



GURU NANAK DEV ENGINEERING COLLEGE BIDAR

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ENGINEERING:E043

MCA:C570

MBA: B181

M.TECH: T834



Introduction to Python Programming Lab (BPLCK105B/205B)

I/II Semester
(common to all branches)
LAB MANUAL

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Chapter 1

Question 1

1.1 Student Details

Question

Develop a program to read the student details like Name, USN, and Marks in three subjects. Display the student details, total marks and percentage with suitable messages.

Python Code

```
1 #!/usr/bin/env python3
2 # -*- coding: utf-8 -*-
3 """
4 Created on Fri Dec 23 13:01:34 2022
5
6 01AStudDetails.py
7 Develop a program to read the student details like Name, USN, and Marks in three
   subjects.
8 Display the student details, total marks and percentage with suitable messages.
9
10 @author: Prabodh C P
11 """
12
13 stName = input("Enter the name of the student : ")
14 stUSN = input("Enter the USN of the student : ")
15 stMarks1 = int(input("Enter marks in Subject 1 : "))
16 stMarks2 = int(input("Enter marks in Subject 2 : "))
17 stMarks3 = int(input("Enter marks in Subject 3 : "))
18
19
20 print("Student Details\n=====")
21 print("%12s"%("Name :"), stName)
22 print("%12s"%("USN :"), stUSN)
23 print("%12s"%("Marks 1 :"), stMarks1)
24 print("%12s"%("Marks 2 :"), stMarks2)
25 print("%12s"%("Marks 3 :"), stMarks3)
26 print("%12s"%("Total :"), stMarks1+stMarks2+stMarks3)
27 print("%12s"%("Percent :"), "%.2f"%((stMarks1+stMarks2+stMarks3)/3))
28 print("=====")
```

Listing 1.1: 01AStudDetails.py



Output

```
=====
1 putta:~/.../Programs$ python3 01AstudDetails.py
2
3 Enter the name of the student : RAMESH
4 Enter the USN of the student : 1SI22CS036
5 Enter marks in Subject 1 : 87
6 Enter marks in Subject 2 : 78
7 Enter marks in Subject 3 : 65
8 Student Details
9 =====
10      Name : RAMESH
11      USN : 1SI22CS036
12      Marks 1 : 87
13      Marks 2 : 78
14      Marks 3 : 65
15      Total : 230
16      Percent : 76.67
17 =====
```

Listing 1.2: OUTPUT



1.2 Senior Citizen Check

Question

Develop a program to read the name and year of birth of a person. Display whether the person is a senior citizen or not.

Python Code

```
1 #!/usr/bin/env python3
2 # -*- coding: utf-8 -*-
3 """
4 Created on Fri Dec 23 13:23:54 2022
5
6 01BChkSnrCitzn.py
7
8 Develop a program to read the name and year of birth of a person. Display whether
   the person is a senior citizen or not.
9
10 @author: Prabodh C P
11 """
12 from datetime import date
13
14
15 perName = input("Enter the name of the person : ")
16 perDOB = int(input("Enter his year of birth : "))
17
18 curYear = date.today().year
19 perAge = curYear - perDOB
20
21 if (perAge > 60):
22     print(perName, "aged", perAge, "years is a Senior Citizen.")
23 else:
24     print(perName, "aged", perAge, "years is not a Senior Citizen.")
```

Listing 1.3: 01BChkSnrCitzn.py



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Output

```
=====
1 putta:~/.../Programs$ python3 01BChkSnrCitzn.py
2
3 Enter the name of the person : Akbar Khan
4 Enter his year of birth : 1978
5 Akbar Khan aged 44 years is not a Senior Citizen.
6
7 putta:~/.../Programs$ python3 01BChkSnrCitzn.py
8
9 Enter the name of the person : George Best
10 Enter his year of birth : 1957
11 George Best aged 65 years is a Senior Citizen.
```

Listing 1.4: OUTPUT



Chapter 2

Question 2

2.1 Fibonacci Sequence

Question

Develop a program to generate Fibonacci sequence of length (N). Read N from the console.

