DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

PYTHON PROGRAMMING LAB MANUAL

NAME OF THE LABORATORY	**:**	**Python Programming**
YEAR AND SEM	**:**	**IV B.TECH I SEM**
REGULATION/LAB CODE	**:**	**R16/CS506PC**

COMPUTER SCIENCE AND ENGINEERING

KG REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

Affiliated o JNTUH, Chilkur,(V), Moinabad(M) R. R Dist, TS-501504

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

VISION AND MISSION OF THE INSTITUTION

VISION

To become self-sustainable institution this is recognized for its new age engineering through innovative teaching and learning culture, inculcating research and entrepreneurial ecosystem, and sustainable social impact in the community.

MISSION

- To offer undergraduate and post-graduate programs that is supported through industry relevant curriculum and innovative teaching and learning processes that would help students succeed in their professional careers.
- To provide necessary support structures for students, this will contribute to their personal and professional growth and enable them to become leaders in their respective fields.
- To provide faculty and students with an ecosystem that fosters research and development through strategic partnerships with government organisations and collaboration with industries.
- To contribute to the development of the region by using our technological expertise to work with nearby communities and support them in their social and economic growth.

VISION AND MISSION OF CSE DEPARTMENT

VISION

To be recognized as a department of excellence by stimulating a learning environment in which students and faculty will thrive and grow to achieve their professional, institutional and societal goals.

MISSION

- To provide high quality technical education to students that will enable life-long learning and build expertise in advanced technologies in Computer Science and Engineering.
- To promote research and development by providing opportunities to solve complex engineering problems in collaboration with industry and government agencies.
- To encourage professional development of students that will inculcate ethical values and leadership skills while working with the community to address societal issues.

DEPARTMENT OF COMPUTERSCIENCEANDENGINEERING

PROGRAM EDUCATIONAL OBJECTIVES (PEOS):

A graduate of the Computer Science and Engineering Program should:

PEO1	**Program Educational Objective1: (PEO1)** The Graduates will provide solutions to difficult and challenging issues in their profession by applying computer science and engineering theory and principles.
PEO2	**Program Educational Objective2 :(PEO2)** **The** Graduates have successful careers in computer science and engineering fields or will be able to successfully pursue advanced degrees.
PEO3	**Program Educational Objective3: (PEO3)** The Graduates will communicate effectively, work collaboratively and exhibit high levels of Professionalism, moral and ethical responsibility.
PEO4	**Program Educational Objective4 :(PEO4)** **The** Graduates will develop the ability to understand and analyse Engineering issues in a broader perspective with ethical responsibility towards sustainable development.

PROGRAM OUTCOMES (POS):

PO1	**Engineeringknowledge**:Applytheknowledgeofmathematics,science,engineering Fundamentals andanengineeringspecializationtothesolutionofcomplexengineeringproblems.
PO2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and sustainability**: Understand the impact of the professional engineering Solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and team work**: Function effectively as an individual, and as a member or leader In diverse teams, and in multi-disciplinary settings.
PO10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance**: Demonstrate knowledge and understanding of the Engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES(PSOS):

PSO1	**Problem Solving Skills** – Graduate will be able to apply computational techniques and software principles to solve complex engineering problems pertaining to software engineering.
PSO2	**Professional Skills** – Graduate will be able to think critically, communicate effectively, and collaborate in teams through participation in co and extra-curricular activities.
PSO3	**Successful Career** – Graduates will possess a solid foundation in computer science and engineering that will enable them to grow in their profession and pursue lifelong learning through post-graduation and professional development.

Course Outcomes (CO's)

Upon completion of this course, the student will be able to:

CO1: Write, test, and debug simple Python programs.

CO2: Implement Python programs with conditionals and loops.

CO3: Develop Python programs step-wise by defining functions and calling them.

CO4: Use Python lists, tuples, dictionaries for representing compound data, Read and write data from/to files in Python

	the names of two text files. the contents of the first file should be input and written to the second file	
17	write a program that input a text file .the program should print all of the unique words in the file in alphabetical order.	
18	write a python class to convert an integer to Roman numeral	
19	write a python class to implement pow(x, n)	
20	write a python class to reverse a string word by word.	

