



Inspiring Excellence

**Course Title: Programming Language II**

**Course Code: CSE 111**

**Lab Assignment no: 6**

## Task 1

Write a **Student** class to get the desired output as shown below.

1. Create a Student class and a class variable called ID initialized with 0.
2. Create a constructor that takes 4 parameters: name, department, age and cgpa.
3. Write a **showDetails()** method to represent all the details of a Student
4. Write a *class method* **from\_String()** that takes 1 parameter which includes name, department, age and cgpa all four attributes in string.

<p><b>#Write your code here for subtasks 1-6.</b></p> <pre>s1 = Student("Samin", "CSE", 21, 3.91) s1.showDetails() print("-----") s2 = Student("Fahim", "ECE", 21, 3.85) s2.showDetails() print("-----") s3 = Student("Tahura", "EEE", 22, 3.01) s3.showDetails() print("-----") s4 = Student.from_String("Sumaiya-BBA-23-3.96") s4.showDetails()</pre> <p><b># Write the answer of subtask 5 here</b></p> <p><b># Write the answer of subtask 6 here</b></p> <p><b>#You are not allowed to change the code above</b></p>	<p><b>OUTPUT</b></p> <pre>ID: 1 Name: Samin Department: CSE Age: 21 CGPA: 3.91 ----- ID: 2 Name: Fahim Department: ECE Age: 21 CGPA: 3.85 ----- ID: 3 Name: Tahura Department: EEE Age: 22 CGPA: 3.01 ----- ID: 4 Name: Sumaiya Department: BBA Age: 23 CGPA: 3.96</pre>
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5. Explain the difference between a class variable and an instance variable. Print your answer at the very end of your code.
6. What is the difference between an instance method and class method? Print your answer at the very end

## Task 2

Write the **Assassin** class so that the given code provides the expected output.

1. Create **Assassin** class
2. Create 1 class variable
3. Create 1 class method titled 'failureRate()'
4. Create 1 class method titled 'failurePercentage()'
5. Maximum success\_rate is 100

[You are not allowed to change the code below]

*# Write your code here*

```
john_wick = Assassin('John Wick', 100)
john_wick.printDetails()
print('=====')
nagisa = Assassin.failureRate("Nagisa", 20)
nagisa.printDetails()
print('=====')
akabane = Assassin.failurePercentage("Akabane", "10%")
akabane.printDetails()
```

*Output:*

Name: John Wick

Success rate: 100%

Total number of Assassin: 1

=====

Name: Nagisa

Success rate: 80%

Total number of Assassin: 2

=====

Name: Akabane

Success rate: 90%

Total number of Assassin: 3

### Task 3

Implement the design of the **Passenger** class so that the following output is produced:

The assumption is Bus base-fare is 450 taka. A passenger can carry upto 20 kg for free. 50 taka will be added if bag weight is between 21 and 50 kg. 100 taka will be added if bag weight is greater than 50 kg.

[You are not allowed to change the code below]

<pre># Write your code here  print("Total Passenger:", Passenger.count) p1 = Passenger("Jack") p1.set_bag_weight(90) p2 = Passenger("Carol") p2.set_bag_weight(10) p3 = Passenger("Mike") p3.set_bag_weight(25) print("=====") p1.printDetail() print("=====") p2.printDetail() print("=====") p3.printDetail() print("=====") print("Total Passenger:", Passenger.count)</pre>	<p><b>Output:</b></p> <pre>Total Passenger: 0 ===== Name: Jack Bus Fare: 550 taka ===== Name: Carol Bus Fare: 450 taka ===== Name: Mike Bus Fare: 500 taka ===== Total Passenger: 3</pre>
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## Task 4

Implement the design of the **Travel** class so that the following output is produced:

[You are not allowed to change the code below]

### **# Write your code here**

```
print("No. of Traveller =", Travel.count)
print("=====")
t1 = Travel("Dhaka","India")
print(t1.display_travel_info())
print("=====")
t2 = Travel("Kuala Lumpur","Dhaka")
t2.set_time(23)
print(t2.display_travel_info())
print("=====")
t3 = Travel("Dhaka","New_Zealand")
t3.set_time(15)
t3.set_destination("Germany")
print(t3.display_travel_info())
print("=====")
t4 = Travel("Dhaka","India")
t4.set_time(9)
t4.set_source("Malaysia")
t4.set_destination("Canada")
print(t4.display_travel_info())
print("=====")
print("No. of Traveller =", Travel.count)
```

