Name : Siddharth Pandya Date : 7-10-20

Roll No. : 23 Subject : OOP

Ans 3 A friend class is a class that can access the private and protected members of a class in which it is declared as friend. Friend class is needed when we want a particular class to access the private and protected members of a class.

Example for friend class :

```
#include <iostream>
using namespace std;

class A
{

};
#include <iostream.h>
#include <conio.h>

Class X
{
    private:  Char ch = 'A';
              int num = 11;
    public:
              friend class A;
};
```

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```
Class A
{
    public :
        void display ( x ob)
        {
            cout << ob.ch << endl;
            cout << ob.num << endl;
        }
};

void main ()
{   clrscr();
    A obj1;
    X obj2;
    obj1. display (obj2);
    getch();
}
```

Output : A
11

Class A can access the private and protected members of class X. In this example we are passing object as an argument to the function.

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The purpose of friend class are:

1) It's purpose is limited. Too many functions or external classes can be declared as friend of a class with protected or private. It lessens the value of encapsulation of separate classes in oop.

2) Friend is not mutual. If class A is a friend of B, then B doesn't become a friend of A automatically.

Ans1 Virtual base class are the class that are used in virtual inheritance in a way - that prevent multiple instances of a given class appearing in an inherited inheritance hierarchy when using multiple inheritances

example:

```
#include <iostream.h>
#include <conio.h>

class ClassA
{   public: int a;
};
```

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```
Class ClassY : virtual public ClassX
{
    public : int b;
};

Class ClassZ : virtual public ClassX
{
    public : int c;
};

class ClassD : public ClassY, public classZ
{
    public : int d;
};

void main ()
{
    ClassD obj;

    obj.a = 10;     // statement 3
    obj.a = 100;    // statement 4

    obj.b = 20;
    obj.c = 30;
    obj.d = 40;
```

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```
cout << "\n X : " << obj.a;
cout << "\n Y : " << obj.b;
cout << "\n Z : " << obj.c;
cout << "\n D : " << obj.d;
```

3

Output :

X : 100
Y : 20
Z : 30
D : 40

According to the above example, Class D have only one copy of Class X therefore statement 4 will overwrite the value of a, given at statement 3

Virtual base classes is a way to save spaces and avoid ambiguities in class hierarchies that uses multiple inheritances. When a base class is specified as a virtual base, it can act as an indirect base more than once without duplication of its data member.