

Lab Assignment 04



Inspiring Excellence

Course Code:	CSE111
Course Title:	Programming Language II
Topic:	Constructor, Constructor Overloading and Multiclass Problem
Number of Tasks:	11 (Coding: 08, Tracing: 03)

[Submit all the Coding Tasks (Task 1 to 8) in the Google Form shared on buX before the next lab. Submit the Tracing Tasks (Task 9 to 11) handwritten to your Lab Instructors at the beginning of the lab]

[You are not allowed to change the driver codes of any of the tasks]

Task 1

Design the **Student** class in such a way that it produces the following output.

Driver Code	Expected Output
<pre>public class StudentTester{ public static void main(String[] args){ Student s1 = new Student("Harry", "CSE"); System.out.println(s1.name); s1.updateName("Harry Potter"); System.out.println(s1.name); System.out.println(s1.prog); s1.updateProgram("CS"); String var = s1.accessProgram(); System.out.println(var); } }</pre>	Harry Harry Potter CSE CS

Task 2

Design the **Toy** class in such a way that it produces the following output

Driver Code	Expected Output
<pre>public class ToyTester{ public static void main(String[] args){ Toy t1 = new Toy("Car", 230); System.out.println("1====="); t1.updatePrice(250); System.out.println("2====="); System.out.println(t1.name); t1.showPrice(); System.out.println("3====="); Toy t2 = new Toy("Robot", 450); System.out.println("4====="); t2.updateName("Autobot"); System.out.println("5====="); System.out.println(t2.name); t2.showPrice(); } }</pre>	A new toy has been made! 1===== 2===== Car price: 250 Taka 3===== A new toy has been made! 4===== Changing old name: Robot new name: Autobot 5===== Autobot price: 450 Taka

Task 3

Design the **Shape2D** class in such a way that it produces the following output.

Driver Code	Expected Output
<pre>public class Shape2DTester { public static void main(String[] args) { Shape2D sq = new Shape2D(); System.out.println("-----1-----"); sq.area(); System.out.println("-----2-----"); Shape2D rectangle = new Shape2D(5,6); System.out.println("-----3-----"); rectangle.area(); System.out.println("-----4-----"); Shape2D tri1 = new Shape2D(5,6,"Triangle"); System.out.println("-----5-----"); tri1.area(); System.out.println("-----6-----"); Shape2D tri2 = new Shape2D(5,6,7); System.out.println("-----7-----"); tri2.area(); System.out.println("-----8-----"); } }</pre>	<pre>A Square has been created with length: 5 -----1----- The area of the Square is: 25.0 -----2----- A Rectangle has been created with length: 5 and breadth: 6 -----3----- The area of the Rectangle is: 30.0 -----4----- A Triangle has been created with height: 5 and base: 6 -----5----- The area of the Triangle is: 15.0 -----6----- A Triangle has been created with the following sides: 5, 6, 7 -----7----- The area of the Triangle is: 14.69 -----8-----</pre>

Task 4

Write "**Student**" class to show the following expected outputs

Note:

- ❖ A student can't take any course until the CGPA is set.
- ❖ A student cannot take more than 4 courses.
- ❖ A student with CGPA below 3 cannot take more than 3 courses.

Driver Code	Expected Output
<pre> public class StudentDriver { public static void main(String[] args){ Student student1 = new Student(12345678); System.out.println("1-----"); student1.addCourse("CSE110"); System.out.println("2-----"); student1.storeCG(2.5); student1.addCourse("CSE110"); student1.addCourse("ENG101"); student1.showAdvisee(); System.out.println("3-----"); student1.removeAllCourse(); student1.showAdvisee(); System.out.println("4-----"); student1.storeID(54652365); String[] courses = {"SOC101","CSE111","ENG102"}; student1.addCourse(courses); student1.showAdvisee(); System.out.println("5-----"); student1.addCourse("CSE230"); student1.showAdvisee(); System.out.println("6-----"); Student student2 = new Student(975738383,3.7); System.out.println("7-----"); String[] courses2 = {"CSE220","PHY112","MAT120","BUS101","CHN101"}; student2.addCourse(courses2); student2.showAdvisee(); } } </pre>	<pre> A student with ID 12345678 has been created. 1----- Failed to add CSE110 Set CG first 2----- Student ID: 12345678, CGPA: 2.5 Added courses are: CSE110 ENG101 3----- Student ID: 12345678, CGPA: 2.5 No courses added. 4----- Student ID: 54652365, CGPA: 2.5 Added courses are: SOC101 CSE111 ENG102 5----- Failed to add CSE230 CG is low. Can't add more than 3 courses. Student ID: 54652365, CGPA: 2.5 Added courses are: SOC101 CSE111 ENG102 6----- A student with ID 975738383 and cgpa 3.7 has been created. 7----- Failed to add CHN101 Maximum 4 courses allowed. Student ID: 975738383, CGPA: 3.7 Added courses are: CSE220 PHY112 MAT120 BUS101 </pre>

Task 5

Design the **Triangle** Class that will produce the following output. We will consider both triangles to have the same sides if all sides are equal in the same orientation/sequence only.

