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 **get_details()** 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. s1 = Student("Samin", "CSE", 21, 3.91) s1.get_details() print("----------") s2 = Student("Fahim", "ECE", 21, 3.85) s2.get_details() print("----------") s3 = Student("Tahura", "EEE", 22, 3.01) s3.get_details() print("----------") s4 = Student.from_String("Sumaiya-BBA-23-3.96") s4.get_details() # ***Write the answer of subtask 5 here*** # ***Write the answer of subtask 6 here*** **#You are not allowed to change the code above**	**OUTPUT** 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 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]

# 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)	**Output:** Total Passenger: 0 ========== Name: Jack Bus Fare: 550 taka ========== Name: Carol Bus Fare: 450 taka ========== Name: Mike Bus Fare: 500 taka ========== Total Passenger: 3

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 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"))	***Output*** 3 6 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 	
 	
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)
	Output
	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]

# 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:***
SultansDine.details() print('##########################') dhanmodi = SultansDine('Dhanmondi') dhanmodi.sellQuantity(25) dhanmodi.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 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% ========== 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% ========== 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%

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

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

Output-1	Output-2

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

```
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
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)
```

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

Output:

x	y	sum

Task 14

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

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

x	y	sum