### **Output**

```
No. of Traveller = 0
=====
Source: Dhaka
Destination:India
Flight Time:1:00
=====
Source: Kuala Lumpur
Destination:Dhaka
Flight Time:23:00
=====
Source: Dhaka
Destination:Germany
Flight Time:15:00
=====
Source: Malaysia
Destination:Canada
Flight Time:9:00
=====
No of Traveller = 4
```

## Task 5

Create an **Employee** Class that will have

- Two instance variable: name and workingPeriod
- A class method named employeeByJoiningYear():
  - To create an Employee object by joining year for calculating the working period
  - It will have two Parameter name and year
- A **static method** experienceCheck() to check if an Employee is experienced or not
  - It will take working period and gender as parameter
  - If an employee's working period is less than 3, he or she is not experienced

[You are not allowed to change the code below]

<b># Write your code here</b> employee1 = Employee('Dororo', 3) employee2 = Employee.employeeByJoiningYear('Harry', 2016) print(employee1.workingPeriod) print(employee2.workingPeriod) print(employee1.name) print(employee2.name) print(Employee.experienceCheck(2, "male")) print(Employee.experienceCheck(3, "female"))	<b>Output</b> 3 7 Dororo Harry He is not experienced She is experienced
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## Task 6

Implement the design of the **Laptop** class so that the following output is produced

[You are not allowed to change the code below]

<b># Write your code here</b> lenovo = Laptop("Lenovo", 5) dell = Laptop("Dell", 7) print(lenovo.name, lenovo.count) print(dell.name, dell.count) print("Total number of Laptops", Laptop.laptopCount) Laptop.advantage() Laptop.resetCount() print("Total number of Laptops", Laptop.laptopCount)	<b>Output</b> Lenovo 5 Dell 7 Total number of Laptops 12 Laptops are portable Total number of Laptops 0
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## Task 7

Design **Cat** class for the following code to get the output as shown.

You have already solved this problem in assignment 4 using constructor overloading. Now, solve this again but this time DO NOT USE CONSTRUCTOR OVERLOADING.

*Hint: You will have to use classmethods.*

**[You are not allowed to change the code below]**

*# Write your code here*

```
print("Total number of cats:", Cat.Number_of_cats)
c1 = Cat.no_parameter()
c2 = Cat.first_parameter("Black")
c3 = Cat("Brown", "jumping")
c4 = Cat("Red", "purring")
c5 = Cat.second_parameter("playing")
print("=====")
c1.printCat()
c2.printCat()
c3.printCat()
c4.printCat()
c5.printCat()
c1.changeColor("Blue")
c3.changeColor("Purple")
c1.printCat()
c3.printCat()
print("=====")
print("Total number of cats:", Cat.Number_of_cats)
```

**Output:**

```
Total number of cats: 0
=====
White cat is sitting
Black cat is sitting
Brown cat is jumping
Red cat is purring
Grey cat is playing
Blue cat is sitting
Purple cat is jumping
=====
Total number of cats: 5
```

## Task 8

Write a **Cylinder** class to get the desired output as shown below.

1. You will have to create a Cylinder class.
2. You will have to create 2 class variables.
3. Create a required constructor.
4. Write 2 *class methods*:
  - One that takes the height first and then the radius and then swaps
  - One that takes a string where the radius and height values are separated with a hyphen.