Python Code

```
1 #!/usr/bin/env python3
2 # -*- coding: utf-8 -*-
3 """
4 Created on Fri Dec 23 13:36:30 2022
5
6 02AFibonacci.py
7
8 Develop a program to generate Fibonacci sequence of length (N). Read N from the
   console.
9
10 @author: Prabodh C P
11 """
12
13 num = int(input("Enter the Fibonacci sequence length to be generated : "))
14
15 firstTerm = 0
16 secondTerm = 1
17 print("The Fibonacci series with", num, "terms is :")
18 print(firstTerm, secondTerm, end=" ")
19 for i in range(2,num):
20     curTerm = firstTerm + secondTerm
21     print(curTerm, end=" ")
22     firstTerm = secondTerm
23     secondTerm = curTerm
24 print()
```

Listing 2.1: 02AFibonacci.py



Output

```
1 putta:~/.../Programs$ python3 02AFibonacci.py
2
3 Enter the Fibonacci sequence length to be generated : 8
4 The Fibonacci series with 8 terms is :
5 0 1 1 2 3 5 8 13

putta:~/.../Programs$ python3 02AFibonacci.py
9
10 Enter the Fibonacci sequence length to be generated : 5
11 The Fibonacci series with 5 terms is :
12 0 1 1 2 3
```

Listing 2.2: OUTPUT



8

Binomial Coefficient Question

Write a function to calculate factorial of a number. Develop a program to compute binomial coefficient (Given N and R).

Python Code

```
1#!/usr/bin/env python3
2# -*- coding: utf-8 -*-
3"""
4Created on Fri Dec 23 13:36:52 2022
5O2BFactNCR.py
6Write a function to calculate factorial of a number.
7Develop a program to compute binomial coefficient (Given N and R).
8
9@author: Prabodh C P
10"""
11
12def fact(num):
13    if num == 0:
14        return 1
15    else:
16        return num * fact(num-1)
17n = int(input("Enter the value of N : "))
18r = int(input("Enter the value of R (R cannot be negative or greater than N): "))
19nCr = fact(n) / (fact(r) * fact(n-r))
20print(n, 'C', r, " = ", "%d"%nCr, sep="")
```

Listing 2.3: O2BFactNCR.py

Output

```
1putta:~/.../Programs$ python3 O2BFactNCR.py
2Enter the value of N : 7
3Enter the value of R (R cannot be negative or greater than N): 5
47C5 = 21
5
6Enter the value of N : 5
7Enter the value of R (R cannot be negative or greater than N): 5
85C5 = 1
9
10Enter the value of N : 3
11Enter the value of R (R cannot be negative or greater than N): 1
123C1 = 3
13
14Enter the value of N : 8
15Enter the value of R (R cannot be negative or greater than N): 0
168C0 = 1
```

Listing 2.4: OUTPUT



Chapter 3

Mean, Variance and Standard Deviation

Question

Read N numbers from the console and create a list. Develop a program to print mean, variance and standard deviation with suitable messages.

Python Code

```
1 #!/usr/bin/env python3
2 # -*- coding: utf-8 -*-
3 """
4 Created on Fri Dec 23 13:59:36 2022
5
6 03MeanVarSD.py
7
8 Read N numbers from the console and create a list. Develop a program to print mean,
9 variance and
10 standard deviation with suitable messages.
11
12 @author: Prabodh C P
13 """
14 from math import sqrt
15
16 myList = []
17
18 num = int(input("Enter the number of elements in your list : "))
19
20 for i in range(num):
21     val = int(input("Enter the element : "))
22     myList.append(val)
23
24 print('The length of list1 is', len(myList))
25
26 print('List Contents', myList)
27
28
29 total = 0
30 for elem in myList:
31     total += elem
32
33 mean = total / num
34
35 total = 0
36 for elem in myList:
37     total += (elem - mean) * (elem - mean)
38
```



```
39 variance = total / num
40
41 stdDev = sqrt(variance)
42
43 print("Mean =", mean)
44 print("Variance =", variance)
45 print("Standard Deviation =", "%.2f"%stdDev)
```

Listing 3.1: 03MeanVarSD.py

Output

```
1 putta:~/.../Programs$ python3 03_Mean_Var_SD.py
2
3 Enter the number of elements in your list : 5
4 Enter the element : 45
5 Enter the element : 34
6 Enter the element : 86
7 Enter the element : 92
8 Enter the element : 35
9
10 The length of list1 is 5
11 List Contents [45, 34, 86, 92, 35]
12
13 Mean = 58.4
14 Variance = 642.64
15 Standard Deviation = 25.35
```

Listing 3.2: OUTPUT



Chapter 4

Digit Frequency

Question

Read a multi-digit number (as chars) from the console. Develop a program to print the frequency of each digit with suitable message.

