Faculty of Technology
# University of Ruhuna

**Programming Practicum – ICT1142**                    **Level 1- Semester 1**

**Lab Sheet 04**                                                            **| 2022**

**Objective:**
   To familiarize with bitwise operators, conditional operator and library functions in C.

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## Bitwise Operators

   &    bitwise AND
   |    bitwise inclusive OR
   ^    bitwise exclusive OR
   <<   left shift
   >>   right shift
   ~    one's complement (unary)

## Exercise 01

Study the following code and write down the expected outputs.  Then write a program to verify your answers.

```c
#include <stdio.h>
int main()
{
   int a = 4, b = 5;

   printf("Output of Bitwise AND = %d\n", a&b);
   printf("Output of Bitwise OR = %d\n", a|b);
   printf("Output of Bitwise XOR (exclusive OR)  = %d\n", a^b);
   printf("Output of Right Shift Operator  = %d\n", a>>1);
   printf("Output of Left Shift Operator  = %d\n", a<<1);
   printf("Output of Bitwise complement operator = %d\n", ~b);

   return 0;
}
```

## Conditional Operator

```
condition ? true-statement : false-statement;
```

Conditional operators return one value if condition is true and returns another value if condition is false.

## Exercise 02

Study the following code and write down the expected outputs for any user input values. Then write a program to verify your answers.

```
#include<stdio.h>
int main()
{
  float num1, num2, max;

  printf("Enter two numbers: ");
  scanf("%f %f", &num1, &num2);

  max = (num1 > num2) ? num1 : num2;

  printf("Maximum Number = %.2f", max);

  return 0;
}
```

## Library functions – math.h

The C library math.h contains the functions pow()  and sqrt()  that raises a number to a given power, and finds the square root of a number respectively.

- **pow(a, 2)**  will raise a to the power of 2.  ($a^2$)
- **sqrt(x)**  will give the square root of x. x should not be negative.
- **cos(t)** returns the cosine of an angle (t) given in radians. Same as **sin(t)** and **tan(t).**
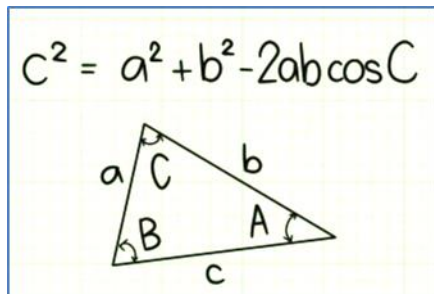
**Exercise 03**

Write a C program to calculate h according to bellow expression. Take 'a' and 'b' as user inputs (Use suitable library functions).



$h^2 = a^2 + b^2$

$h = \sqrt{a^2 + b^2}$
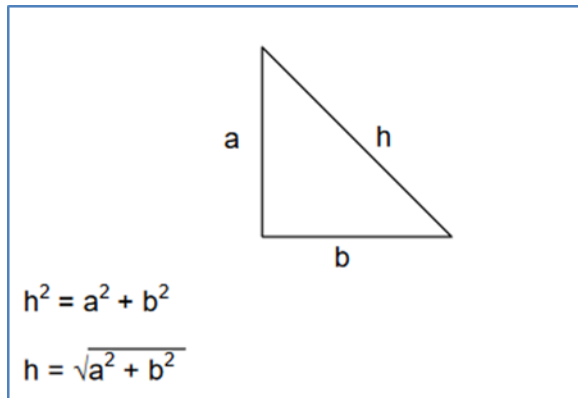
**Exercise 04**

Write a program to calculate the length "c" of a triangle. Get length a, b and angle C in degrees through runtime keyboard. When the angle is given in degrees, you can convert it to radians using the following formula before applying to the equation.

**radians = degrees / 180 * $\pi$**



$$c^2 = a^2 + b^2 - 2ab \cos C$$

**Exercise 05**

Write a C program to input principle amount (P), time (T) and rate (R) from user and calculate Compound Interest (CI).

Formula for calculate compound interest is given by,

$$CI = P \times \left(1 + \frac{R}{100}\right)^T - P$$