Lab Assignment 04

Inspiring Excellence

Course Code:	**CSE111**
Course Title:	**Programming Language II**
Topic:	**OOP Basics, Instance Variable, and Instance Method**
Number of Tasks:	**11**

[Submit all the Coding Tasks (Task 1 to 9) in the Google Form shared on buX before the next lab. Submit the Tracing Tasks (Task 10 & 11) handwritten to your Lab Instructors at the beginning of the lab]

Task 1

You are given the following "**University**" class:

```
public class University{
    public String name;
    public String country;
}
```

Now write a Java **tester** class named "**UniversityTester**".

a. Write the main method and create 2 objects of **University** class and print the location of the objects and print the instance variables of the objects. Are the location of the objects the same?

b. Now change the instance variables of the first object.
name = "Imperial College London"
country = "England"

Now change the instance variables of the second object.
name = "Brac University"
country = "Bangladesh"

Now check if the instance variables of both objects have changed or not and whether the instance variables of both objects are of the same value or not.

Task 2

Write the driver code of **"Test2"** class to generate the following output:

```
public class Test2{
    public static void main(String [] args){
    //Your code here
    }
}
```

Design Class	Output

`public class Circle {`
`  public double radius = 5;`
`}`
	`Radius of the circle is 5.0`
	`The area of the circle is 78.53981633974483`
	`The circumference of the circle is 31.41592653589793`

Task 3

Design the **"Student"** class so that the main method prints the following:

Tester Class	Output

`public class Test3{`
`  public static void main(String [] args){`
`  Student s1 = new Student();`
`  System.out.println("Name of the Student: "+s1.name);`
`  System.out.println("ID of the Student: "+s1.id);`
`  s1.id = 123;`
`  System.out.println("ID of the Student: "+s1.id);`
`  }`
`}`
	`Name of the Student: Bob`
	`ID of the Student: 1`
	`ID of the Student: 123`

Task 4

Write the code in java for the **"Vehicle"** class. The tester class and the output is given below:

Tester class	Output

`public class Tester4{`
`  public static void main(String [] args){`
`  Vehicle car = new Vehicle();`
`  System.out.println("Attributes of car object:");`
`  System.out.println(car.type);`
`  System.out.println(car.wheels);`
`  System.out.println(car.color);`
`  System.out.println("=========");`
`  Vehicle bike = new Vehicle();`
`  bike.type="Motor bike";`
`  bike.wheels=2;`
`  bike.color="Red";`
`  System.out.println("Attributes of bike object:");`
`  System.out.println(bike.type);`
`  System.out.println(bike.wheels);`
`  System.out.println(bike.color);`
`  }`
`}`
	`Attributes of car object:`
	`Car`
	`4`
	`White`
	`=========`
	`Attributes of bike object:`
	`Motor bike`
	`2`
	`Red`

Task 5

Write the code in java for the "**Tournament**" class. The tester class and the **output** is given below:

Tester class	Output

public class Tester5{
  public static void main(String [] args){
  Tournament asiaCup = new Tournament();
  System.out.println(asiaCup.name+" "+
asiaCup.sportsType+" "+asiaCup.numberOfTeams+"
"+asiaCup.teams);
  System.out.println("**********");
  asiaCup.name="Asia Cup";
  asiaCup.sportsType="Cricket";
  asiaCup.numberOfTeams=4;
  asiaCup.teams = new String[] {"BD","IND","PAK","SL"};
  System.out.printf("%s %s Tournament is played between
%d teams\n",asiaCup.name, asiaCup.sportsType,
asiaCup.numberOfTeams);
  System.out.println("The teams are:");
  for(int i=0; i<asiaCup.teams.length; i++){
  System.out.println(asiaCup.teams[i]);
  }
  }
}
	null null 0 null
	**********
	Asia Cup Cricket Tournament
	is played between 4 teams
	The teams are:
	BD
	IND
	PAK
	SL

Task 6

Design the "**ImaginaryNumber**" to generate the **output** given below:

Tester Class	Output

`public class Tester6{`
`  public static void main(String [] args){`
`  ImaginaryNumber num1 = new ImaginaryNumber();`
`  num1.printNumber();`
`  System.out.println("1********");`
`  num1.realPart=3;`
`  num1.imaginaryPart=7;`
`  num1.printNumber();`
`  System.out.println("2********");`
`  ImaginaryNumber num2 = new ImaginaryNumber();`
`  num2.realPart=1;`
`  num2.imaginaryPart=9;`
`  num2.printNumber();`
`  }`
`}`
	`0 + 0i`
	`1********`
	`3 + 7i`
	`2********`
	`1 + 9i`

Task 7

Complete the **"Cat"** class so the main method produces the following output:

Test Class	Output

`public class Test7{`
`  public static void main(String [] args){`
`  Cat c1 = new Cat();`
`  System.out.println("==================");`
`  c1.printCat();`
`  c1.color = "Black";`
`  System.out.println("==================");`
`  c1.printCat();`
`  c1.color = "Brown";`
`  c1.action = "jumping";`
`  System.out.println("==================");`
`  c1.printCat();`
`  }`
`}`
	`==================`
	`White cat is sitting`
	`==================`
	`Black cat is sitting`
	`==================`
	`Brown cat is jumping`

Task 8

Complete the **Bird** class so that main method produces the following **output**:

Test class	Output

`public class Test8{`
`  public static void main(String args[]) {`
`  Bird b1 = new Bird();`
`  b1.name = "Parrot";`
`  b1.flyUp(3);`
`  b1.makeNoise();`
`  b1.flyDown(5);`
`  b1.flyDown(2);`
`  b1.flyDown(1);`
`  Bird b2 = new Bird();`
`  b2.name = "Eagle";`
`  b2.flyUp(5);`
`  b2.flyDown(5);`
`  b2.makeNoise();`
`  }`
`}`
	`Parrot has flown up 3 feet.`
	`Squawk`
	`Parrot cannot fly down 5 feet.`
	`Parrot has flown down 2 feet.`
	`Parrot has flown down 1 feet and landed.`
	`Eagle has flown up 5 feet.`
	`Eagle has flown down 5 feet and landed.`
	`Squee`

Task 9

Design the **CellPhone** class so that the **main** method of tester class can produce the following output:

Tester Class	Output

public class Tester9{
  public static void main(String[]args){
  CellPhone phone1 = new CellPhone();
  phone1.printDetails();
  phone1.model ="Nokia 1100";
  System.out.println("1##################");
  phone1.storeContact("Joy - 01834");
  phone1.printDetails();
  System.out.println("2##################");
  phone1.storeContact("Toya - 01334");
  phone1.storeContact("Aayan - 01135");
  phone1.printDetails();
  System.out.println("3##################");
  phone1.storeContact("Sani - 01441");
  phone1.printDetails();
  }
}
	Phone Model unknown
	Contacts Stored 0
	1##################
	Contact Stored
	Phone Model Nokia 1100
	Contacts Stored 1
	Stored Contacts:
	Joy - 01834
	2##################
	Contact Stored
	Contact Stored
	Phone Model Nokia 1100
	Contacts Stored 3
	Stored Contacts:
	Joy - 01834
	Toya - 01334
	Aayan - 01135
	3##################
	Memory full. New contact can't be stored.
	Phone Model Nokia 1100
	Contacts Stored 3
	Stored Contacts:
	Joy - 01834
	Toya - 01334
	Aayan - 01135

Task 10

Consider the following class:

```
public class Human{
    public int age;
    public double height;
}
```

Show the output of the following sequence of statements:

	Output
`Human h1 = new Human();`	
`Human h2 = new Human();`	
`h1.age = 21;`	
`h1.height = 5.5;`	
`System.out.println(h1.age);`	
`System.out.println(h1.height);`	
`h2.height = h1.height - 3;`	
`System.out.println(h2.height);`	
`h2.age = h1.age++;`	
`System.out.println(h1.age);`	
`h2 = h1;`	
`System.out.println(h2.age);`	
`System.out.println(h2.height);`	
`h2.age++;`	
`h2.height++;`	
`System.out.println(h1.age);`	
`System.out.println(h1.height);`	
`h1.age = ++h2.age;`	
`System.out.println(h2.age);`	
`System.out.println(h2.height);`	

Task 11

Consider the following class:

```
public class Student{
    public String name;
    public double cgpa;
}
```

Show the output of the following sequence of statements:

	Output
`Student s1 = new Student();`	
`Student s2 = new Student();`	
`Student s3 = null;`	
`s1.name = "Student One";`	
`s1.cgpa = 2.3;`	
`s3 = s1;`	
`s2.name = "Student Two";`	
`s2.cgpa = s3.cgpa + 1;`	
`s3.name = "New Student";`	
`System.out.println(s1.name);`	
`System.out.println(s2.name);`	
`System.out.println(s3.name);`	
`System.out.println(s1.cgpa);`	
`System.out.println(s2.cgpa);`	
`System.out.println(s3.cgpa);`	
`s3 = s2;`	
`s1.name = "old student";`	
`s2.name = "older student";`	
`s3.name = "oldest student";`	
`s2.cgpa = s1.cgpa - s3.cgpa + 4.5;`	
`System.out.println(s1.name);`	
`System.out.println(s2.name);`	
`System.out.println(s3.name);`	
`System.out.println(s1.cgpa);`	
`System.out.println(s2.cgpa);`	
`System.out.println(s3.cgpa);`	