Write 2 *static methods*:

- One that calculates the area of a whole cylinder (*formula:  $2\pi r^2 + 2\pi rh$* )
- Another that calculates the volume of a cylinder (*formula:  $\pi r^2 h$* )

*\*\*Observe the output values carefully to understand how the radius and height values are changing.*

**[You are not allowed to change the code below]**

*# Write your code here*

```
c1 = Cylinder(0,0)
Cylinder.area(c1.radius,c1.height)
Cylinder.volume(c1.radius,c1.height)
print("=====")
c2 = Cylinder.swap(8,3)
c2.area(c2.radius,c2.height)
c2.volume(c2.radius,c2.height)
print("=====")
c3 = Cylinder.changeFormat("7-13")
c3.area(c3.radius,c3.height)
c3.volume(c3.radius,c3.height)
print("=====")
Cylinder(0.3,5.56).area(Cylinder.radius,Cylinder.height)
print("=====")
Cylinder(3,5).volume(Cylinder.radius,Cylinder.height)
```

**Output:**

```
Default radius=5 and height=18.
Updated: radius=0 and height=0.
Area: 0.0
Volume: 0.0
=====
Default radius=0 and height=0.
Updated: radius=3 and height=8.
Area: 207.34511513692635
Volume: 226.1946710584651
=====
Default radius=3 and height=8.
Updated: radius=7.0 and height=13.0.
Area: 879.645943005142
Volume: 2001.1945203366981
=====
Default radius=7.0 and height=13.0.
Updated: radius=0.3 and height=5.56.
Area: 11.045839770021713
=====
Default radius=0.3 and height=5.56.
Updated: radius=3 and height=5.
Volume: 141.3716694115407
```



## Task 9

Write the **Student** class so that the given code provides the expected output.

1. Create **Student** class
2. Create 3 class variable
3. Create 1 class method for object creation
4. Create 1 class method for printing

[You are not allowed to change the code below]

*# Write your code here*

```
Student.printDetails()
print('#####')

mikasa = Student('Mikasa Ackerman', "CSE")
mikasa.individualDetail()
print('-----')
Student.printDetails()

print('=====')

harry = Student.createStudent('Harry Potter', "Defence Against Dark
Arts", "Hogwarts School")
harry.individualDetail()
print('-----')
Student.printDetails()

print('=====')

levi = Student.createStudent("Levi Ackerman", "CSE")
levi.individualDetail()
print('-----')
Student.printDetails()
```

**Output:**

```
Total Student(s): 0
BRAC University Student(s): 0
Other Institution Student(s): 0
#####
Name: Mikasa Ackerman
Department: CSE
Institution: BRAC University
-----
Total Student(s): 1
BRAC University Student(s): 1
Other Institution Student(s): 0
=====
Name: Harry Potter
Department: Defence Against Dark Arts
Institution: Hogwarts School
-----
Total Student(s): 2
BRAC University Student(s): 1
Other Institution Student(s): 1
=====
Name: Levi Ackerman
Department: CSE
Institution: BRAC University
-----
Total Student(s): 3
BRAC University Student(s): 2
Other Institution Student(s): 1
```

## Task 10

Write the **SultansDine** class so that the given code provides the expected output.

[You are not allowed to change the code below]

<pre># Write your code here  SultansDine.details() print('#####') dhanmondi = SultansDine('Dhanmondi') dhanmondi.sellQuantity(25) dhanmondi.branchInformation() print('-----') SultansDine.details()  print('=====')  baily_road = SultansDine('Baily Road') baily_road.sellQuantity(15) baily_road.branchInformation() print('-----') SultansDine.details()  print('=====')  gulshan = SultansDine('Gulshan') gulshan.sellQuantity(9) gulshan.branchInformation() print('-----') SultansDine.details()</pre>	<p><b>Output:</b></p> <p>Total Number of branch(s): 0 Total Sell: 0 Taka ##### Branch Name: Dhanmondi Branch Sell: 10000 Taka ----- Total Number of branch(s): 1 Total Sell: 10000 Taka Branch Name: Dhanmondi, Branch Sell: 10000 Taka Branch consists of total sell's: 100.00% =====</p> <p>Branch Name: Baily Road Branch Sell: 5250 Taka ----- Total Number of branch(s): 2 Total Sell: 15250 Taka Branch Name: Dhanmondi, Branch Sell: 10000 Taka Branch consists of total sell's: 65.57% Branch Name: Baily Road, Branch Sell: 5250 Taka Branch consists of total sell's: 34.43% =====</p> <p>Branch Name: Gulshan Branch Sell: 2700 Taka ----- Total Number of branch(s): 3 Total Sell: 17950 Taka Branch Name: Dhanmondi, Branch Sell: 10000 Taka Branch consists of total sell's: 55.71% Branch Name: Baily Road, Branch Sell: 5250 Taka Branch consists of total sell's: 29.25% Branch Name: Gulshan, Branch Sell: 2700 Taka Branch consists of total sell's: 15.04%</p>
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### Subtaks:

1. Create **SultansDine** class
2. Create 2 class variable and 1 class list
3. Create 1 class method
4. Calculation of branch sell is given below
  - a. If sellQuantity < 10:

- i.  $\text{Branch\_sell} = \text{quantity} * 300$
  - b. Else if  $\text{sellQuantity} < 20$ :
    - i.  $\text{Branch\_sell} = \text{quantity} * 350$
  - c. Else
    - i.  $\text{Branch\_sell} = \text{quantity} * 400$
5. Calculation of branch's sell percentage =  $(\text{branch's sell} / \text{total sell}) * 100$

## Task 11

1	<code>class Puzzle:</code>
2	<code>    x = 0</code>
3	<code>    def methodA(self):</code>
4	<code>        Puzzle.x = 5</code>
5	<code>        z = Puzzle.x + self.methodB(Puzzle.x)</code>
6	<code>        print(Puzzle.x, z)</code>
7	<code>        z = self.methodB(z + 2) + Puzzle.x</code>
8	<code>        print(Puzzle.x, z)</code>
9	<code>        self.methodB(Puzzle.x, z)</code>
10	<code>        print(Puzzle.x, z)</code>
11	<code>    def methodB(self, *args):</code>
12	<code>        if len(args) == 1:</code>
13	<code>            y = args[0]</code>
14	<code>            Puzzle.x = y + Puzzle.x</code>
15	<code>            print(Puzzle.x, y)</code>
16	<code>            return Puzzle.x + 3</code>
17	<code>        else:</code>
18	<code>            z, x = args</code>
19	<code>            z = z + 1</code>
20	<code>            x = x + 1</code>
21	<code>            print(z, x)</code>

`p = Puzzle()`

Output-1

Output-2

p.methodA()		
p.methodA()		
p = Puzzle()		
p.methodA()		
p.methodB(7)		

## Task 12

1	<code>class FinalT6A:</code>
2	<code>    temp = 3</code>
3	
4	<code>    def __init__(self, x, p):</code>
5	<code>        self.sum, self.y = 0, 2</code>
6	<code>        FinalT6A.temp += 3</code>
7	<code>        self.y = self.temp - p</code>
8	<code>        self.sum = self.temp + x</code>
9	<code>        print(x, self.y, self.sum)</code>
10	
11	<code>    def methodA(self):</code>
12	<code>        x, y = 0, 0</code>
13	<code>        y = y + self.y</code>
14	<code>        x = self.y + 2 + self.temp</code>
15	<code>        self.sum = x + y + self.methodB(self.temp, y)</code>
16	<code>        print(x, y, self.sum)</code>
17	
18	<code>    def methodB(self, temp, n):</code>

19	<code>x = 0</code>
20	<code>FinalT6A.temp += 1</code>
21	<code>self.y = self.y + (FinalT6A.temp)</code>
22	<code>FinalT6A.temp -= 1</code>
23	<code>x = x + 2 + n</code>
24	<code>self.sum = self.sum + x + self.y</code>
25	<code>print(x, self.y, self.sum)</code>
26	<code>return self.sum</code>

<pre>q1 = FinalT6A(2,1) q1.methodA() q1.methodA()</pre>	x	y	sum

## Task 13

1	<code>class A:</code>
2	<code>    temp = 4</code>
3	<code>    def __init__(self):</code>
4	<code>        self.y = self.temp - 2</code>
5	<code>        self.sum = self.temp + 1</code>
6	<code>    A.temp -= 2</code>
7	<code>    self.methodA(3, 4)</code>
8	<code>    def methodA(self, m, n):</code>
9	<code>        x = 0</code>
10	<code>        self.y = self.y + m + (self.temp)</code>
11	<code>    A.temp += 1</code>
12	<code>        x = x + 1 + n</code>
13	<code>        self.sum = self.sum + x + self.y</code>
14	<code>        print(x, self.y, self.sum)</code>
15	
16	<code>class B:</code>
17	<code>    x = 0</code>
18	<code>    def __init__(self, b = None):</code>
19	<code>        self.y, self.temp, self.sum = 5, -5, 2</code>
20	
21	<code>        if b == None:</code>
22	<code>            self.y = self.temp + 3</code>

