


<p align="center">Philadelphia University Faculty of Engineering Department of Computer Engineering</p>		<p align="center">First Semester 2017/2018 Date:- 29/03/2018 Allowed time:- 60 Minutes</p>
<p align="center">Object Oriented Programming (630221)</p>		<p align="center">First Exam</p>
<p>Student Name: - ID: -</p>		

Question 1: Mark the following statements as true or false.

20 points

1. A structure can be passed to function by reference only. F
2. A member of a structure cannot be another structure. F
3. Default copy constructor perform deep copy of class data. F
4. The member methods of class must be public. F
5. A class cannot have more than one constructor. F
6. Static variable of class can only be accessed by static methods. F
7. Static methods of class can access non static data. F
8. Dynamically created data of class don't destroyed when class is destroyed. T
9. Constructor can be called by user after object was created. F
10. Private data members are accessible from nonmember methods. F

Question 2: Suppose that you have the following definitions:

25 points

<pre>struct Time { int Hr; int Min; int Sec; };</pre>	<pre>struct Trip { string Destination; int Distance; Time Travel_Time; Time Arrival_Time; };</pre>
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Perform the following tasks

- 1- Declare a pointer of type Trip then use it to declare an array of 20 elements of type Trip.

```
Trip* T;
T=new Trip[20];
```

- 2- Write a function that asks the user to enter the information of a single Trip and return the input data.

```
Trip Input()
{
    Trip T;
    cin>>T.Destination;
    cin>>T.Distance;
    cin>>T.Travel_Time.Hr;
```

```

        cin>>T.Travel_Time.Min;
        cin>>T.Travel_Time.Sec;
        cin>>T.Arrival_Time.Hr;
        cin>>T.Arrival_Time.Min;
        cin>>T.Arrival_Time.Sec;
        return T;
    }

```

3- use the function defined in previous question to Enter the data of Trips in the array.

```

    for(int i=0;i<20;i++)
    {
        T[i]=Input();
    }

```

4- Write a function that display the information of data stored in the array.

```

void Display(Trip[] T,int Size)
{
    for(int i=0;i<Size;i++)
        cout<<T[i].Destination<<" "<<T[i].Distance<<" "
        <<T[i].Travel_Time.Hr<<": "<<T[i].Travel_Time.Min<<": "<<T[i].Travel_Time.Sec
        <<" "<<T[i].Arrival_Time.Hr<<": "<<T[i].Arrival_Time.Min<<": "
        <<T[i].Arrival_Time.Sec<<endl;
}

```

5- Write a function that displays the destination of trips with distance greater than 50 km.

```

void Display(Trip[] T,int Size)
{
    for(int i=0;i<Size;i++)
    {
        if(T[i].Distance>50)
            cout<<T[i].Destination
    }
}

```

Question 3:

30 points

a- Define a structure Date which contains Day, Month, Year of type int.

```

struct Date
{
    int Day;
    int Month;
    int year;
};

```

b- Define a class Person which contains the following data:

- 1- Class name Person.
- 2- The class has 4 variables:
 - i. Name of type string.
 - ii. ID of type int.
 - iii. Birth date of type Date.
 - iv. Address of type string.
- 3- The class has the following methods

- i. Default constructor which initialize the int data to ZERO and string data to "".
 - ii. Constructor that takes argument (ID, name, Address, day, month, year) to initialize the variable of class.
 - iii. Print method to print the data of class on screen.
 - iv. Get methods that return each data member of the class.
- 4- Write a definition of class methods listed above.

```

class Person
{
private:
    int ID;
    string Name;
    string Address;
    Date BDate;
public:
    Person();
    Person(int, string, string, Date);
    void Print();
    int Get_ID();
    string Get_Name();
    string Get_Address();
    Date Get_BDate();
};

Person::Person()
{
    ID=0; Name="";    Address="";
    BDate.Day=0;    BDate.Month=0;    BDate.year=0;
}
Person::Person(int id, string n, string a, Date bd)
{
    ID=id;
    Name=n;
    Address=a;
    BDate=bd;
}
void Person::Print()
{
    cout<<"ID: "<<ID<<endl;
    cout<<"Name: "<<Name<<endl;
    cout<<"Address: "<<Address<<endl;
    cout<<"Bdate:
"<<BDate.Day<<"/"<<BDate.Month<<"/"<<BDate.year<<endl;
}
int Person::Get_ID()
{
    return ID;
}
string Person::Get_Name()
{
    return Name;
}
string Person::Get_Address()
{
    return Address;
}
Date Person::Get_BDate()
{
    return BDate;
}

```

Question 4: Given the following class definition:

25 points

```
class test
{
private:
    static int cnt;
    int value;
    double* Data
public:
};
```

- 1- Write a C++ statement that initialize the cnt variable to 0.
- 2- Define a method that return the value of cnt.
- 3- Define a constructor that take one argument X which use it to initialize the variable value then use value to create a dynamic array Data that contain [value] elements , and increment cnt variable.
- 4- Define a destructor that free memory locations and decrement cnt.
- 5- Define a copy constructor that perform deep copy of class data, and increment cnt.
- 6- Write a C++ statement that display the cnt value on screen.

```
class test
{
private:
    static int cnt;
    int value;
    double* Data
public:
    static int get_cnt()
    {
        return cnt
    }
    test(int x)
    {
        value=x;
        cnt++;
        Data=new double[value];
    }
    ~test()
    {
        delete Data;
        cnt--;
    }
    test(test& T)
    {
        value=T.value;
        Data=new double[value];
        for(int i=0;i<value;i++)
            Data[i]=T.Data[i];
        cnt++;
    }
};

int test::cnt=0;
int main()
{
    cout<<test::get_cnt()<<endl;
    return 0;
}
```