Types of Triangle:

- Equilateral: When all sides in the same orientation are equal.
- Isosceles: When any two sides of a triangle in the same orientation are equal.
- Scalene: When all sides are of different lengths.

Driver Code	Output
<pre>public class TriangleTester{ public static void main(String args[]){ Triangle t1 = new Triangle(4, 4, 4); Triangle t2 = new Triangle(4, 5, 6); Triangle t3 = new Triangle(4, 5, 6); Triangle t4 = new Triangle(5, 4, 6); t1.triangleDetails(); System.out.println("-----1-----"); System.out.println(t1.printTriangleType()); System.out.println("-----2-----"); t3.triangleDetails(); System.out.println(t3.printTriangleType()); System.out.println("-----3-----"); t4.triangleDetails(); System.out.println(t4.printTriangleType()); System.out.println("-----4-----"); t2.compareTriangles(t3); System.out.println("-----5-----"); t1.compareTriangles(t2); System.out.println("-----6-----"); t1 = t2; t1.compareTriangles(t2); System.out.println("-----7-----"); t3.compareTriangles(t4); } }</pre>	<pre>Three sides of the triangle are: 4, 4, 4 Perimeter: 12 -----1----- This is an Equilateral Triangle. -----2----- Three sides of the triangle are: 4, 5, 6 Perimeter: 15 This is a Scalene Triangle. -----3----- Three sides of the triangle are: 5, 4, 6 Perimeter: 15 This is a Scalene Triangle. -----4----- Addresses are different but the sides of the triangles are equal. -----5----- Addresses, length of the sides and perimeter all are different. -----6----- These two triangle objects have the same address. -----7----- Only the perimeter of both triangles is equal.</pre>

Task 6

Write the **Teacher** and **Course** classes so that the TestTeacher class produces the outputs given.
Hint: A teacher can add a maximum of 3 courses.

Driver Code	Output
<pre>public class TestTeacher{ public static void main(String [] args){ Teacher t1 = new Teacher("Matin Saad Abdullah","MSA"); Teacher t2 = new Teacher("Mumit Khan","MMK"); Teacher t3 = new Teacher("Sadia Hamid Kazi","SKZ"); Course c1 = new Course("CSE 110"); Course c2 = new Course("CSE 111"); Course c3 = new Course("CSE 220"); Course c4 = new Course("CSE 221"); Course c5 = new Course("CSE 230"); Course c6 = new Course("CSE 310"); Course c7 = new Course("CSE 320"); Course c8 = new Course("CSE 340"); t1.addCourse(c1); t1.addCourse(c2); t2.addCourse(c3); t2.addCourse(c4); t2.addCourse(c5); t3.addCourse(c6); t3.addCourse(c7); t3.addCourse(c8); System.out.println("1====="); t1.printDetail(); System.out.println("2====="); t2.printDetail(); System.out.println("3====="); t3.printDetail(); } }</pre>	<pre>A new teacher has been created A new teacher has been created A new teacher has been created 1===== Name: Matin Saad Abdullah Initial: MSA List of courses: CSE 110 CSE 111 2===== Name: Mumit Khan Initial: MMK List of courses: CSE 220 CSE 221 CSE 230 3===== Name: Sadia Hamid Kazi Initial: SKZ List of courses: CSE 310 CSE 320 CSE 340</pre>

Task 7

Design the required class/es so that the following output is generated. Read the following description:

1. You may assume that to board a bus, a student must have the bus pass, and his/her destination must match the route of the bus.
2. Additionally, the default maximum capacity of the bus is 2.

