

Course Code: CS1004	Course Name: Object Oriented Programming
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Student Roll No:	Section No:

Instructions:

- Return the question paper and make sure to keep it inside your answer sheet.
- Read questions completely before answering. There are **3 questions, 2 sides on 1 page**.
- In case of any ambiguity, you may make assumption. But your assumption should not contradict any statement in the question paper.
- You are **not allowed to write** anything on the question paper (except your ID and section).

**Time:** 60 minutes.

**Max Marks:** 49 Marks

**Q 1.** Write single-line short answers to the following questions: **[10 min, 10 Marks]**

- a. If we add a parameterised constructor, then there is no need for a setter function. Do you agree with this? give an explanation.

**No, we need setter for update value as constructor only called once.**

- b. Why a constructor does not return anything, although it is a function and function must return.

**It returns the object itself or address of object.**

- c. Why do we need to add a NULL constructor, if it does nothing?

**We need an empty object as well.**

- d. What happens if an attribute does not have a setter function?

**We cannot initialize the value of that attribute.**

- e. Why do we need separate setter functions for every data element, we can create a combined setter as well? discuss.

**We need separate setter to manipulate the value of single attribute. If we use combine setter then we may lose the value of other attributes.**

- f. A static function can be called using an object reference, then why is it recommended to use a class reference.

**Static is a class member that is why we need to use a class reference. Secondly how we can differentiate between a class member and an object member.**

- g. When do we want to declare a function as private?

**When we want to restrict the access of any attribute.**

- h. What happens if a constructor is declared as private?

**We cannot. In addition, if we do then we cannot create object of that class.**

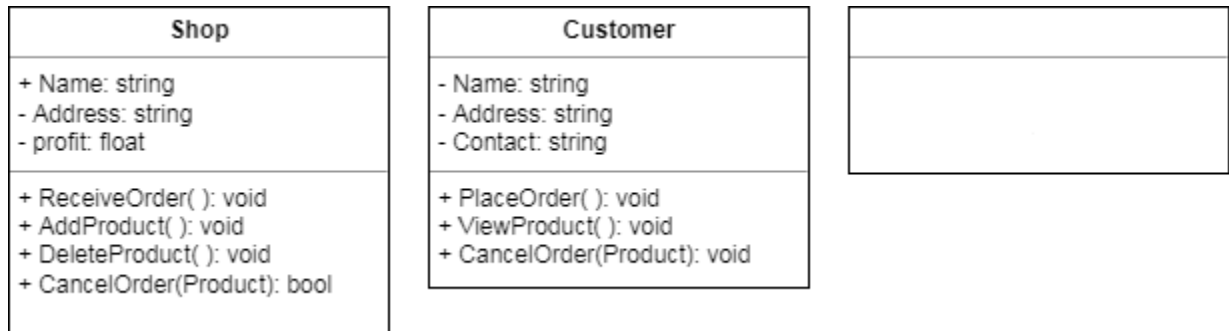
- i. What should we do to restrict our object to be copied by other objects of the class.

**Make copy constructor private.**

- j. What is the size of a class with two *int* and one *char* member variables?

**Zero. No size until objects are created.**

**Q 2.** Consider the classes and their members in the diagram given below and perform the tasks that follow: **[25 min, 18 Marks (3 each)]**



- Convert the entities Shop and Customer in given diagram to OOP classes and write the member variables with their correct access modifiers.
- Create a new UML/Class Diagram for a third entity named Product. Show some attributes of Product you can think of in your diagram. In your Product UML/Class Diagram, write appropriate function prototypes if we desire functionality to update and read the attributes of Product.
- Write product class for your Product UML/Class Diagram, write appropriate function if we desire functionality to calculate how many products have been created.
- Write program of parameterized constructor for each of the three classes.
- Implement the functions AddProduct and DeleteProduct to allow for creation and removal of a product. You can declare any appropriate parameters for these functions.
- Implement the functions PlaceOrder to allow for purchase of a product and ReceiveOrder for displaying the total bill. You can declare any suitable parameters for these functions.

**Solution:**

**C++ Version**

**a)**

<pre>class Shop { Private: string Address; float Profit; string Name; };</pre>	<pre>class Customer { Private: string Name; string Address; string Contact; };</pre>	
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**b)**

<pre>Product - ID: int - Price: int - Description: String + void setID(int ID) + int getID() + void setPrice(int Price) + int getPrice()</pre>		
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**c)**

<pre>class Product { static int productCount; public:</pre>		
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<pre> Product () {     productCount += 1; } };  int Product::productCount = 0; </pre>		
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d)

<pre> class Shop { public: Shop(string a, string n) {     Address = a;     Name = n; } }; </pre>	<pre> class Customer { public: Customer(string n, string a, string c) {     Address = a;     Name = n;     Contact = c; } }; </pre>	<pre> class Product { public: Product() { } Product(int i, int p, string d) {     ID = i;     Price = p;     Description = d; } }; </pre>
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e)

<pre> class Shop { // other code Product * p = new Product[10]; int i = 0; public: void AddProduct( ) {     int price;     string pID, pDescription;     cout &lt;&lt; "Enter ID of product";     getline(cin, pID);     cout &lt;&lt; "Enter price";     cin &gt;&gt; price;     cout &lt;&lt; "Enter description";     getline(cin, pDescription);     p[i] = Product(pID, price, pDescription);     ++i; } }; </pre>	<pre> class Shop { // other code public: void DeleteProduct( Product* p ) {     delete p; } }; </pre>
---	---

f)