1. **write a program to demonstrate different number data types in python(script.py)**

SOURCE CODE:

```
a = 5
print(a, "is of type", type(a))
a = 2.0
print(a, "is of type", type(a))
a = 1+2j
print(a, "is complex number?", isinstance(1+2j,complex))
```

output:

output:

```
5 is of type <class 'int'>
2.0 is of type <class 'float'>
(1+2j) is complex number? True
```

2: write a program to perform different arithmetic operations on numbers in python

SOURCE CODE:

```
num1 = int(input('Enter First number: '))
num2 = int(input('Enter Second number '))
add = num1 + num2
dif = num1 - num2
mul = num1 * num2
div = num1 / num2
floor_div = num1 // num2
power = num1 ** num2
modulus = num1 % num2
print('Sum of ',num1 ,'and' ,num2 ,'is :',add)
print('Difference of ',num1 ,'and' ,num2 ,'is :',dif)
print('Product of' ,num1 ,'and' ,num2 ,'is :',mul)
print('Division of ',num1 ,'and' ,num2 ,'is :',div)
print('Floor Division of ',num1 ,'and' ,num2 ,'is :',floor_div)
print('Exponent of ',num1 ,'and' ,num2 ,'is :',power)
print('Modulus of ',num1 ,'and' ,num2 ,'is :',modulus
```

output:

```
C:\Python34\python.exe G:/Websites/programminginPython/Programs/arithmetic_operations.py
Enter First number: 9
Enter Second number 5
Sum of  9 and 5 is : 14
Difference of  9 and 5 is : 4
Product of 9 and 5 is : 45
Division of  9 and 5 is : 1.8
Floor Division of  9 and 5 is : 1
Exponent of  9 and 5 is : 59049
Modulus of  9 and 5 is : 4

Process finished with exit code 0
```

3: write a program to create, concatenate and print a string and accessing sub-string from given string

SOURCE CODE:

```
create string
# all of the following are equivalent
my_string = 'Hello'
print(my_string)

my_string = "Hello"
print(my_string)

my_string = '''Hello'''
print(my_string)

# triple quotes string can extend multiple lines
my_string = """Hello, welcome to
        the world of Python"""
print(my_string)
```

output:

Hello

Hello

Hello

Hello, welcome to the world of Python

ii)access string:

ii)concatenate

```
str1 = 'Hello'
str2 ='World!'

# using +
print('str1 + str2 = ', str1 + str2)
```

```
# using *
print('str1 * 3 =', str1 * 3)
```

o/p: str1 + str2 = HelloWorld!
str1 * 3 = HelloHelloHello

iii)print string:

```
str = 'programiz'
print('str = ', str)

#first character
print('str[0] = ', str[0])

#last character
print('str[-1] = ', str[-1])

#slicing 2nd to 5th character
print('str[1:5] = ', str[1:5])

#slicing 6th to 2nd last character
print('str[5:-2] = ', str[5:-2])
```

output:

str = programiz
str[0] = p

str[-1] = z

str[1:5] = rogr

str[5:-2] = am

4:write a python script to print the current date in the fallowing format"Sun May 29 02:26:23 IST 2017"

SOURCE CODE:

```
# Python Date and Time - Example Program

import time;

localtime = time.asctime(time.localtime(time.time()))

print("The current time = ", localtime);
```

output:

```
>>> ================================ RESTART ================================
>>>
The current time =  Fri Feb 20 09:10:09 2015
>>>
```

5: write a program to create, append and remove lists in python

SOURCE CODE:

create a list in python.

```
list1 = ['computer', 'programming', 1957, 2070, 3242];
list2 = [1, 2, 3, 4, 5];
list3 = ["a", "b", "c", "d", "e"];
```

ex:

```
# Python Lists Example - Creating a list program
my_list = ["zero", "one", "two", "three"];
print("Elements of the list, my_list are:");
for ml in my_list:
print(ml);
```

output:

```
>>>
Elements of the list, my_list are:
zero
one
two
three
>>>
```

ii) Concatenating two lists in python

```
# Lists concatenation in python example
my_list = ["zero", "one", "two", "three", "four"];
my_new_list = ["five", "six"];
my_list += my_new_list;
print("List's items after concatenating:");
for l in my_list:
    print(l);
```

output:

```
>>>
List's items after concatenating:
zero
one
two
three
four
five
six
>>>
```

iii) To delete any element from a list in python

```
# Deleting element from list in python example
my_list = ["zero", "one", "two", "three", "four"];
print("Elements of the list, my_list are:");
for ml in my_list:
   print(ml);
index = input("\nEnter index no:");
index = int(index);
print("Deleting the element present at index number",index);
del my_list[index];
print("\nNow elements of the list, my_list are:");
for ml in my_list:
 print(ml);
```

output:

```
>>>
Elements of the list, my_list are:
zero
one
two
three
four

Enter index no:
```

