Object oriented Programming Practice Problems

1. Define a class student with the following specification
Private members of class student
admno integer
sname 20 character
eng. math, science float
total float
ctotal() a function to calculate eng + math + science with float return type.
Public member function of class student
Takedata() Function to accept values for admno, sname, eng, science and invoke ctotal() to calculate total.
Showdata() Function to display all the data members on the screen.

2. Write a program that defines a shape class with a constructor that gives value to width and height. The define two sub-classes triangle and rectangle, that calculate the area of the shape area (). In the main, define two variables a triangle and a rectangle and then call the area() function in this two varibles.

3.Write a program with a mother class and an inherited daugther class.Both of them should have a method void display ()that prints a message (different for mother and daugther).In the main define a daughter and call the display() method on it.

4.Create a class Person and two derived classes Employee, and Student, inherited from class Person. Now create a class Manager which is derived from two base classes Employee and Student. Show the use of the virtual base class.

5.Write a program to create a class shape with functions to find area of the shapes and display the name of the shape and other essential component of the class. Create derived classes circle, rectangle and trapezoid each having overridden functions area and display. Write a suitable program to illustrate virtual functions and virtual destructor.

6.Define a class in C++ with following description:
Private Members
A data member Flight number of type integer
A data member Destination of type string
A data member Distance of type float
A data member Fuel of type float
A member function CALFUEL() to calculate the value of Fuel as per the following criteria

Distance	Fuel
<=1000	500
more than 1000 and <=2000	1100
more than 2000	2200

Public Members
A function FEEDINFO() to allow user to enter values for Flight Number, Destination, Distance & call function CALFUEL() to calculate the quantity of Fuel
A function SHOWINFO() to allow user to view the content of all the data members .

7.Write the definition for a class called Rectangle that has floating point data members length and width. The class has the following member functions:
void setlength(float) to set the length data member
void setwidth(float) to set the width data member
float perimeter() to calculate and return the perimeter of the rectangle
float area() to calculate and return the area of the rectangle
void show() to display the length and width of the rectangle
int sameArea(Rectangle) that has one parameter of type Rectangle. sameArea returns 1 if the two Rectangles have the same area, and returns 0 if they don't.
1. Write the definitions for each of the above member functions.
2. Write main function to create two rectangle objects. Set the length and width of the first rectangle to 5 and 2.5. Set the length and width of the second rectangle to 5 and 18.9. Display each rectangle and its area and perimeter.
3. Check whether the two Rectangles have the same area and print a message indicating the result. Set the length and width of the first rectangle to 15 and 6.3. Display each Rectangle and its area and perimeter again. Again, check whether the two Rectangles have the same area and print a message indicating the result.

8.Write the definition for a class called complex that has floating point data members for storing real and imaginary parts. The class has the following member functions:
void set(float, float) to set the specified value in object
void disp() to display complex number object
complex sum(complex) to sum two complex numbers & return complex number
1. Write the definitions for each of the above member functions.
2. Write main function to create three complex number objects. Set the value in two objects and call sum() to calculate sum and assign it in third object. Display all complex numbers.

9.Write the definition for a class called Distance that has data member feet as integer and inches as float. The class has the following member functions:
void set(int, float) to give value to object
void disp() to display distance in feet and inches
Distance add(Distance) to sum two distances & return distance
1. Write the definitions for each of the above member functions.
2. Write main function to create three Distance objects. Set the value in two objects and call add() to calculate sum and assign it in third object. Display all distances.

10.Write the definition for a class called time that has hours and minutes as integer. The class has the following member functions:
void settime(int, int) to set the specified value in object
void showtime() to display time object
time sum(time) to sum two time object & return time
1. Write the definitions for each of the above member functions.
2. Write main function to create three time objects. Set the value in two objects and call sum() to calculate sum and assign it in third object. Display all time objects.

