INDUS UNIVERSITY
INDUS INSTITUTE OF TECHNOLOGY & ENGINEERING
COMPUTER ENGINEERING DEPARTMENT

Subject: Programming for Scientific Computing(Python)
Semester: V

List of Practicals

SIMPLE PROGRAMS:

1. Demonstrate functions and all categories of functions in C/C++/java/python.
2. Demonstrate arrays (Insertion, Deletion, arithmetic operations).
3. Perform Addition, Multiplication for Vectors and Matrices.
4. Practical based on Strings (Length finding, change specific character, palindrome, concatenation)
5. Create a menu driven program to show various operators supported by python.
6. Write a python program to find out if a given number is even or odd using a user defined function.
7. 1) Addition of first 15 numbers using loop. 2) Addition of any 15 numbers using a loop.
8. Write a python program to check if the entered year is leap year or not.
9. Write a Python program which accepts the user's first and last name and print them in reverse order with a space between them.
10. Write a Python program to print the calendar of a given month and year.
11. Write a Python program to check whether a specified value is contained in a group of values.
       Test Data:
    c. -> [1, 5, 8, 3]: True
    -1 -> [1, 5, 8, 3]: False
12. Write a Python program to get OS name, platform and release information.

USER DEFINED FUNCTIONS (RECURSION, ARGUMENT PASSING, SCOPING)

13. Write a function to find out x^y. Function should find out the square of x in case of default argument passing.
14. Write a function to find out the factorial of a given number.
    I) without recursion   II) with recursion
15. Write a program to find out Fibonacci series using recursion and function as an object.
16. Demonstrate Function Scoping.

HIGHER ORDER FUNCTIONS (LAMDA, MAP, FILTER)

17. Write a Python program to check whether a specified value is contained in a group of values using lambda function.
       Test Data: 3 -> [1, 5, 8, 3] : True
                       -1 -> [1, 5, 8, 3] : False
18. Write a Python program to find whether a given string ends with a given character using Lambda.
19. Prime or not prime. Input: L= [3,4,6,9,11] Output: L= [P, NP, NP, NP, P] using map function.

20. Write a python program to find out even numbers from a list using filter ().

MODULES

21. An interactive program where one module asks numbers from the user and the second module performs at least three arithmetic operations on them.

FILE HANDLING

22. A program to count the number of words, number of lines, occurrence of particular word, occurrence of particular character, number of blank spaces in a text file.
23. A program to read a string from the user and append it into a file.
24. A program to copy the contents of one file into another.
25. A program to read a text file and print all the numbers present in the text file.
26. A program to append the contents of one file to another file.
27. A program to read a file and capitalize the first letter of every word in the file.
28. A program to read the contents of a file in reverse order.

Collection Object Programs:

29. Write a Python program which accepts a sequence of comma-separated numbers from the user and generate a list and a tuple with those numbers.
30. Write a Python program to display the first and last colours from the following list. [orange, purple, red, yellow, blue]
31. Write a Python program to concatenate all elements in a list into a string and return it.
32. Write a Python program to print out a set containing all the colours from color_list_1 which are not present in color_list_2.
33. Test Data: color_list_1 = set (["White", "Black", "Red"])
    color_list_2 = set (["Red", "Green"])
    Expected Output: {'Black', 'White'}
34. Write a Python script to print a dictionary where the keys are numbers between 1 and 15 (both included) and the values are squares of keys.
    Sample Dictionary: {1: 1, 2: 4, 3: 9, 4: 16, 5: 25, 6: 36, 7: 49, 8: 64, 9: 81, 10: 100, 11: 121, 12: 144, 13: 169, 14: 196, 15: 225}
35. Write a menu driven program to implement the following methods on List.
    (1) Create (2) Update particular element of list (3) Append to the list
    (4) Delete whole list (5) Delete particular element (6) Sort the list (7) Find length
36. Write a menu driven program to implement the following methods on set.
    (1) Create (2) Update particular element of set (3) Append to the set
    (4) Delete whole set (5) Delete particular element (6) Sort the set (7) Find length
37. Write a menu driven program to implement following methods on Dictionary.
    (1) Create (2) Update particular element of dictionary (3) Append to the dictionary (4) Delete whole dictionary (5) Delete particular element (6) Sort the dictionary (7) Find length
38. Do following:
    1) Define and Call user defined function for n numbers one by one.
    2) Check if each element is Even or Odd and Print it. (Use Class Variable) 3) Print List of even numbers and odd numbers.