6: write a program to demonstrate working with tuples in python

SOURCE CODE:

Create an empty Tuple in Python

my_tuple = (); here the variable named my_tuple is the name of the tuple.

Create a Tuple with Items in Python

my_tuple = ("me", "my friend", "my brother", "my sister");
or

tuple1 = ("python", "tuple", 1952, 2323, 432);
tuple2 = (1, 2, 3, 4, 5);
tuple3 = ("a", "b", "c", "d", "e");
ex:

```
# Python Tuple Example
print("Creating an empty tuple...");
my_tuple = ();
print("An empty tuple, my_tuple is created successfully.");
if not my_tuple:
    print("The tuple, my_tuple, contains no any item.");
print("Inserting some items to the tuple...");
my_tuple = ("me", "my friend", "my brother", "my sister");
print("\nPrinting the tuple...");
print(my_tuple);
print("\nNow printing each item in the tuple...");
for item_in_tuple in my_tuple:
    print(item_in_tuple);
```

output:

```
>>>
Creating an empty tuple...
An empty tuple, my_tuple is created successfully.
The tuple, my_tuple, contains no any item.
Inserting some items to the tuple...

Printing the tuple...
('me', 'my friend', 'my brother', 'my sister')

Now printing each item in the tuple...
me
my friend
my brother
my sister
>>>
```

7. write a program to demonstrate working with dictionaries in python

SOURCE CODE:

How to create a dictionary

```
# empty dictionary
my_dict = {}
# dictionary with integer keys
my_dict = {1: 'apple', 2: 'ball'}
# dictionary with mixed keys
my_dict = {'name': 'John', 1: [2, 4, 3]}
# using dict()
my_dict = dict({1:'apple', 2:'ball'})
# from sequence having each item as a pair
my_dict = dict([(1,'apple'), (2,'ball')])
```

How to access elements from a dictionary

```
my_dict = {'name':'Jack', 'age': 26}
# Output: Jack
print(my_dict['name'])
# Output: 26
print(my_dict.get('age'))
# Trying to access keys which doesn't exist throws error
# my_dict.get('address')
# my_dict['address']
```

Output : Jack 26

How to change or add elements in a dictionar

```
my_dict = {'name':'Jack', 'age': 26}
# update value
my_dict['age'] = 27
#Output: {'age': 27, 'name': 'Jack'}
print(my_dict)
# add item
my_dict['address'] = 'Downtown'
# Output: {'address': 'Downtown', 'age': 27, 'name': 'Jack'}
print(my_dict)
```

output: {'age': 27, 'name': 'Jack'}
{'age': 27, 'address': 'Downtown', 'name': 'Jack'}

How to delete or remove elements from a dictionary

```
# create a dictionary
squares = {1:1, 2:4, 3:9, 4:16, 5:25}

# remove a particular item
# Output: 16
print(squares.pop(4))
# Output: {1: 1, 2: 4, 3: 9, 5: 25}
print(squares)
# remove an arbitrary item
# Output: (1, 1)
print(squares.popitem())
# Output: {2: 4, 3: 9, 5: 25}
print(squares)
# delete a particular item
del squares[5]
# Output: {2: 4, 3: 9}
print(squares)
# remove all items
squares.clear()
# Output: {}
print(squares)
# delete the dictionary itself
del squares
# Throws Error
# print(squares)
```