11.Answer the questions (i) and (iii) after going through the following class:

```
class Seminar
{
```

```
    int time;
public:
    Seminar()        //Function 1
    {
        time = 30;
        cout << "Seminar starts now" << endl;
    }

    void lecture()        //Function 2
    {
        cout << "Lectures in the seminar on" << endl;
    }

    Seminar(int duration)        //Function 3
    {
        time = duration;
        cout << "Seminar starts now" << endl;
    }

    ~Seminar()        //Function 4
    {
        cout << "Thanks" << endl;
    }
};
```

i. Write statements in C++ that would execute Function 1 and Function 3 of class Seminar.

ii. In Object Oriented Programming, what is Function 4 referred as and when does it get invoked/called?

iii. In Object Oriented Programming, which concept is illustrated by Function 1 and Function 3 together?

12. Answer the questions (i) and (ii) after going through the following class:

```
class Test
{
    char paper[20];
    int marks;
public:
    Test ()    // Function 1
    {
        strcpy (paper, "Computer");
        marks = 0;
    }

    Test (char p[])    // Function 2
    {
        strcpy(paper, p);
        marks = 0;
```

```
    }

    Test (int m)    // Function 3
    {
        strcpy(paper,"Computer");
        marks = m;
    }

    Test (char p[], int m)    // Function 4
    {
        strcpy (paper, p);
        marks = m;
    }
};
```

i. Write statements in C++ that would execute Function 1, Function 2, Function 3 and Function 4 of class Test.

ii. Which feature of Object Oriented Programming is demonstrated using Function 1, Function 2, Function 3 and Function 4 together in the above class Test?

13.Consider the definition of the following class:

```
class Sample
{
private:
    int x;
    double y;
public :
    Sample(); //Constructor 1
    Sample(int); //Constructor 2
    Sample(int, int); //Constructor 3
    Sample(int, double); //Constructor 4
};
```

i. Write the definition of the constructor 1 so that the private member variables are initialized to 0.

ii. Write the definition of the constructor 2 so that the private member variable x is initialized according to the value of the parameter, and the private member variable y is initialized to 0.

iii. Write the definition of the constructors 3 and 4 so that the private member variables are initialized according to the values of the parameters.

15.Create a class called Area which contains method called “find_area”. Write down appropriate code to creat objects named as Circle and Rectangle of the above class and implement function overloading to calculate area of a rectangle and area of a circle based upon user input.

16.Create a class called point with two integer attributes such as x and y to represent its x coordintate and y coordintate.Provide constructor to initialize the attributes.Provide another method named as move() which will move the coordintates only in the direction of x-axis for 10 unit at a time.Also display the new and old values of the coordintates.

17.With an appropriate example explain the role of virtual base class removing ambiguities n case of diamond inheritance which is a special case of multipath inheritance.

18.Write a program to overload binary operator + to find sum of two number using friend function

19.Write a program to overload the pre-increment and post increment operators in a same program using non member operator functions.

20.Create a class called Volume which contains a method called "find_vol".Write down appropriate code to create objects named as sphere and cylinder of the above class and implement function overloading to calculate volume of a sphere and cylinder based upon user input.

21.Write a program that access the private data variable of two different class using friend function

22.Create an abstract class called Shape which contains a pure function called find_vol() and a protected attribute named as volume.Create two new derived classes from the above class named as Cube and Sphere having double type attribute named as side and radius respectively.
Implement dynamic polymorphism to find out volume of a cube and a Sphere.Also display the result.

23.Suppose there is a class called X with two double type attributes. Write a C++ program to create two objects named ob 1 and ob 2 of the above class and overload the binary ==
operator to perform the following operation within main():
if(ob 1== ob 2)
cout<<”Objects are same”<<endl;
else
cout<<”Objects are different”<<endl;

24.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.

25.Write a program to create a class shape with functions to find area of and display the name of the shape and other essential component of the class.Create derived classes circle,rectangle and trapazoid each having overriden functions area and display.Write a suitable program to illustrate virtual functions.

26.Write a program to overload unary operator ++ using member function

27.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.

28.Write a program to read two double type numbers from keyboard and a function to calculate the division of these two numbers.A try block to throw an exception when wrong type of data is entered and another try Block to throw an exception if the condition "Division occurs".Appropriate catch block to handle the exception thrown.