39. Print total number of Even numbers and Total number of Odd Numbers.
   Example: 1) function(21), function(22), function(35),function(36),function(40).
            2) 21 is odd, 22 is even, 35 is odd,36 is even, 40 is even.
            3) Even={22,36,40} Odd={21,35}
            total number of even = 3, total number of odd=2

Object- Orientation Programs:

40. Implement following inheritance:
    (1)Single (2) Multiple (3) Multilevel (4) Hybrid
41. Demonstrate Overriding and methods to overcome.

Data Structures Programs:

42. Implement following searching techniques:
    (1) Linear (2) Binary
43. Implement following sorting algorithms.
    (1) Selection (2) Merge (3) Tim
44. Implement a Singly Linked List. (Insert, Display, Delete).

Regular Expressions Programs:

45. Implement following Regular Expressions.

    1) Write a Python Program that searches a string to see if it starts with "The " and ends with "Indus".
    2) Write a Python Program that returns a match where the string contains a white space character.
    3) Write a Python program that matches a string that has an a followed by three 'b'. 4) Write a Regular Expression to find Words or strings having three characters and with 'm' as first character.
    5) Write a regular expression to retrieve all words starting with "a".
    6) Write a regular expression to retrieve all words starting with a numeric digit.
    7) Write a regular expression to retrieve all words having 5 character length.
    8) Write a regular expression to retrieve all words with 3,4 or 5 character length. [a-z]{3,5}
    9) Write a regular expression to retrieve all single digits from a string.
    10) Write a regular expression to retrieve the last word from the string.
    11) Write a regular expression to retrieve all words starting with 'an' or 'ak'.
    12) Write a regular expression to retrieve DOB from the string.

Networking and Multithreading Programs:

46. Implement Chat Application.
47. Demonstrate multithreading.

GUI Using Tkinter:

48. Create a tkinter GUI to implement a calculator.
49. Create a dropdown list to select a city from the given list of cities.
50. Write a tkinter code to place an image/picture in the window.
51. Create Registration window.

GUI Using Turtle:

52. Using the Turtle module in python, Draw Square, Rectangle, Star and explore various attributes with it (ex: background color, line fill, border color, etc…)

Numpy

53. a) Extract all odd numbers from the array using "where" clause.
    b) Replace all odd numbers in array with -1
    c) Convert a 1D array to a 2D array with 2 rows and 5 columns.
    d) Get the common items between array1 and array2
      Input:
      array1 = [1,2,3,2,3,4,3,4,5,6]
      array2 = [7,2,10,2,7,4,9,4,9,8]
      Desired Output:
      array([2, 4])
    e) Perform Matrix multiplication on 2 matrices.
    f) Using numpy and matplotlib/pylab generate bar plots for appropriate data.

Pandas:

54. Create a DataFrame fruits that looks like this:

	Apples	Bananas
O	30	21

55. Create a dataframe fruit_sales that matches the diagram below:

	Apples	Bananas
2017 Sales	35	21
2018 Sales	41	34

56. Create a variable ingredients with a Series that looks like:

    Flour   4 cups
    Milk   1 cup
    Eggs   2 large
    Spam   1 can
    Name: Dinner, dtype: object

57. Download file name: winemag-data-130k-v2.csv and perform the following.
    1) Display row number 25
    2) Display column number 13
    3) Display rows where country name = France
    4) Display records where province=Michigan and taster_name=Alexander Peartree
    5) Explore describe() for the generated dataframe.

58. To display any Sports Scoreboard generate appropriate plot (line/bar/scatter, etc..)

Miscellaneous:

59. Basic Program of Flask.
60. Basic Program of TensorFlow.