Output : 16
{1: 1, 2: 4, 3: 9, 5: 25}
(1, 1)
{2: 4, 3: 9, 5: 25}
{2: 4, 3: 9}
{}

8: program to find the largest number among the three input numbers

SOURCE CODE:

```
# change the values of num1, num2 and num3
# for a different result
num1 = 10
num2 = 14
num3 = 12
# uncomment following lines to take three numbers from user
#num1 = float(input("Enter first number: "))
#num2 = float(input("Enter second number: "))

#num3 = float(input("Enter third number: "))

if (num1 >= num2) and (num1 >= num3):

   largest = num1

elif (num2 >= num1) and (num2 >= num3):
   largest = num2
else:
   largest = num3
print("The largest number between",num1,",",num2,"and",num3,"is",largest)
```

Output : The largest number between 10 , 14 and 12 is 14

9: Program to convert temperature in Celsius to Fahrenheit

SOURCE CODE:

```
# change this value for a different result
celsius = 37.5
# calculate fahrenheit
fahrenheit = (celsius * 1.8) + 32
print('%0.1f degree Celsius is equal to %0.1f degree Fahrenheit' %(celsius,fahrenheit))
```

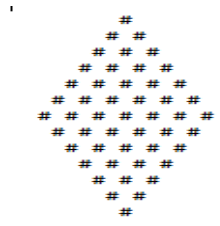
Output : 37.5 degree Celsius is equal to 99.5 degree Fahrenheit

10:write a python program to construct the following pattern, using a nested for loop

SOURCE CODE:

```
def run():
    j = 7
    k = 7
    p = 1
    for i in range(8):
        print " " * k," #" *  i
        k -=1
    while j > 1:
        j -= 1
        print " " * p," #" * j
        p +=1
run()
```

Output :



11:write a python script that prints prime numbers less than 20

SOURCE CODE:

```
# Python program to display all the prime numbers upto n
# Setting the intial value with 1
Starting_value = 1
# Taking input from the user
n  = int(input("Enter the number: "))
print("Prime numbers between", Starting_value, "and", n, "are:")
for num in range(Starting_value, n + 1):
  if num > 1:
     for i in range(2, int(num/2)+1):
        if (num % i) == 0:
           break
     else:
        print(num)
```

Output : Enter the number: 20
Prime numbers between 1 and 20 are:
2
3
5
7
11
13
17
19

12: write a python program to find the factorial of a number using recursion

SOURCE CODE:

```
def recur_factorial(n):
   """Function to return the factorial
   of a number using recursion"""
   if n == 1:
      return n
   else:
      return n*recur_factorial(n-1)

# Change this value for a different result
num = 7

# uncomment to take input from the user
#num = int(input("Enter a number: "))

# check is the number is negative
if num < 0:
   print("Sorry, factorial does not exist for negative numbers")
elif num == 0:
   print("The factorial of 0 is 1")
else:
   print("The factorial of",num,"is",recur_factorial(num))
```

Output : The factorial of 7 is 5040

13:write a program that accepts the lengths of three sides of a triangle as input the program output should indicate whether or not the triangle ,is right triangle(recall from the Pythagorean theorem that in a right triangle ,the square of one side equals the sum of the squares of the other two sides)

SOURCE CODE:

```
print("Input lengths of the triangle sides: ")
x = int(input("x: "))
y = int(input("y: "))
z = int(input("z: "))

if x == y == z:
        print("Equilateral triangle")
elif x==y or y==z or z==x:
        print("isosceles triangle")
else:
        print("Scalene triangle")
```

output:

```
x: 6
y: 8
z: 12
Scalene triangle
```

14: write a python program to define a module to find Fibonacci numbers and import the module to another program

SOURCE CODE:

```
# Fibonacci numbers module

def fib(n):    # write Fibonacci series up to n
    a, b = 0, 1
    while a < n:
        print(a, end=' ')
        a, b = b, a+b
    print()

def fib2(n):   # return Fibonacci series up to n
    result = []
    a, b = 0, 1
    while a < n:
        result.append(a)
        a, b = b, a+b
    return result
>>> import fibo
```

```
>>> fibo.fib(1000)
0 1 1 2 3 5 8 13 21 34 55 89 144 233 377 610 987
>>> fibo.fib2(100)
[0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89]
>>> fibo.__name__
'fibo'
```

```
>>> fib = fibo.fib
```

```
>>> fib(500)
0 1 1 2 3 5 8 13 21 34 55 89 144 233 377
```

15: write a python program to define a module and import a specific function in that module to another program