23	<code>self.sum = 3 + self.temp + 2</code>
24	<code>self.temp -= 2</code>
25	<code>else:</code>
26	<code>self.sum = b.sum</code>
27	<code>B.x = b.x</code>
28	<code>b.methodB(2, 3)</code>
29	<code>def methodA(self, m, n):</code>
30	<code>    x = 2</code>
31	<code>    self.y = self.y + m + (self.temp)</code>
32	<code>    self.temp += 1</code>
33	<code>    x = x + 5 + n</code>
34	<code>    self.sum = self.sum + x + self.y</code>
35	<code>    print(x, self.y, self.sum)</code>
36	<code>def methodB(self, m, n):</code>
37	<code>    y = 0</code>
38	<code>    y = y + self.y</code>
39	<code>    B.x = self.y + 2 + self.temp</code>
40	<code>    self.methodA(self.x, y)</code>
41	<code>    self.sum = self.x + y + self.sum</code>
42	<code>    print(self.x, y, self.sum)</code>

```

a1 = A()
b1 = B()
b2 = B(b1)
b1.methodA(1, 2)
b2.methodB(3, 2)

```



## Task 14

1	<code>class msgClass:</code>
2	<code>    def __init__(self):</code>
3	<code>        self.content = 0</code>
4	
5	<code>class Quiz3:</code>
6	<code>    x = 0</code>
7	<code>    def __init__(self, k = None):</code>
8	<code>        self.sum, self.y = 0, 0</code>
9	<code>        if k is None:</code>
10	<code>            self.sum = 5</code>
11	<code>            Quiz3.x = 2</code>
12	<code>            self.y = 2</code>
13	<code>        else:</code>
14	<code>            self.sum = self.sum + k</code>
15	<code>            self.y = 3</code>
16	<code>            Quiz3.x += 2</code>
17	<code>    def methodA(self):</code>
18	<code>        x = 1</code>
19	<code>        y = 1</code>
20	<code>        msg = [None]</code>
21	<code>        myMsg = msgClass()</code>
22	<code>        myMsg.content = Quiz3.x</code>

23	<code>msg[0] = myMsg</code>
24	<code>msg[0].content = self.y + myMsg.content</code>
25	<code>self.y = self.y + self.methodB(msg[0])</code>
26	<code>y = self.methodB(msg[0]) + self.y</code>
27	<code>x = y + self.methodB(msg, msg[0])</code>
28	<code>self.sum = x + y + msg[0].content</code>
29	<code>print(x, y, self.sum)</code>
30	<code>def methodB(self, *args):</code>
31	<code>    if len(args) == 2:</code>
32	<code>        mg2, mg1 = args</code>
33	<code>        x = 2</code>
34	<code>        self.y = self.y + mg2[0].content</code>
35	<code>        mg2[0].content = self.y + mg1.content</code>
36	<code>        x = x + 2 + mg1.content</code>
37	<code>        self.sum = self.sum + x + self.y</code>
38	<code>        mg1.content = self.sum - mg2[0].content</code>
39	<code>        print(Quiz3.x, self.y, self.sum)</code>
40	<code>        return self.sum</code>
41	
42	<code>    elif len(args) == 1:</code>
43	<code>        mg1, = args</code>
44	<code>        x = 1</code>
45	<code>        y = 2</code>
46	<code>        y = self.sum + mg1.content</code>

47	<code>self.y = y + msg1.content</code>
48	<code>x = Quiz3.x + 5 + msg1.content</code>
49	<code>self.sum = self.sum + x + y</code>
50	<code>Quiz3.x = msg1.content + x + 3</code>
51	<code>print(x, y, self.sum)</code>
52	<code>return y</code>

<pre> a1 = Quiz3() a2 = Quiz3(5) msg = msgClass() a1.methodA() a2.methodB(msg) </pre>	x	y	sum