



COMSATS University Islamabad

Department of Computer Science

Midterm Examination Fall 2023

CSC241- Object Oriented Programming

Class: BCS, BSE, BAI, BDS, BCT

Instructor: Sajida Kalsoom

Marks: 25

Date: 10-11-2023

(CLO1: Demonstrate fundamental principles and concepts of object-oriented programming.)

1. What is the output of the following code?

[Marks: 2]

```
public class Example {  
    public static void main(String[] args) {  
        Parent p=new Parent(11,22);  
        p.display();  
        Child c=new Child(11,22);  
        c.display();  
    }  
}  
class Parent{  
    int a;  
    int b;  
    int c;  
    Parent(){  
        a=1;  
        b=2;  
        c=3;  
    }  
    Parent(int x, int y){  
        a=x;  
        b=y;  
    }  
    void display(){  
        System.out.println(a);  
        System.out.println(b);  
        System.out.println(c);  
    }  
}
```

```
class Child extends Parent{  
    int a;  
    int b;  
    Child(){  
        a=11;  
        b=22;  
    }  
    Child(int x, int y){  
        a=x;  
        b=y;  
    }  
    void display(){  
        System.out.println(a);  
        System.out.println(b);  
        System.out.println(c);  
    }  
}
```

2. Write the output for the following scenario:

[Marks 3]

Suppose you have a parent class **WebBrowser** that has a method **defaultSearchEngine()** which returns google: .

- Firefox is a child class that has a **defaultSearchEngine()** that returns: Google
- MicrosoftEdge is a child that has a **defaultSearchEngine()** that returns: Bing
- Opera is a child that does not have a **defaultSearchEngine()** method
- Safari is a child that does not have a **defaultSearchEngine()** method

- SlimBrowser is a child that has a defaultSearchEngine() that returns: Yahoo

What is the output from looping through the array created below and asking each browser to provide defaultSearchEngine ()?

```
WebBrowser[] a = { new FireFox(), new MicrosoftEdge(), new Opera(), new Safari(), new SlimBrowser() }
```

(CLO 2:- Apply the concepts of object-oriented programming principles along with interfaces and exception handling to solve a real-world problem.)

3. "Mr. Books" is an online bookstore for all ages and interests. Mr. Books offers a wide range of books, from bestsellers to rare collector's items. The bookstore also provides services such as book recommendations, customer reviews, and personalized reading lists. As the lead software architect at Mr. Books, you are tasked is to create a class diagram for the online system by keeping in view the following requirements.

Books: There are different categories of books, such as FictionBook, NonFictionBook, and ScienceFictionBook. Each book has a title, author(s), ISBN, and price.

Customers: Mr. Books customers can have a customer ID, name, and address.

Reviews: Customers can leave reviews for books. Each review has a rating and comments.

Recommendations: The system provides personalized book recommendations to customers based on their reading history.

Orders: Customers can place orders for books. The system should be able to store order ID, order date, and the list of books ordered. [Marks: 10]

4. Create a **University Member System** that must follow all the principles of Object-Oriented Paradigm. Here we want to record the Faculty and Network Administrators who are university members.

All members have a name, email and salary. For faculty members we also have to record their Designation and for Network administrators we have to record Qualification.

The system should have provision to instantiate all members with user supplied data. It should also display the income of every university member. [Marks: 3+2+3+2]

Using the following information calculate the income of the members:

- a) For Faculty member should be calculated as follows:
 - i) If the designation is Lecturer, it is same as regular university members.
 - ii) For Assistant Professor, income is 10% greater than regular university members.
 - iii) If the designation is Professor, income is 25% greater than regular university members.
- b) For Network Administrators, the income is same as the regular university members.

Furthermore, we should be able to compare two Faculty members and two network administrators.