Python Code

```
1#!/usr/bin/env python3
2# -*- coding: utf-8 -*-
3"""
4Created on Fri Dec 23 14:12:31 2022
5O4DigitFreq.py
6Read a multi-digit number (as chars) from the console.
7Develop a program to print the frequency of each digit with suitable message.
8@author: Prabodh C P
9"""
10num = input("Enter a number : ")
11print("The number entered is :", num)
12uniqDig = set(num)
13for elem in uniqDig:
14    print(elem, "occurs", num.count(elem), "times")
```

Listing 4.1: O4DigitFreq.py

Output

```
1putta:~/.../Programs$ python3 O4DigitFreq.py
2
3Enter a number : 234939
4The number entered is : 234939
54 occurs 1 times
69 occurs 2 times
73 occurs 2 times
82 occurs 1 times
9
10putta:~/.../Programs$ python3 O4DigitFreq.py
11
12Enter a number : 7843338
13The number entered is : 7843338
147 occurs 1 times
154 occurs 1 times
163 occurs 3 times
178 occurs 2 times
```

Listing 4.2: OUTPUT



Chapter 5

Word Frequency

Question

Develop a program to print 10 most frequently appearing words in a text file. [Hint: Use dictionary with distinct words and their frequency of occurrences. Sort the dictionary in the reverse order of frequency and display dictionary slice of first 10 items]

Python Code

```
1 #!/usr/bin/env python3
2 # -*- coding: utf-8 -*-
3 """
4 Created on Fri Dec 23 14:21:12 2022
5
6 05WordFreq.py
7
8 Develop a program to print 10 most frequently appearing words in a text file. [Hint:
    Use dictionary with distinct words and their frequency of occurrences. Sort the
    dictionary in the reverse order of frequency and display dictionary slice of
    first 10 items]
9
10 @author: Prabodh C P
11 """
12 import sys
13 import string
14 import os.path
15
16 fname = input("Enter the filename : ")          #sample file text.txt also provided
17
18 if not os.path.isfile(fname):
19     print("File", fname, "doesn't exists")
20     sys.exit(0)
21
22 infile = open(fname, "r")
23
24 filecontents = ""
25
26 for line in infile:
27     for ch in line:
28         if ch not in string.punctuation:
29             filecontents = filecontents + ch
30         else:
31             filecontents = filecontents + ' '      #replace punctuations and \n with
space
32
33 wordFreq = {}
34 wordList = filecontents.split()
```



```
35
36 #Calculate word Frequency
37
38 for word in wordList:
39     if word not in wordFreq.keys():
40         wordFreq[word] = 1
41     else:
42         wordFreq[word] += 1
43
44 #Sort Dictionary based on values in descending order
45 sortedWordFreq = sorted(wordFreq.items(), key=lambda x:x[1], reverse=True )
46
47 #Display 10 most frequently appearing words with their count
48
49 print("\n=====")
50 print("10 most frequently appearing words with their count")
51 print("=====")
52 for i in range(10):
53     print(sortedWordFreq[i][0], "occurs", sortedWordFreq[i][1], "times")
```

Listing 5.1: 05WordFreq.py

Output

```
1 putta:~/.../Programs$ python3 05WordFreq.py
2
3 Enter the filename : text.txt
4
5 =====
6 10 most frequently appearing words with their count
7 =====
8 the occurs 45 times
9 of occurs 24 times
10 party occurs 12 times
11 part occurs 12 times
12 a occurs 9 times
13 and occurs 8 times
14 second occurs 7 times
15 to occurs 6 times
16 shall occurs 6 times
17 first occurs 5 times
```

Listing 5.2: OUTPUT



Chapter 6

Sort File Contents

Question

Develop a program to sort the contents of a text file and write the sorted contents into a separate text file. [Hint: Use string methods strip(), len(), list methods sort(), append(), and file methods open(), readlines(), and write().]

