

Lab Assignment-5  
UTA018: Object Oriented Programming

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**Topics covered: Constructors in Inheritance, abstract class and virtual base class**

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**Q1.** Implement a C++ program to define three classes *Alpha*, *Beta* and *Gamma*, each class having private data members. *Gamma* is a class derived from *Alpha* and *Beta* (by applying multiple inheritance). Use constructors and destructors to read and display data.

**Q2.** Write a program to define class *X*, *Y* and *Z*. Each class contains one character array as a data member. Using multiple inheritance, concatenate strings of class *X* and *Y* and store it in class *Z*. Using constructor and destructors, show all the three strings.

**Q3.** Write a C++ program to implement the diamond problem (hybrid inheritance). State the necessary assumptions using comments. – (HINT: use virtual base class)

**Q4.** Write a C++ program creating an abstract class *Student*. Create three derived classes *Science*, *Art* and *Commerce* from the base class. Create the objects of the derived classes and process them and access them using array of pointer of type *Student*.

**Topics: Classification of Polymorphism, Compile time and Run time Polymorphism, Pointers to derived class object, Virtual functions, Pure virtual functions.**

1. Class polygon contains data member width and height and public method `set_value()` to assign values to width and height. Class Rectangle and Triangle are inherited from polygon class. Both the classes contain public method `calculate_area()` to calculate the area of Rectangle and Triangle. Use base class pointer to access the derived class object and show the area calculated.
2. Write a program to create a class shape with functions *area* and *display* to find area and display the name of the shape and other essential component of the class. Create derived classes circle, rectangle and triangle each having overridden functions *area* and *display*. Write a program to find and display the area of circle, rectangle and triangle.
3. Write a C++ program to compute area of right angle triangle, equilateral triangle, isosceles triangle using function overloading concept.
4. Write a program with Student as abstract class and create derive classes Engineering, Medicine and Science from base class Student. Create the objects of the derived classes and process them and access them using array of pointer of type base class Student.