Time Allowed: 1 Hour

Q1

(A) What is a **constructor**?

    List some of the special properties of constructors.

    Describe the importance of destructors.

(B) What is **operator overloading**?

    Why is it necessary to overload an operator?

    What is an operator function? Describe the syntax of an operator function.

    Define a class **complex** that could work as a user-defined complex number type.

    Include constructors (i) to enable us to create an uninitialized complex number

    e.g: Complex z1; // $z_1 = i$

    (ii) to initialize an object with two values for real and imaginary part at the time of
    creation

    e.g: complex z_2(a, b); // $z_2 = a + bi$

Write a complete C++ program to test your class for the following cases:

  (a) Creates uninitialized complex objects.

  (b) Creates objects with two initial values for real and imaginary parts.

  (c) Input a complex number. (Hint: You have to overload the input operator >>)

  (d) Display a complex number. (Hint: You have to overload the output operator <<)

  (e) Add two complex numbers. (Hint: You have to use operator overloading
       technique)

Define the following terms in Object Oriented Programming techniques:

(a) inheritance

(b) base class

(c) derived class

(d) simple inheritance

(e) multiple inheritance

Describe the difference between **private** and **protected** class members.

Create a base class named **Point** with two data members named `x` and `y`, which represents the coordinate of a point.

The class **Point** should consist of the following member functions:

(i) a constructor

(ii) a member function named **area** that returns zero

From this class **Point** derive a class named **Circle** having an additional data member named **radius**. For this derived class the **x** and **y** data members represent the center coordinate of the circle.

Additionally the derived class should have a constructor and an override function named **area** that returns the area of a circle.