Python Code

```
1 #!/usr/bin/env python3
2 # -*- coding: utf-8 -*-
3 """
4 Created on Fri Dec 23 17:14:27 2022
5
6 06SortLinesFile.py
7
8 Develop a program to sort the contents of a text file and write the sorted contents
   into a separate text
9 file. [Hint: Use string methods strip(), len(), list methods sort(), append(), and
   file methods open(),
10 readlines(), and write()].
11
12 @author: Prabodh C P
13 """
14
15 import os.path
16 import sys
17
18 fname = input("Enter the filename whose contents are to be sorted : ")      #sample
   file unsorted.txt also provided
19
20 if not os.path.isfile(fname):
21     print("File", fname, "doesn't exists")
22     sys.exit(0)
23
24 infile = open(fname, "r")
25
26 myList = infile.readlines()
27 # print(myList)
28
29 #Remove trailing \n characters
30 lineList = []
31 for line in myList:
32     lineList.append(line.strip())
33
34 lineList.sort()
35
```



```
36 #Write sorted contents to new file sorted.txt
37
38 outfile = open("sorted.txt","w")
39
40
41 for line in lineList:
42     outfile.write(line + "\n")
43
44 infile.close() # Close the input file
45 outfile.close() # Close the output file
46
47
48 if os.path.isfile("sorted.txt"):
49     print("\nFile containing sorted content sorted.txt created successfully")
50     print("sorted.txt contains", len(lineList), "lines")
51     print("Contents of sorted.txt")
52     print("=====")
53     rdFile = open("sorted.txt","r")
54     for line in rdFile:
55         print(line, end="")
```

Listing 6.1: O6SortLinesFile.py

Output

```
1 putta:~/.../Programs$ python3 O6SortLinesFile.py
2
3 Enter the filename whose contents are to be sorted : unsorted.txt
4
5 File containing sorted content sorted.txt created successfully
6 sorted.txt contains 15 lines
7 Contents of sorted.txt
8 =====
9 A deep C diva.
10 All the troubles you have will pass away very quickly.
11 Beware of a tall black man with one blond shoe.
12 Don't read everything you believe.
13 Exercise caution in your daily affairs.
14 He changes the domain.
15 How does a hacker fix a function which doesn't work for all of the elements in its
    domain?
16 Lay on, MacDuff, and curs'd be him who first cries, "Hold, enough!".
17 People are beginning to notice you. Try dressing before you leave the house.
18 The surest protection against temptation is cowardice.
19 To be or not to be.
20 Tuesday is the Wednesday of the rest of your life.
21 What is the square root of 4b^2?
22 You display the wonderful traits of charm and courtesy.
23 You may be recognized soon. Hide.
```

Listing 6.2: OUTPUT



Chapter 7

Backup Directory into Zip

Question

Develop a program to backing Up a given Folder (Folder in a current working directory) into a ZIP File by using relevant modules and suitable methods.

Python Code

```
1 #!/usr/bin/env python3
2 # -*- coding: utf-8 -*-
3 """
4 Created on Fri Dec 23 16:14:28 2022
5 07BackFolderZip.py
6 Develop a program to backing Up a given Folder (Folder in a current working
   directory) into a ZIP
7 File by using relevant modules and suitable methods.
8 @author: Prabodh C P
9 """
10 import os
11 import sys
12 import pathlib
13 import zipfile
14
15 dirName = input("Enter Directory name that you want to backup : ")
16 if not os.path.isdir(dirName):
17     print("Directory", dirName, "doesn't exists")
18     sys.exit(0)
19 curDirectory = pathlib.Path(dirName)
20 with zipfile.ZipFile("myZip.zip", mode="w") as archive:
21     for file_path in curDirectory.rglob("*"):
22         archive.write(file_path, arcname=file_path.relative_to(curDirectory))
23 if os.path.isfile("myZip.zip"):
24     print("Archive", "myZip.zip", "created successfully")
25 else:
26     print("Error in creating zip archive")
```

Listing 7.1: 07BackFolderZip.py

Output

```
1 putta:~/.../Programs$ python3 07BackFolderZip.py
2
3 Enter Directory name that you want to backup : zipDemo
4 Archive myZip.zip created successfully
```

Listing 7.2: OUTPUT



Chapter 8

Assertions and Exceptions Demo

Question

Write a function named *DivExp* which takes TWO parameters *a*, *b* and returns a value *c* ($c=a/b$). Write suitable assertion for *a* greater than 0 in function *DivExp* and raise an exception for when *b=0*. Develop a suitable program which reads two values from the console and calls a function *DivExp*.

