Inspiring Excellence

Course Title: Programming Language II
Course Code: CSE111
Lab Assignment no: 8

Task - 1

Let's Play with **Numbers**!!!

Write the **ComplexNumber** class so that the following code generates the output below.

```
class RealNumber:

    def __init__(self, r=0):
        self.__realValue = r
    def getRealValue(self):
        return self.__realValue
    def setRealValue(self, r):
        self.__realValue = r
    def __str__(self):
        return 'RealPart: '+str(self.getRealValue())


cn1 = ComplexNumber()
print(cn1)
print('---------')
cn2 = ComplexNumber(5,7)
print(cn2)
```

OUTPUT:

RealPart: 1.0
ImaginaryPart: 1.0

RealPart: 5.0
ImaginaryPart: 7.0

Task - 2

Write the **ComplexNumber** class so that the following code generates the output below.

```
class RealNumber:
    def __init__(self, number=0):
        self.number = number
    def __add__(self, anotherRealNumber):
        return self.number + anotherRealNumber.number
    def __sub__(self, anotherRealNumber):
        return self.number - anotherRealNumber.number
    def __str__(self):
        return str(self.number)

r1 = RealNumber(3)
r2 = RealNumber(5)
print(r1+r2)
cn1 = ComplexNumber(2, 1)
print(cn1)
cn2 = ComplexNumber(r1, 5)
print(cn2)
cn3 = cn1 + cn2
print(cn3)
cn4 = cn1 - cn2
print(cn4)
```

OUTPUT:

```
8
2 + 1i
3 + 5i
5 + 6i
-1 - 4i
```

Task - 3

Write the **CheckingAccount** class so that the following code generates the output below:

```
class Account:
    def __init__(self, balance):
        self._balance = balance

    def getBalance(self):
        return self._balance



print('Number of Checking Accounts: ', CheckingAccount.numberOfAccount)
print(CheckingAccount())
print(CheckingAccount(100.00))
print(CheckingAccount(200.00))
print('Number of Checking Accounts: ', CheckingAccount.numberOfAccount)
```

OUTPUT:

Number of Checking Accounts: 0
Account Balance: 0.0
Account Balance: 100.00
Account Balance: 200.00
Number of Checking Accounts: 3

Task - 4

Write the **Mango** and the **Jackfruit** classes so that the following code generates the output below:

```
class Fruit:
    def __init__(self, formalin=False, name=''):
        self.__formalin = formalin
        self.name = name

    def getName(self):
        return self.name

    def hasFormalin(self):
        return self.__formalin

class testFruit:
    def test(self, f):
        print('----Printing Detail----')
        if f.hasFormalin():
            print('Do not eat the',f.getName(),'.')
            print(f)
        else:
            print('Eat the',f.getName(),'.')
            print(f)

m = Mango()
j = Jackfruit()
t1 = testFruit()
t1.test(m)
t1.test(j)
```

OUTPUT:

```
----Printing Detail-----
Do not eat the Mango.
Mangos are bad for you
----Printing Detail-----
Eat the Jackfruit.
Jackfruits are good for you
```

Task - 5

Write the **ScienceExam** class so that the following code generates the output below:

```
class Exam:
    def __init__(self,marks):
        self.marks = marks
        self.time = 60

    def examSyllabus(self):
        return "Maths , English"
    def examParts(self):
        return "Part 1 - Maths\nPart 2 - English\n"


engineering = ScienceExam(100,90,"Physics","HigherMaths")
print(engineering)
print('---------------------------------')
print(engineering.examSyllabus())
print(engineering.examParts())
print('=================================')
architecture =
ScienceExam(100,120,"Physics","HigherMaths","Drawing")
print(architecture)
print('---------------------------------')
print(architecture.examSyllabus())
print(architecture.examParts())
```

