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.

#Write your code here for subtasks 1-6.	OUTPUT
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() **# Write the answer of subtask 5 here** **# Write the answer of subtask 6 here** **#You are not allowed to change the code above**	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

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*	*Output:*

``python
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()
``
	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]

# *Write your code here*	Output:
`print("Total Passenger:", Passenger.count)`	Total Passenger: 0
`p1 = Passenger("Jack")`	========================
`p1.set_bag_weight(90)`	Name: Jack
`p2 = Passenger("Carol")`	Bus Fare: 550 taka
`p2.set_bag_weight(10)`	========================
`p3 = Passenger("Mike")`	Name: Carol
`p3.set_bag_weight(25)`	Bus Fare: 450 taka
`print("========================")`	========================
`p1.printDetail()`	Name: Mike
`print("========================")`	Bus Fare: 500 taka
`p2.printDetail()`	========================
`print("========================")`	Total Passenger: 3
`p3.printDetail()`	
`print("========================")`	
`print("Total Passenger:", Passenger.count)`	

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	Output
print("No. of Traveller =", Travel.count) print("======================") t1 = Travel("Dhaka","India") print(t1.display_travel_info()) print("======================") t2 = Travel("Kuala Lampur","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)	No. of Traveller = 0 ====================== Source: Dhaka Destination:India Flight Time:1:00 ====================== Source: Kuala Lampur 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]

# Write your code here	Output
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"))	3 7 Dororo Harry He is not experienced She is experienced

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]

# Write your code here	Output
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)	Lenovo 5 Dell 7 Total number of Laptops 12 Laptops are portable Total number of Laptops 0

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*	Output:

```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)```
	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]

```python
# 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]

# *Write your code here*	*Output:*
| ```python
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()
``` | Total Number of branch(s): 0<br>Total Sell: 0 Taka<br>################################<br>Branch Name: Dhanmondi<br>Branch Sell: 10000 Taka<br>----------------------------------------<br>Total Number of branch(s): 1<br>Total Sell: 10000 Taka<br>Branch Name: Dhanmondi, Branch Sell: 10000 Taka<br>Branch consists of total sell's: 100.00%<br>==============================<br>Branch Name: Baily Road<br>Branch Sell: 5250 Taka<br>----------------------------------------<br>Total Number of branch(s): 2<br>Total Sell: 15250 Taka<br>Branch Name: Dhanmondi, Branch Sell: 10000 Taka<br>Branch consists of total sell's: 65.57%<br>Branch Name: Baily Road, Branch Sell: 5250 Taka<br>Branch consists of total sell's: 34.43%<br>==============================<br>Branch Name: Gulshan<br>Branch Sell: 2700 Taka<br>----------------------------------------<br>Total Number of branch(s): 3<br>Total Sell: 17950 Taka<br>Branch Name: Dhanmondi, Branch Sell: 10000 Taka<br>Branch consists of total sell's: 55.71%<br>Branch Name: Baily Road, Branch Sell: 5250 Taka<br>Branch consists of total sell's: 29.25%<br>Branch Name: Gulshan, Branch Sell: 2700 Taka<br>Branch consists of total sell's: 15.04% |

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. Branch_sell = quantity * 300
  b. Else if sellQuantity < 20:
    i. Branch_sell = quantity * 350
  c. Else
    i. Branch_sell = quantity * 400
5. Calculation of branch's sell percentage = (branch's sell / total sell) * 100

Task 11

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

p = Puzzle()	Output-1	Output-2

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


Task 12

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

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

```
q1 = FinalT6A(2,1)
q1.methodA()
q1.methodA()
```

x	y	sum

Task 13

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

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

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

Task 14

```python
class msgClass:
    def __init__(self):
        self.content = 0

class Quiz3:
    x = 0
    def __init__(self, k = None):
        self.sum, self.y = 0, 0
        if k is None:
            self.sum = 5
            Quiz3.x = 2
            self.y = 2
        else:
            self.sum = self.sum + k
            self.y = 3
            Quiz3.x += 2
    def methodA(self):
        x = 1
        y = 1
        msg = [None]
        myMsg = msgClass()
        myMsg.content = Quiz3.x
```

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

47	`self.y = y + mg1.content`
48	`x = Quiz3.x + 5 + mg1.content`
49	`self.sum = self.sum + x + y`
50	`Quiz3.x = mg1.content + x + 3`
51	`print(x, y, self.sum)`
52	`return y`

	x	y	sum
`a1 = Quiz3()`			
`a2 = Quiz3(5)`			
`msg = msgClass()`			
`a1.methodA()`			
`a2.methodB(msg)`			

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