Question 01- Short Q/A *[points: (5*4)=20] [Estimated Time: 20 minutes]*

1. What is name mangling?

C++ supports function overloading, i.e., there can be more than one function with the same name but, different parameters. How does the C++ compiler distinguish between different functions when it generates object code –

It changes names by adding information about arguments. This technique of adding additional information to function names is called Name Mangling.

void func(int i, char c) { . . . }

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2. What is the mechanism to declare and use a friend function and friend class? Explain using an example.

```
#include <iostream>
using namespace std;
class Distance {
   private:
      int meter;
      friend int addFive(Distance);
   public:
      Distance() : meter(0) {}

};
int addFive(Distance d) {
   d.meter += 5;
   return d.meter;
}
int main() {
   Distance D;
   cout << "Distance: " << addFive(D);
   return 0;
}
```

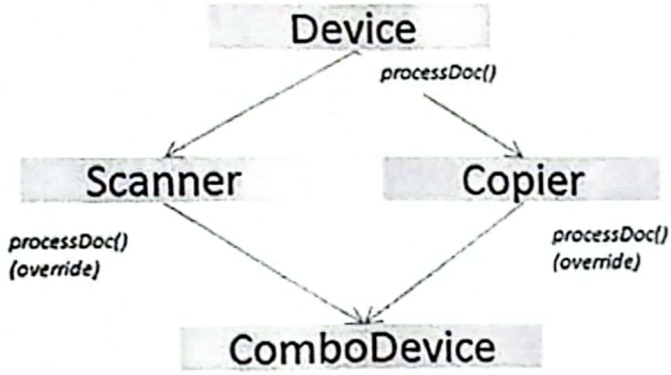
```
#include <iostream>
using namespace std;
// forward declaration
class ClassB;
class ClassA {
   private:
      int numA;
      friend class ClassB;

   public:
      ClassA() : numA(12) {}
};
class ClassB {
   private:
      int numB;
   public:
      ClassB() : numB(1) {}
   int add() {
      ClassA objectA;
      return objectA.numA + numB;
   }
};
int main() {
   ClassB objectB;
   cout << "Sum: " << objectB.add();
   return 0;
}
```

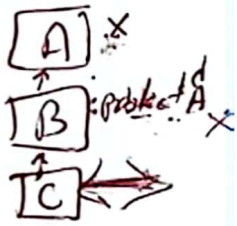
3. How many types of inheritance are included in the hybrid inheritance Diamond problem. Write the names of those and Give the diamond problem example in terms of UML diagram.

Hybrid inheritance:

Combination of heretical and multiple inheritance.



Diamond Problem - Multiple Inheritance



4. Assume class C is inherited from class B and class B is inherited from class A. Can we access a public variable of class A, using the object of class C, if class B has protected inheritance? Explain your answer.

Yes.

Question 02- Coding *[points: 20] [Estimated Time: 10 minutes]*

1. Determine the output of the following code segment.

Solution:

Output:
Hi from a rectangle!

2. Find the Errors in Following code segment and write the only correct line of code. No need to write whole code.Solution:

Error Correction:
Make student and faculty as a virtual base class.
Output:
Parameterized Person
Faculty Parameterized
Student Parameterized
TA Parameterized
Default Person
020

Question 03- Coding *[points: 30] [Estimated Time: 30 minutes]*

Kosar Medical Store provides their services to customers according to doctor prescriptions. The pharmacy has **three** different categories of medicines: **tablets, capsules and syrup.** Each of the medicines has a **name, formula, retail price, a manufacture date and an expiration date.**
Additionally,

- Tablets have sucrose_level which can be a value in range 0 to 1.
- Capsules have an absorption percentage which is a value between 1 to 100.
- Syrups don't have any special fields.

The pharmacy also has employees. A Pharmacist whose responsibility is to ensure that the medicines are sold according to prescription and a Counter Staff whose responsibility is to maintain the revenue of Kosar Medical Store.

Flow of operation:
The customer enters the pharmacy and presents a prescription to the counter staff. The counter staff forwards this prescription to the pharmacist who checks ar recommends the appropriate medicine type. The counter staff then collects the payment, hands over the medicines and updates the overall revenue.

The tasks you have to do are:

1. Identify all the classes, attributes and functions in the above scenario.
2. Identify the type(s) of inheritance present in the scenario.
3. Declare variables and also provide suitable implementation for default and parameterized constructor(s) of each class.
4. Overload the "<=" operator to compare the medicines expiry date with current date. If medicines' is expired not add in bill. Just update the stock. Otherwise generate the bill and update the stock.
5. Create Search_Medicine() in both Pharmacist and Counter Staff. The function should allow Pharmacists to search and print the details of medicine based on the formula. The function in Counter Staff should allow to search the medicine using the name. Using virtual function.

```
class medicine{
```

```
        protected:
                string name;
                string formula;
                float price;
                string manf_date;
                string exp_date;
                int quantity;
        public:
        medicine(string n, string f, string p, string m, string e):
        name(n),formula(f),    price(p),manf_date(m),exp_date(e){
        }
        void display(){
                cout<<name<<"\t"<<formula<<"\t"<<price<<"\t"<<manf_date<<"\t"<<exp_date<<"\n";
        }
        bool operator <=(medicine m1){
                if(exp_date<=m1.exp_date)
                        return true;
                return false;
        }
};
class tablet:public medicine{
float sur_level;
public:
tablet(string n, string f, string p, string m, string e,string sl):
sur_level(sl),medicine(n,f,p,m,e){
}
};
class capsule:public medicine{
float absorption;
public:
capsule(string n, string f, string p, string m, string e,string abss):
absorption(abss),medicine(n,f,p,m,e){
}
};
class syrup:public medicine{
public:
syrup(string n, string f, string p, string m, string e,string abss):
medicine(n,f,p,m,e){
}
};
class employee{
        tablet t1;
        syrup s1;
        capsule c1;
        public:
        virtual void search_medicines(string str){
        }
};
class pharmist:public employee{
        public:
        void search_medicines(){
                // enter formula and check from file
                //the details of medicine based on the formula
        }
        char give_medicinesType(){
                //checks and recommends the appropriate medicine type
        }
};
class counter_staff:public employee{

        public:
        counter_staff(){
        }
        void search_medicines(string str){
                //search the medicine using the name
        }
```

```
        void forword_pres(string prescription){
        char flag= give_medicinesType()
        }
        void updatestock(){
                if(quantity<=stock){
                        stock-=quantity;
                }
                else
                cout<<"quantity:\t"<<quantity<<endl;
                cout<<"Not in stock!"<<endl;
        }
        void bill(){
                cout<<"PName\t"<<name<<endl;
                cout<<"Formula\t"<<formula<<endl;
                cout<<"Unit price\t"<<price<<endl;
                cout<<"Quantity\t"<<quantity<<endl;
                cout<<"Total\t"<<price*quantity<<endl;
        }
};
```