



COMSATS University Islamabad

Department of Computer Science

Midterm Examination Spring 2023

Object Oriented Programming

Class: BCS, BSE, BAI, BDS, BCT

Instructor:

Marks: 40

Date: 09-05-2023

1. What is the output of the following code? [CLO-1] [Marks: 5]

```
class Student {
    String name;
    int marks;
    void display() {
        System.out.println("Name =" + name);
        System.out.println("Marks =" + marks);
    }
}

class Runner {
    public static void main(String args[]) {
        Student s1 = new Student();
        s1.display();
        s1.name = "Ali";
        s1.marks = 44;
        s1.display();
        Student s2 = new Student();
        s2 = s1;
        s2.display();
        s2.name = "Aslam";
        s2.marks = 55;
        s2.display();
        s1.display();
    }
}
```

Handwritten annotations for the first code block:

- Arrows point to the `System.out.println` lines in the `display()` method.
- Next to `s1.display();`, the output `Ali` and `44` is written.
- Next to `s2.display();` (the first one), the output `Aslam` and `55` is written.
- Next to `s1.display();` (the second one), the output `Ali` and `44` is written.

2. What is wrong in following class Example. Re-write the following code after making necessary corrections and find out the output. [CLO-1] [Marks: 3]

```
class Example {
    int a;
    int b;
    static void display() { //method must be declared static here
        System.out.println("a =" + a);
        System.out.println("b =" + b);
    }
}

class Runner {
    public static void main(String args[]) {
        Example obj1 = new Example();
        obj1.display();
        obj1.a = 1;
        obj1.b = 2;
        obj1.display();
        Example obj2 = new Example();
        obj2.display();
    }
}
```

3. What is wrong with the following code? Re-write the following code after making necessary corrections. [CLO-1] [Marks: 2]

```
class MyClass {
    private int a;
    private int b;
    void MyClass() {
    }
    void MyClass(int a, int b) {
        a=a;
        b=b;
    }
    void MyClass(int x, int y) {
        a=x;
        b=y;
    }
    @Override
    void display() {
        System.out.println("a = ",a);
        System.out.println("b = ",b);
    }
}

public class Mid {
    public static void main(String args[]) {
        MyClass obj=new MyClass();
        obj.a=11; obj.b=22;
        obj.display()
    }
}
```

4. Create a class diagram for a Railway management system using following classes: [CLO-2] [Marks: 10]

- Person
- Customer
- Employee
- Train
- Ticket
- RailwayStation

Assign appropriate data members to each class. The system should have following functions:

- Display information about a customer
- Display information about an employee
- Display ticket information.
- Display the route for the train which includes departure and arrival place.
- Assign trains to a railway station.
- Display trains at a railway station

5. Consider the following classes and write the missing code in Bank class. [CLO-3] [Marks:10]

```
public class Customer {
    private String name;
    private String address;
    private String email;

    public Customer(String name, String address,
String email) {
        this.name = name;
        this.address = address;
        this.email = email;
    }

    public String getName() {
        return name;
    }

    public String getAddress() {
        return address;
    }

    public String getEmail() {
        return email;
    }
}

public class Account {
    private int id;
    private Customer c;
    private double balance;

    public Account(int id, Customer c, double balance)
    {
        this.id = id;
        this.c = c;
        this.balance = balance;
    }

    public int getId() {
        return id;
    }

    public Customer getC() {
        return c;
    }

    public double getBalance() {
        return balance;
    }
}
```

```
public class Bank {

    private Account [] acc_array ;

    public Bank(Account [] a) {
        acc_array = a;
    }

    public void display()
    {

        //display complete state of all bank accounts

    }

    public void findNamesOfHighDepositAccounts()
    {
        . . . . .

        // display the names of all customers who
        have balance greater than 50 Lac.

    }

    public double totalDepositInBank()
    {

        // return the total deposit in bank

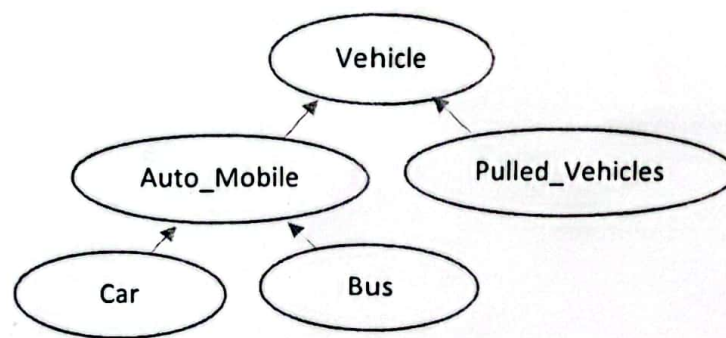
    }

    public Customer findCustomerByID(int id)
    {

        //search and return a customer using account ID

    }
}
```

6. Implement class **Vehicle** having data members **Registration_No** and **Ownership_Cost**. Make argument constructor and **toString()** method in this class. Create a derive classes called **Auto_Mobiles** (having data members **Fuel_Type** and **Warranty**) and **Pulled_Vehicles** (with no additional data members). Create argument constructor and **toString()** method in both classes. Further inherit classes **Car** and **Bus** from class **Auto_Mobiles**. Think of one data member in each of these classes and add argument constructor and **toString()** method. Insert a method **checkRegistrationNumber()** in **Bus** class that returns true if it is registered for Islamabad. Figure for the scenario is added for the reference. [CLO-3] [Marks: 10]



Note:

Do not add additional constructors and methods in classes other than those mentioned in the question.

The Data of parent classes is protected.

The data of leaf child classes is private.

Protected String Registration_No;
Protected Double Ownership_Cost;

```

class Vehicle {
    String Registration_No;
    Double Ownership_Cost;

    Vehicle() {
        // Constructor
    }

    toString() {
        // Method
    }
}

class Auto_Mobile {
    String Fuel_Type;
    int Warranty;

    void Pulled_Vehicle {
        // Method
    }
}
  
```

```

class Auto extends Vehicle {
    Vehicle();
}

class Bus extends Auto {
    Vehicle();

    String checkRegistrationNumber();

    if (checkRN == RN) {
        Return True;
    }
}
  
```