SOURCE CODE:

```
# Python Module example


def add(a, b):
   """This program adds two
   numbers and return the result"""

   result = a + b
   return result
```

```
>>> import example

>>> example.add(4,5.5)

9.5
```

```
# import statement example

# to import standard module math

import math

print("The value of pi is", math.pi)
```

Output : The value of pi is 3.141592653589793

16: write a script named copyfile.py. This script should prompt the user for the names of two text files. the contents of the first file should be input and written to the second file

SOURCE CODE:

```
#directory:   /home/imtiaz/code.py
text_file = open('file.txt','r')
#Another method using full location
text_file2 = open('/home/imtiaz/file.txt','r')
print('First Method')
print(text_file)
print('Second Method')
print(text_file2)
```

The **output** of the following code will be

```
================== RESTART: /home/imtiaz/code.py ==================

First Method

Second Method

>>>
```

Python Read File, Python Write File

```
#open the file
text_file = open('/Users/pankaj/abc.txt','r')
#get the list of line
line_list = text_file.readlines();
#for each line from the list, print the line
for line in line_list:
    print(line)
text_file.close() #don't forget to close the file
```

output:

```
>>>
================ RESTART: /Users/pankaj/Desktop/read-file.py ====
Hi Pankaj

I am here

>>>
```

Again, the sample code for writing into file is given below

```
#open the file
text_file = open('/Users/pankaj/file.txt','w')
#initialize an empty list
word_list= [ ]
#iterate 4 times
for i in range (1, 5):
    print("Please enter data: ")
    line = input() #take input
    word_list.append(line) #append to the list
text_file.writelines(word_list) #write 4 words to the file

text_file.close() #don't forget to close the file
```

```
>>>
================ RESTART: /Users/pankaj/Desktop/write-file.py =====
Please enter data:
1
Please enter data:
2
Please enter data:
3
Please enter data:
4
>>>
```

Python Copy File

```
import shutil
shutil.copy2('/Users/pankaj/abc.txt', '/Users/pankaj/abc_copy2.txt')
#another way to copy file
shutil.copyfile('/Users/pankaj/abc.txt', '/Users/pankaj/abc_copyfile.txt')
print("File  Done")
```

Python Delete File

We can use below code to delete a file in python.

17: write a program that input a text file .the program should print all of the unique words in the file in alphabetical order.

```
# change this value for a different result
my_str = "Hello this Is an Example With cased letters"

# uncomment to take input from the user
#my_str = input("Enter a string: ")

# breakdown the string into a list of words
words = my_str.split()

# sort the list
words.sort()

# display the sorted words

print("The sorted words are:")
for word in words:
   print(word)
```

o/p:

```
The sorted words are:

Example

Hello

Is
```

```
With

an

cased

letters

this
```

18: write a python class to convert an integer to Roman numeral

Source Code:

```
class py_solution:
    def roman_to_int(self, s):
        rom_val = {'I': 1, 'V': 5, 'X': 10, 'L': 50, 'C': 100, 'D': 500, 'M': 1000}
        int_val = 0
        for i in range(len(s)):
            if i > 0 and rom_val[s[i]] > rom_val[s[i - 1]]:
                int_val += rom_val[s[i]] - 2 * rom_val[s[i - 1]]
            else:
                int_val += rom_val[s[i]]
        return int_val
print(py_solution().roman_to_int('MMMCMLXXXVI'))
print(py_solution().roman_to_int('MMMM'))
print(py_solution().roman_to_int('C'))
```

Output :

```
3986
4000
100
```

19: write a python class to implement pow(x, n)

Source Code:

```
# Python3 program to calculate pow(x,n)

# Function to calculate x
# raised to the power y
def power(x, y):

    if (y == 0): return 1
    elif (int(y % 2) == 0):
        return (power(x, int(y / 2)) *
                power(x, int(y / 2)))
    else:
        return (x * power(x, int(y / 2)) *
                power(x, int(y / 2)))

# Driver Code
x = 2; y = 3
print(power(x, y))
```

Output : 8

20: write a python class to reverse a string word by word.

Source Code:

```
class py_solution:
    def reverse_words(self, s):
        return ' '.join(reversed(s.split()))


print(py_solution().reverse_words('hello .py'))
```

output: .py hello