OUTPUT:

```
Marks: 100 Time: 90 minutes Number of
Parts: 4
---------------------------------
Maths , English , Physics , HigherMaths
Part 1 - Maths
Part 2 - English
Part 3 - Physics
Part 4 - HigherMaths
=================================
Marks: 100 Time: 120 minutes Number of
Parts: 5
---------------------------------
Maths , English , Physics , HigherMaths
, Drawing
Part 1 - Maths
Part 2 - English
Part 3 - Physics
Part 4 - HigherMaths
Part 5 - Drawing
```

Task - 6

Given the following class, write the code for the **Sphere** and the **Cylinder** class so that the following output is printed.

```
class Shape3D:

  pi = 3.14159
  def __init__(self, name = 'Default', radius = 0):
    self._area = 0
    self._name = name
    self._height = 'No need'
    self._radius = radius

  def calc_surface_area(self):
    return 2 * Shape3D.pi * self._radius

  def __str__(self):
      return "Radius: "+str(self._radius)


sph = Sphere('Sphere', 5)
print('---------------------------------')
sph.calc_surface_area()
print(sph)
print('=================================')
cyl = Cylinder('Cylinder', 5, 10)
print('---------------------------------')
cyl.calc_surface_area()
print(cyl)
```

OUTPUT:

```
Shape name: Sphere, Area Formula: 4 * pi * r
* r
---------------------------------
Radius: 5, Height: No need
Area: 314.159
=================================
Shape name: Cylinder, Area Formula: 2 * pi *
r * (r + h)
---------------------------------
Radius: 5, Height: 10
Area: 471.2385
```

Task - 7

Write the **PokemonExtra** class so that the following code generates the output below:

```
class PokemonBasic:

  def __init__(self, name = 'Default', hp = 0,
weakness = 'None', type = 'Unknown'):
    self.name = name
    self.hit_point = hp
    self.weakness = weakness
    self.type = type

  def get_type(self):
    return 'Main type: ' + self.type

  def get_move(self):
    return 'Basic move: ' + 'Quick Attack'

  def __str__(self):
    return "Name: " + self.name + ", HP: " +
str(self.hit_point) + ", Weakness: " + self.weakness

print('\n------------Basic Info:--------------')
pk = PokemonBasic()
print(pk)
print(pk.get_type())
print(pk.get_move())

print('\n------------Pokemon 1 Info:-------------')
charmander = PokemonExtra('Charmander', 39, 'Water',
'Fire')
print(charmander)
print(charmander.get_type())
print(charmander.get_move())

print('\n------------Pokemon 2 Info:-------------')
charizard = PokemonExtra('Charizard', 78, 'Water',
'Fire', 'Flying', ('Fire Spin', 'Fire Blaze'))
print(charizard)
print(charizard.get_type())
print(charizard.get_move())
```

OUTPUT:

```
------------Basic Info:--------------
Name: Default, HP: 0, Weakness: None
Main type: Unknown
Basic move: Quick Attack

------------Pokemon 1 Info:--------------
Name: Charmander, HP: 39, Weakness: Water
Main type: Fire
Basic move: Quick Attack

------------Pokemon 2 Info:--------------
Name: Charizard, HP: 78, Weakness: Water
Main type: Fire, Secondary type: Flying
Basic move: Quick Attack
Other move: Fire Spin, Fire Blaze
```

Task – 8

Implement the design of the **FootBallTeam** and the **CricketTeam** classes that inherit from **Team** class so that the following code generates the output below:

Driver Code	Output

class Team:
 	
    def __init__(self, name):
        self.name = "default"
        self.total_player = 5
    def info(self)
        print("We love sports")
# Write your code here. 	
 	
class Team_test:
    def check(self, tm):
        print("========================")
        print("Total Player: ", tm.total_player)
        tm.info()
 	
f = FootBallTeam("Brazil")
c = CricketTeam("Bangladesh")
test = Team_test()
test.check(f)
test.check(c)
	========================
	Total Player: 11
	Our name is Brazil
	We play Football
	We love sports
	========================
	Total Player: 11
	Our name is Bangladesh
	We play Cricket
	We love sports

Task – 9

Implement the design of the **Pikachu** and **Charmander** classes that are derived from the **Pokemon** class so that the following output is produced:

