Question1: Mark the following statements as true or false.   5 points

1) The member variables of a class or structure must be of the same type.   F

2) The member methods of a class must be public.   F

3) const methods in a class can update the member variables of the class.   F

4) the constructor of a derived class can call the constructor of base class only   F
   if the call stated explicitly in the definition of derived class constructor.

5) the public data members of base class A become a protected data members   F
   of derived class B if class B inherit class A as private.

Question2: Assume that you have the following definition of a struct.   5 points

```
struct parts_type
{
      string part_name;
      int part_num;
      double price;
      int quantities_In_stock;
};
```
Perform the following tasks.

1) use pointer to Declare an array, **inventory**, of 100 components of type parts_type.

```
parts_type* inventory;
inventory=new parts_type[100];
```

2) Write a C++ code to initialize each component of inventory as follows: part_name to "PART"
   string, part_num to -1, price to 0. 0, and quantities_In_stock to 0.

```
for(int i=0;i<100;i++)
{
     inventory[i].partname="PART";
     inventory[i].part_num=-1;
     inventory[i].price=0.0;
     inventory[i]. quantities_In_stock=0;
}
```

3) Write a C++ code that uses a loop to output the data stored in **inventory** array.

```
cout<<"Part name \t Part number \t Price \t quantities_In_stock \n";
for(int i=0;i<100;i++)
{
cout<<inventory[i].partname<<"\t";
cout<<inventory[i].part_num<<"\t";
cout<<inventory[i].price<<"\t";
cout<<inventory[i]. quantities_In_stock<<"\n";
}
```

Question 3: Write a class called Employee which have the following characteristics   5 points
   1- The class name is Employee
   2- The class have 4 variables as followings:
         a. Name of type string.
         b. NN of type long
         c. Birth_Date of type int
         d. Job of type string
   3- The class have a member methods as the following
         a. Constructor that take no arguments and initialize the variables with default parameters(Name to NULL ,NN to 0 , Birth_Date to 0 and Job to NULL.
         b. constructor that take arguments of Name,NN,Birth_Date and job to initialize the member variables of class.
         c. A const Display method to display the information of the class on screen.
         d. A const member methods to return each variable.
         e. A method to update the variables a the class.
   4- Write the definition of the above member method (use inline method if possible).

```cpp
class Employee
{
public:
      Employee();
      Employee(string,long,int,string);
      void display()const;
      string get_name()const{return name;}
      long get_NN()const{return NN;}
      int get_birth_date()const{return birth_date;}
      string get_job()const{return job;}
      void update(string,long,int,string);
private:
      string name;
      long NN;
      int birth_date;
      string job;
};
Employee::Employee()
{
      name="";
      NN=0;
      birth_date=0;
      job="";
}
Employee::Employee(string n, long nn, int bd,string j)
{
      name=n;
      NN=nn;
      birth_date=bd;
      job=j;
}
void Employee::display()const
{
      cout<<NN<<"\t";
      cout<<name<<"\t";
      cout<<birth_date<<"\t";
      cout<<job<<"\n";
}
void Employee::update(string n, long nn, int bd,string j)
{
      name=n;
      NN=nn;
      birth_date=bd;
      job=j;
}
```

Question4: Consider the following class definition: 5 points

```
class circle {
    public:
        void print() const;
        void setRadius(double) ;
        double getRadius() ;
        double area() ;
        circle();
        circle(double) ;
    private:
        double radius;
} ;
```

1- write a definition for class cylinder that inherit the class circle as the base of cylinder and add the following:
   a. A double data member for height
   b. 2 constructors the first one take no arguments and the second take two double arguments
   c. A method print
   d. A method get_height to return the value of the height
   e. A method set_height to upsate the value of the height
   f. A method volume to calculate and return the volume
   g. A method area to calculate and return the surface area
2- Write a definition for the methods described above (use inline method if possible).

```cpp
class cylinder:public circle
{
public:
    cylinder();
    cylinder(double,double);
    void print();
    double get_hight()const{return hight;}
    void set_hight(double h){hight=h;}
    double calculate_volume()const;
    double calculate_surface_area()const;
private:
    double hight;
};


cylinder::cylinder()
{
    hight=0.0;
}
cylinder::cylinder(double r, double h):circle(r)
{
    hight=h;
}
void cylinder::print()
{
    cout<<"radiaus="<<circle::getRadius();
    cout<<"hight="<<hight<<endl;
}
double cylinder::calculate_volume() const
{
    double a=area();
    return hight*a;
}
double cylinder::calculate_surface_area()const
{
    return 2*area()+2*getRadius()*3.14*hight;
}
```