Driver Code	Output
<pre> public class BracuStudentTester { public static void main(String[] args) { BracuStudent st1 = new BracuStudent("Afif", "Mirpur"); System.out.println("1====="); BracuStudent st2 = new BracuStudent("Shanto", "Motijheel"); BracuStudent st3 = new BracuStudent("Taskin", "Mirpur"); st1.showDetails(); st2.showDetails(); System.out.println("2====="); st3.showDetails(); System.out.println("3====="); BracuBus bus1 = new BracuBus("Mirpur"); BracuBus bus2 = new BracuBus("Azimpur", 5); bus1.showDetails(); bus2.showDetails(); System.out.println("4====="); st2.getPass(); st3.getPass(); System.out.println("5====="); st2.showDetails(); st3.showDetails(); System.out.println("6====="); bus1.board(); System.out.println("7====="); bus1.board(st1, st2); System.out.println("8====="); st1.getPass(); st2.updateHome("Mirpur"); st1.showDetails(); st2.showDetails(); System.out.println("9====="); bus1.board(st1); bus1.board(st2, st3); System.out.println("10====="); bus1.showDetails(); } } </pre>	<pre> 1===== Student Name: Afif Lives in Mirpur Have Bus Pass? false Student Name: Shanto Lives in Motijheel Have Bus Pass? false 2===== Student Name: Taskin Lives in Mirpur Have Bus Pass? false 3===== Bus Route: Mirpur Passenger Count: 0 (Max: 2) Passengers on Board: Bus Route: Azimpur Passenger Count: 0 (Max: 5) Passengers on Board: 4===== 5===== Student Name: Shanto Lives in Motijheel Have Bus Pass? true Student Name: Taskin Lives in Mirpur Have Bus Pass? true 6===== No passengers 7===== You don't have a bus pass! You got on the wrong bus! 8===== Student Name: Afif Lives in Mirpur Have Bus Pass? true Student Name: Shanto Lives in Mirpur Have Bus Pass? true 9===== Afif boarded the bus. Shanto boarded the bus. Bus is full! 10===== Bus Route: Mirpur </pre>

Passenger Count: 2 (Max: 2) Passengers on Board: Afif Shanto
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Task 8

Design the **Student** and the **Usis** class so that the following output is produced.

Note:

- A student's email, password, and login status are null by default while creating an object of the Student class.
- Your code should satisfy the conditions mentioned in the output only.
- Usis class will have two instance variables: totalAdvisee and an array of Student type to store the student object. The array will be updated inside the advising() method only when the advising is successful.
- Usis can take at most 5 advisees.

Driver Code	Expected Output
<pre> public class UsisTester { public static void main(String[] args) { Student rakib = new Student("Rakib", 12301455, "CSE"); Student roy = new Student("Roy", 12501345, "CS"); System.out.println("1*****"); Usis usisObj = new Usis(); System.out.println("2*****"); usisObj.login(rakib); System.out.println("3*****"); usisObj.advising(rakib); System.out.println("4*****"); rakib.email = "rakib@hotmail.com"; rakib.password = "1234"; System.out.println("5*****"); usisObj.login(rakib); System.out.println("6*****"); usisObj.advising(rakib); System.out.println("7*****"); usisObj.advising(rakib, "CSE110", "PHY111", "MAT110", "CSE260"); System.out.println("8*****"); usisObj.advising(rakib, "CSE110", "PHY111", "MAT110"); System.out.println("9*****"); usisObj.allAdviseeInfo(); System.out.println("10*****"); roy.email = "roy@hotmail.com"; roy.password = "abcd"; usisObj.login(roy); System.out.println("11*****"); usisObj.advising(roy, "CSE110", "ENG101", "PHY112"); System.out.println("12*****"); </pre>	<pre> Student object is created Student object is created 1***** Usis is ready to use! 2***** Email and password need to be set. 3***** Please login to advise courses! 4***** 5***** Login successful 6***** You haven't selected any courses. 7***** You need special approval to take more than 3 courses. 8***** Advising successful! 9***** Total Advisee: 1 Name: Rakib ID: 12301455 Department: CSE Advised Courses: CSE110 PHY111 MAT110 ===== 10***** Login successful 11***** Advising successful! 12***** Total Advisee: 2 Name: Rakib ID: 12301455 Department: CSE Advised Courses: CSE110 PHY111 MAT110 ===== </pre>


```

    usisObj.allAdviseeInfo();
  }
}

```

Name: Roy ID: 12501345
 Department: CS
 Advised Courses:
 CSE110 ENG101 PHY112
 =====

Task 9

1	public class A{
2	public int temp = 3, sum = 9, y = 4, x = 0;
3	public A(){
4	int sum = 7;
5	y = temp - 5;
6	sum = temp + 2;
7	temp-=2;
8	this.x = sum + temp + y;
9	}
10	public A(int y, int temp){
11	y = temp - 1 + x;
12	sum = temp + 2 -x;
13	temp-=2;
14	}
15	public void methodA(int m, int [] n){
16	int x = 0;
17	y = y + m + methodB(x,m) ;
18	x = this.x + 2 + (++n[0]);
19	sum = sum + x + y;
20	n[0] = sum + 2;
21	System.out.println(n[0] + " " + y+ " " + sum) ;
22	}
23	public int methodB(int m, int n){
24	int [] y = {0};
25	this.y = y[0] + this.y + m;
26	x = this.y + 2 + temp - n;
27	sum = x + y[0] + this.sum;
28	System.out.println(y[0]+ " "+ temp + " " + sum) ;
29	return y[0];
30	}
31	}

Driver Code	Output		
<pre>public class Tester9 { public static void main(String args[]){ int[] x = {35}; A a1 = new A(); A a2 = new A(-5,-7); a1.methodA(1, x); a2.methodA(1, x); } }</pre>			