<pre> class Customer { //other code Shop * s; public: void PlaceOrder( ) {     string prod;     cout &lt;&lt; "Enter ID of product you want to buy";     getline(cin, prod);     s = new Shop("Nursery, Karachi", "Mart");     s -&gt; ReceiveOrder(prod); } }; </pre>	<pre> class Shop { // other code public: void ReceiveOrder(string prod) {     for(int i = 0; i &lt; 10; i++)     {         if(prod.equals(p[i]))         {             cout &lt;&lt; "Order placed";             break;         }     } } }; </pre>
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**Q 3.** Design a class VideoTape whose data members are private. The data members are labelled: string Title is a programme title, int Duration is the running time of the programme in minutes, double Size is the video size in GB's, string Created is a const data member of a class and it stores created date and time, string Resolution is given in pixels, and string Classification of the programme(Comedy, Drama, or Talk Show). **[25 min, 20 Marks (5 each)]**

- a. The default constructor of the class should initialize Title is "TITLE", Duration is 0, Size is 5.02, Created is "2010-07-09,21:42:40", Resolution is "1920 X 1080 pixels", and Classification is "CLASSIFICATION". A parameterized constructor (string Title, int Dur, double Size, string Created, string Resolution, string Classification) should initialize VideoTape's data members just make sure classification should be from given range as given above. If classification does not match from above mentioned programme list, assign the right value using SetClassification().
- b. Create a VT1 and VT2 objects with a given Title, Duration, Size, Created, Resolution, and Classification. Create VT3 and copy VT1 data in it.
- c. Implement the following functions:
  - i. string getTitle(); - Return VideoTape's Title
  - ii. int getDuration(); - Return VideoTape's Duration
  - iii. void setDuration(int); Update VideoTape's Duration
  - iv. double getSize(); - Return VideoTape's Size
  - v. string getCreated(); - Return VideoTape's Created
  - vi. string getResolution(); - Return VideoTape's Resolution
  - vii. string getClassification(); - Return VideTape's classification
  - viii. void setClassification(string);
- d. Compare method is a member function of a class VideoTape, in this function compare VT2 and VT3 and display only the maximum duration Tape details using display function. Also void Display () - print the details of the video tape to the output terminal in the following format: Title (Classification) Duration minutes, Size GBs.

**SOLUTION:**

**C++ Version**

```
#include<iostream>
using namespace std;
class VideoTape {
    string Title, Resolution;
    mutable string Classification;
    int Duration;
    double Size;
    const string Created;
public:
    VideoTape():Title("TITLE"),Size(5.02),Created("2010-07-09,21:42:40"),Resolution("1920 X 1080
pixels"),Classification("CLASSIFICATION"){
        Duration=new int;
        Duration=0;
    }
}
```

```

VideoTape(string Title, int Dur, double Size, string Created, string Resolution, string
Classification):Title(Title),Size(Size),Created(Created),Resolution(Resolution){
    Duration=Dur;
    if(Classification=="Comedy" // Classification=="Talk Show" // Classification=="Drama")
        this->Classification=Classification;
    else{
        cout<<"Re-Enter Classification from these(Comedy, Talk Show, Drama): ";
        getline(cin,Classification);
        setClasssification(Classification);
    }
}
VideoTape( VideoTape &B):Created(B.Created) {
    Title=B.Title;

```

```

        Duration=B.Duration;
        Size=B.Size;
        Resolution=B.Resolution;
        Classification=B.Classification;
    }
    string getTitle() {
        return Title;
    }
    int getDuration() {
        return Duration;
    }
    void setDuration(int du){
        *Duration=du;
    }
    double getSize(){
        return Size;
    }
    string getCreated(){
        return Created;
    }
    string getResolution(){
        return Resolution;
    }
    string getClassification() {
        return Classification;
    }
    void setClasssification(string clas)const{
        Classification=clas;
    }
    VideoTape& compare(VideoTape VT_old) {
        if (Duration > VT_old.Duration) {
            return *this;
        }
        else
            return VT_old;
    }
    void display(){
        cout<<getTitle()<<" ( "<<getClassification()<<" ) "<<getDuration()<<" minutes,
"<<getSize()<<"GB\'s."<<endl;
    }
    ~VideoTape(){

```

```

        if(Duration!=NULL){
            delete Duration;
            cout<<"END"<<endl;
        }
    }
};

int main(){
    VideoTape VT1("PariZaad",45,8.04,"2021-03-03,21:22:23","1980 X 1190 pixels","Drama");
    VideoTape VT2("hasb-e-haal",30,7.5,"2022-01-02,20:00:00","1950 X 1090 pixels","Talk Show");
    VideoTape VT3(VT1);
    VT1.display();
    VT2.display();
    VT3.display();
    VT2.setClassssification("Comedy");
    VT1.setDuration(60);
    VT1.display();
    VT2.display();
    VT3.display();
    VideoTape T=VT2.compare(VT3);
    T.display();

    return 0;
}

```

**BEST OF LUCK!**