Python Code

```
1 #!/usr/bin/env python3
2 # -*- coding: utf-8 -*-
3 """
4 Created on Fri Dec 23 17:50:46 2022
5
6 08AssertExceptDemo.py
7
8 Write a function named DivExp which takes TWO parameters a, b and returns a value c
   (c=a/b). Write suitable assertion for a>0 in function DivExp and raise an
   exception for when b=0. Develop a suitable program which reads two values from
   the console and calls a function DivExp.
9
10 @author: Prabodh C P
11 """
12 import sys
13
14 def DivExp(a,b):
15     assert a>0, "a should be greater than 0"
16     try:
17         c = a/b
18     except ZeroDivisionError:
19         print("Value of b cannot be zero")
20         sys.exit(0)
21     else:
22         return c
23
24 val1 = int(input("Enter a value for a : "))
25 val2 = int(input("Enter a value for b : "))
26
27 val3 = DivExp(val1, val2)
28
29 print(val1, "/", val2, "=", val3)
```

Listing 8.1: 08AssertExceptDemo.py



Output

```
putta:~/.../Programs$ python3 08AssertExceptDemo.py
2 Enter a value for a : 7
3 Enter a value for b : 6
4 7 / 6 = 1.1666666666666667
5
6 putta:~/.../Programs$ python3 08AssertExceptDemo.py
7 Enter a value for a : 0
8 Enter a value for b : 5
9 AssertionError: a should be greater than 0
10
11 putta:~/.../Programs$ python3 08AssertExceptDemo.py
12 Enter a value for a : -3
13 Enter a value for b : 6
14 AssertionError: a should be greater than 0
15
16 putta:~/.../Programs$ python3 08AssertExceptDemo.py
17 Enter a value for a : 6
18 Enter a value for b : 0
19 Value of b cannot be zero
```

Listing 8.2: OUTPUT



Chapter 9

Complex Class Demo

Question

Define a function which takes 2 objects representing complex numbers and returns new complex number with a addition of two complex numbers. Define a suitable class Complex to represent the complex number. Develop a program to read N (N greater than 2) complex numbers and to compute the addition of N complex numbers.

Python Code

```
1#!/usr/bin/env python3
2# -*- coding: utf-8 -*-
3"""
4Created on Fri Dec 23 18:11:47 2022
5
609ComplexClass.py
7
8Define a function which takes 2 objects representing complex numbers and returns new
   complex number with a addition of two complex numbers. Define a suitable class
   Complex to represent the complex number. Develop a program to read N (N >= 2)
   complex numbers and to compute the addition of N complex numbers.
9
10@author: Prabodh C P
11"""
12
13class Complex:
14    def __init__(self, realp = 0, imagp=0):
15        self.realp = realp
16        self.imagp = imagp
17
18    def setComplex(self, realp, imagp):
19        self.realp = realp
20        self.imagp = imagp
21
22    def readComplex(self):
23        self.realp = int(input("Enter the real part : "))
24        self.imagp = int(input("Enter the real part : "))
25
26    def showComplex(self):
27        print('(',self.realp,')','+i', '(',self.imagp,')',sep="")
28
29    def addComplex(self, c2):
30        c3 = Complex()
31        c3.realp = self.realp + c2.realp
32        c3.imagp = self.imagp + c2.imagp
33        return c3
34
```



```
35 def add2Complex(a,b):
36     c = a.addComplex(b)
37     return c
38
39 def main():
40     c1 = Complex(3,5)
41     c2 = Complex(6,4)
42
43     print("Complex Number 1")
44     c1.showComplex()
45     print("Complex Number 2")
46     c2.showComplex()
47
48     c3 = add2Complex(c1, c2)
49
50     print("Sum of two Complex Numbers")
51     c3.showComplex()
52
53 #Addition of N (N >=2) complex numbers
54
55     compList = []
56
57     num = int(input("\nEnter the value for N : "))
58
59     for i in range(num):
60         print("Object", i+1)
61         obj = Complex()
62         obj.readComplex()
63         compList.append(obj)
64
65     print("\nEntered Complex numbers are : ")
66     for obj in compList:
67         obj.showComplex()
68
69     sumObj = Complex()
70     for obj in compList:
71         sumObj = add2Complex(sumObj, obj)
72
73
74     print("\nSum of N complex numbers is", end = " ")
75     sumObj.showComplex()
76
77 main()
```