Driver Code	Output

class Pokemon:
 	
    def __init__(self, p):
        self.pokemon = p
        self.pokemon_type = "Needs to be set"
        self.pokemon_weakness = "Needs to be set"
    def kind(self):
        return self.pokemon_type
    def weakness(self):
        return self.pokemon_weakness
    def what_am_i(self):
        print("I am a Pokemon.")
 	
pk1 = Pikachu()
print("Pokemon:", pk1.pokemon)
print("Type:", pk1.kind())
print("Weakness:", pk1.weakness())
pk1.what_am_i()
print("=======================")
c1 = Charmander()
print("Pokemon:", c1.pokemon)
print("Type:", c1.kind())
print("Weakness:", c1.weakness())
c1.what_am_i()
	Pokemon: Pikachu
	Type: Electric
	Weakness: Ground
	I am a Pokemon.
	I am Pikachu.
	=======================
	Pokemon: Charmander
	Type: Fire
	Weakness: Water, Ground and Rock
	I am a Pokemon.
	I am Charmander.

Task – 10

Implement the design of the **CSE** and **EEE** classes that are derived from the Department class so that the following output is produced:

Driver Code	Output

class Department:
    def __init__(self, s):
        self.semester = s
        self.name = "Default"
        self.id = -1
 	
    def student_info(self):
        print("Name:", self.name)
        print("ID:", self.id)
 	
    def courses(self, c1, c2, c3):
        print("No courses Approved yet!")
 	
s1 = CSE("Rahim", 16101328,"Spring2016")
s1.student_info()
s1.courses("CSE110", "MAT110", "ENG101")
print("==================")
s2 = EEE("Tanzim", 18101326, "Spring2018")
s2.student_info()
s2.courses("Mat110", "PHY111", "ENG101")
print("==================")
s3 = CSE("Rudana", 18101326, "Fall2017")
s3.student_info()
s3.courses("CSE111", "PHY101", "MAT120")
print("==================")
s4 = EEE("Zainab", 19201623, "Summer2019")
s4.student_info()
s4.courses("EEE201", "PHY112", "MAT120")
	Name: Rahim
	ID: 16101328
	Courses Approved to this CSE student in Spring2016 semester :
	CSE110
	MAT110
	ENG101
	==================
	Name: Tanzim
	ID: 18101326
	Courses Approved to this EEE student in Spring2018 semester:
	Mat110
	PHY111
	ENG101
	==================
	Name: Rudana
	ID: 18101326
	Courses Approved to this CSE student in Fall2017 semester:
	CSE111
	PHY101
	MAT120
	==================
	Name: Zainab
	ID: 19201623
	Courses Approved to this EEE student in Summer2019 semester:
	EEE201
	PHY112
	MAT120

Task – 11

```
1  class A:
2      def __init__(self):
3          self.temp = 4
4          self.sum = 1
5          self.y = 2
6          self.y = self.temp - 2
7          self.sum = self.temp + 3
8          self.temp -= 2
9      def methodA(self, m,  n):
10         x = 0
11         self.y = self.y + m + self.temp
12         self.temp += 1
13         x = x + 2 + n
14         self.sum = self.sum + x + self.y
15         print(x, self.y, self.sum)
16
17 class B(A):
18     def __init__(self, b=None):
19         super().__init__()
20         self.x = 1
21         self.sum = 2
22         if b == None:
23             self.y = self.temp + 3
24             self.sum = 3 + self.temp + 2
25             self.temp -= 1
26         else:
27             self.sum = b.sum
28             self.x = b.x
29     def methodB(self, m,  n):
30         y = 0
31         y = y + self.y
32         self.x = y + 2 + self.temp
33         self.methodA(self.x, y)
34         self.sum = self.x + y + self.sum
35         print(self.x, y, self.sum)
```

Write the output of the following code:

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

Output:

x	y	sum

Task – 12

```
1  class A:
2      temp = 4
3      def __init__(self):
4          self.sum = 0
5          self.y = 0
6          self.y = A.temp - 2
7          self.sum = A.temp + 1
8          A.temp -= 2
9      def methodA(self, m,  n):
10         x = 0
11         self.y = self.y + m + (A.temp)
12         A.temp += 1
13         x = x + 1 + n
14         self.sum = self.sum + x + self.y
15         print(x, self.y, self.sum)
16
17 class B(A):
18     x = 0
19     def __init__(self,b=None):
20         super().__init__()
21         self.sum = 0
22         if b==None:
23             self.y = A.temp + 3
24             self.sum = 3 + A.temp + 2
25             A.temp -= 2
26         else:
27             self.sum = b.sum
28             B.x = b.x
29             b.methodB(2, 3)
30     def methodB(self, m,  n):
31         y = 0
32         y = y + self.y
33         B.x = self.y + 2 + A.temp
34         self.methodA(B.x, y)
35         self.sum = B.x + y + self.sum
36         print(B.x, y, self.sum)
```

Write the output of the following code:

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

Output:

x	y	sum

Task – 13

```
1  class A:
2    temp = 3
3    def __init__(self):
4      self.sum = 0
5      self.y = 0
6      self.y = A.temp - 1
7      self.sum = A.temp + 2
8      A.temp -= 2
9
10   def methodA(self, m, n):
11     x = 0
12     n[0] += 1
13     self.y = self.y + m + A.temp
14     A.temp += 1
15     x = x + 2 + n[0]
16     n[0] = self.sum + 2
17     print(f"{x} {self.y} {self.sum}")
18
19 class B(A):
20   x = 1
21   def __init__(self, b = None):
22     super().__init__()
23     self.sum = 2
24     if b == None:
25       self.y = self.temp + 1
26       B.x = 3 + A.temp + self.x
27       A.temp -= 2
28     else:
29       self.sum = self.sum + self.sum
30       B.x = b.x + self.x
31   def methodB(self, m, n):
32     y = [0]
33     self.y = y[0] + self.y + m
34     B.x = self.y + 2 +  self.temp - n
35     self.methodA(self.x, y)
36     self.sum = self.x + y[0] + self.sum
37     print(f"{self.x} {y[0]} {self.sum}")
```

Write the output of the following code:

```
x = [23]
a1 = A()
b1 = B()
b2 = B(b1)
a1.methodA(1, x)
b2.methodB(3, 2)
a1.methodA(1, x)
```

Output:

x	y	sum

Task – 14

```
1  class A:
2    temp = 7
3    def __init__(self):
4      self.sum, self.y = 0, 0
5      self.y = A.temp - 1
6      self.sum = A.temp + 2
7      A.temp -= 3
8    def methodA(self, m, n):
9      x = 4
10     n[0] += 1
11     self.y = self.y + m + A.temp
12     A.temp += 2
13     x = x + 3 + n[0]
14     n[0] = self.sum + 2
15     print(f"{x} {self.y} {self.sum}")
16   def get_A_sum(self):
17     return self.sum
18   def update_A_y(self, val):
19     self.y = val
20 class B(A):
21   x = 2
22   def __init__(self, b = None):
23     super().__init__()
24     self.sum = 2
25     if b == None:
26       self.y = self.temp + 1
27       B.x = 4 + A.temp + self.x
28       A.temp -= 2
29     else:
30       self.sum = self.sum + self.get_A_sum()
31       B.x = b.x + self.x
32   def methodB(self, m, n):
33     y = [0]
34     self.update_A_y(y[0] + self.y + m)
35     B.x = self.y + 4 +  self.temp - n
36     self.methodA(self.x, y)
37     self.sum = self.x + y[0] + self.get_A_sum()
38     print(f"{self.x} {y[0]} {self.sum}")
```

Write the output of the following code:

```
x = [32]
a1 = A()
b1 = B()
b2 = B(b1)
a1.methodA(2, x)
b2.methodB(2, 3)
a1.methodA(3, x)
```

Output:

x	y	sum