Task 10

1	public class msgClass{
2	public int content;
3	}
4	class FinalT5A{
5	public int sum = 2, y = 1, x = 1;
6	public void methodA(){
7	int x=6, y =0;
8	msgClass myMsg = new msgClass();
9	myMsg.content = this.x;
10	x = x + myMsg.content;
11	this.y = this.y + methodB(myMsg, myMsg.content);
12	System.out.println(x + " " + this.y+ " " + sum);
13	y = this.y/2 + this.x;
14	x = y + sum/2;
15	sum = x + y + myMsg.content;
16	System.out.println(x + " " + y+ " " + sum);
17	}
18	public int methodB(msgClass mg2, int mg1){
19	int x = 0;
20	y = y + mg2.content;
21	mg2.content = y + mg1;
22	x = this.x + 3 + mg1;
23	sum = sum + x + y;
24	System.out.println(this.x + " " + this.y+ " " + sum);
25	mg2.content = sum - mg1 ;
26	return sum;
27	}
28	}

DRIVER CODE	OUTPUTS		
<pre> public class Tester10{ public static void main(String args []){ FinalT5A fT5A = new FinalT5A(); fT5A.methodA(); } } </pre>			

Task 11

1	public class TracingX {
2	public int x, y = 1;
3	public int metA(int y){
4	y += x + 3;
5	int temp = y + this.y;
6	if (temp % 2 == 0){
7	return temp;
8	}
9	TracingX t = new TracingX();
10	t.y = this.x - (++x) + t.x;
11	this.y = y + t.metA(t.x);
12	System.out.println(x + " " + y + " " + temp);
13	return temp + this.y;
14	}
15	}

Driver code:

```
public class TesterX {  
    public static void main(String[] args) {  
        TracingX t1 = new TracingX();  
        t1.y = t1.x = 5;  
        TracingX t2 = new TracingX();  
        t2.x = t1.metA(2);  
        t2.y = t2.metA(4);  
        System.out.println(t1.y + t1.x + " " + t2.x + " " + t2.y);  
    }  
}
```

Output:

Ungraded Tasks (Optional)

(You don't have to submit the ungraded tasks)

Task 1

Design the **Parcel** class in such a way that it produces the following output.

NOTE: For the method **calcFee()**, if the delivery location is **Dhanmondi**, then the location charge will be 50 taka or else it'll be free. Also, while calculating total fee, if the product weight is 0 the total_fee would also be 0.

Formula: fee = (weight * 20) + location_charge (if any)

Driver Code	Expected Output
<pre>public class ParcelDriver { public static void main(String[] args){ Parcel p1 = new Parcel(); p1.printDetails(); p1.name = "Spongebob"; p1.printDetails(); System.out.println("1*****"); Parcel p2 = new Parcel("Bob the Builder"); p2.weight = 15; p2.calcFee("Gulshan"); p2.printDetails(); System.out.println("2*****"); p2.addWeight(25); p2.calcFee("Banani"); p2.printDetails(); System.out.println("3*****"); Parcel p3 = new Parcel("Dora the Explorer", 10); p3.addWeight(15); p3.calcFee("Dhanmondi"); p3.printDetails(); } }</pre>	<pre>Set name first Name: Spongebob Total Weight: 0 Total Fee: 0.0 1***** Name: Bob the Builder Total Weight: 15 Total Fee: 300.0 2***** Updated Weight: 40 Name: Bob the Builder Total Weight: 40 Total Fee: 800.0 3***** Updated Weight: 25 Name: Dora the Explorer Total Weight: 25 Total Fee: 550.0</pre>

Task 2

Design the program to get the output as shown.

Hints:

- Create an array in the Team class to store the player's object
- Use constructor overloading technique for Team class

```
public class TeamTester {  
    public static void main(String[] args) {  
        Team b = new Team();  
        b.updateName("Bangladesh");  
        Player mashrafi = new Player("Mashrafi", 42, 100);  
        b.addPlayer(mashrafi);  
        Player tamim = new Player("Tamim", 35, 70);  
        b.addPlayer(tamim);  
        b.printDetail();  
        System.out.println("=====");  
        Team a = new Team("Australia");  
        Player ponting = new Player("Ponting", 50, 300);  
        a.addPlayer(ponting);  
        Player lee = new Player("Lee", 49, 200);  
        a.addPlayer(lee);  
        a.printDetail();  
    }  
}
```

Output:

```
Team: Bangladesh  
List of players:  
Name: Mashrafi  
Age: 42, Total Matches: 100  
Name: Tamim  
Age: 35, Total Matches: 70  
=====
```

Team: Australia
List of players:
Name: Ponting
Age: 50, Total Matches: 300
Name: Lee
Age: 49, Total Matches: 200