Listing 9.1: 09ComplexClass.py

Output

```
1 putta:~/.../Programs$ python3 09ComplexClass.py
2
3 Complex Number 1
4 (3)+i(5)
5 Complex Number 2
6 (6)+i(4)
7 Sum of two Complex Numbers
8 (9)+i(9)
9
10 Enter the value for N : 5
11 Object 1
12 Enter the real part : 1
13 Enter the real part : 9
```



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14 Object 2

15 Enter the real part : 2

16 Enter the real part : 8



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```
17 Object 3
18 Enter the real part : 3
19 Enter the real part : 7
20 Object 4
21 Enter the real part : 4
22 Enter the real part : 6
23 Object 5
24 Enter the real part : 5
25 Enter the real part : 5
26
27 Entered Complex numbers are :
28 (1)+i (9)
29 (2)+i (8)
30 (3)+i (7)
31 (4)+i (6)
32 (5)+i (5)
33
34 Sum of N complex numbers is (15)+i (35)
```

Listing 9.2: OUTPUT



Chapter 10

Student Class Demo

Question

Develop a program that uses class Student which prompts the user to enter marks in three subjects and calculates total marks, percentage and displays the score card details. [Hint: Use list to store the marks in three subjects and total marks. Use init method to initialize name, USN and the lists to store marks and total, Use getMarks() method to read marks into the list, and display() method to display the score card details.]

Python Code

```
1 #!/usr/bin/env python3
2 # -*- coding: utf-8 -*-
3 """
4 Created on Fri Dec 23 18:58:35 2022
5
6 10StudentClass.py
7
8 Develop a program that uses class Student which prompts the user to enter marks in
   three subjects and calculates total marks, percentage and displays the score card
   details. [Hint: Use list to store the marks in three subjects and total marks.
   Use_init_() method to initialize name, USN and the lists to store marks and
   total, Use getMarks() method to read marks into the list, and display() method to
   display the score card details.]
9
10 @author: Prabodh C P
11 """
12
13 class Student:
14     def __init__(self, name = "", usn = "", score = [0,0,0,0]):
15         self.name = name
16         self.usn = usn
17         self.score = score
18
19     def getMarks(self):
20         self.name = input("Enter student Name : ")
21         self.usn = input("Enter student USN : ")
22         self.score[0] = int(input("Enter marks in Subject 1 : "))
23         self.score[1] = int(input("Enter marks in Subject 2 : "))
24         self.score[2] = int(input("Enter marks in Subject 3 : "))
25         self.score[3] = self.score[0] + self.score[1] + self.score[2]
26
27     def display(self):
28         percentage = self.score[3]/3
29         spcstr = "=" * 81
30         print(spcstr)
31         print("SCORE CARD DETAILS".center(81))
```



```
32         print(spcstr)
33         print("%15s"%( "NAME" ), "%12s"%( "USN" ), "%8s"% "MARKS1" , "%8s"% "MARKS2" , "%8s"% "
MARKS3" , "%8s"% "TOTAL" , "%12s"%( "PERCENTAGE" ))
34         print(spcstr)
35         print("%15s"%self.name, "%12s"%self.usn, "%8d"%self.score[0], "%8d"%self.
score[1], "%8d"%self.score[2], "%8d"%self.score[3], "%12.2f"%percentage)
36         print(spcstr)
37
38
39 def main():
40     s1 = Student()
41     s1.getMarks()
42     s1.display()
43
44 main()
```

Listing 10.1: 10StudentClass.py

Output

```
1 putta:~/.../Programs$ python3 10StudentClass.py
2
3 Enter student Name : Shivappa
4 Enter student USN : 1SI22CS065
5 Enter marks in Subject 1 : 87
6 Enter marks in Subject 2 : 79
7 Enter marks in Subject 3 : 92
8 =====
9                                SCORE CARD DETAILS
10 =====
11          NAME          USN    MARKS1    MARKS2    MARKS3    TOTAL    PERCENTAGE
12 =====
13          Shivappa    1SI22CS065        87        79        92        258        86.00
14 =====
```

Listing 10.2: OUTPUT