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**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 |
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**Task - 2 [Ungraded - Optional]**

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 |
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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 |
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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 |
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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 |
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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 |
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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** |
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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** |
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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** |
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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** |
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