St. Francis Institute of Technology, Mumbai-400 103
Department Of Information Technology

A.Y. 2023-24
Class: SE-ITA/B, Semester: IV

Subject: Python Lab

Experiment – 2:

a) Python Inbuilt Mathematical and String Methods
b) Implementing Python Operators

1. **Aim**: To implement Python programs for the following:
   a. Write a Python program to demonstrate any 10 inbuilt Math methods.
   b. Write a Python program to demonstrate any 10 inbuilt String methods.

2. **Objectives**: After performing this experiment, a student will be able to write different String and Math methods.
3. **Prerequisite:** Python Basics
4. **Requirements:** PC, Python 3.9, Windows 10/ MacOS/ Linux, IDLE IDE.
5. **Pre-Experiment Exercise:**

Theory:

a. Math Methods:

Python includes the following functions that perform mathematical calculations. Random numbers are used for games, simulations, testing, security, and privacy applications. Python also includes some trigonometric functions.

b. Strings in Python:

Python has a set of built-in methods that you can use on strings. All string methods return new values. They do not change the original string.

c. Operators in python

i. Arithmetic operators +, -, *, %, /, //, **
ii. Assignment operators =, +=, -=, *=, /=%=,//=.**=,&=,|=,^=.<<=,>>=
iii. Comparison operators ==, !=, >=, <=, > , <
iv. Logical operators : and, or , not
v. Identity operators: is, isnot
vi. Membership operators : in , notin
vii. Bitwise operators: &, !, ^, ~, <<, >>

6. **Laboratory Exercise:**

A. Procedure

i. Open IDE for Python programming
ii. Open new Python file from menu file-new
iii.Type Python code with proper syntax
iv.Save file with .py extension
v. Execute the command statements inside the saved file using ctrl+enter key and explore results in other windows of IDE.
vi.Add relevant comments in your programs and execute the code. Test it for various cases.

7. **Post-Experiments Exercise**

A. Extended Theory:

a. List and explain different building blocks of a Python program.

b. List the different types of operators used in Python.

B. Post Lab Program:

a. Write a Python program to demonstrate types of operators.

C. Conclusion:

1. Write what was performed in the program (s).
2. What is the significance of program (s)?

References:

[1]Dr. R. Nageswara Rao," Core Python Programming" , Dreamtech Press, Wiley Publication

[2]https://www.pythonforbeginners.com/

[3] https://www.w3schools.com/

[4] https://www.geeksforgeeks.org/tf6

In-Lab Program

a.Write a Python program to demonstrate any 10 inbuilt Math methods.

CODE:

```
#Importing Libraries
import math
import cmath

#General Terms
#math.pi (Calling π(radian) through dot using math lib.)

#1. Getting Values in Degrees and Radians
#radians = degress * π(here 3.14159) /180 deg
#Degrees()- Convert Radians to Degrees
print("\nConverting Radians into degress using math.degrees()")
print("pi/2 in degrees is ",math.degrees((math.pi/2)))
print("pi/4 in degrees is ",math.degrees((math.pi/4)))
print("pi in degrees is ",math.degrees((math.pi)))
print("pi/37 in degrees is ",math.degrees((math.pi/37)))

#Radians()- Convert Degree to Radians
print("\nConverting Degrees into radians using math.radians()")
print("90 in radians is",math.radians(90))
print("45 in radians is",math.radians(45))
print("180 in radians is",math.radians(180))
print("4.86 in radians is",math.radians(4.86))

#2. Getting values of Sin,cos and tan in radians
print("\nGetting values of Sin, Cos and tan in radians using
math.sin(), math.cos() and math.tan()")
print("Sin(pi/2) is ", math.sin(math.pi/2))
print("Cos(pi/2) is ", math.cos(math.pi/2))
print("tan(pi)   is ", math.tan(math.pi))
```

```
#3. Getting arc Values
print("\nGetting arc Values (Output is in Radians) using
math.asin(), math.acos() and math.atan()")
print("Sin inverse of 1 is ",math.asin(1))
print("Cos inverse of 0 is",math.acos(0))
print("Tan inverse of 1 is",math.atan(1))

#Complex Declearation
x=1.0
y=1.0
z= complex(x,y)
print("\nComplex Number using ",x, " and ",y," is ",z)

#4. Getting Inverse of Complex Number
print("\nGetting Inverse of Complex Number using cmath.asin(),
cmath.acos() and cmath.atan()")
print("The arc sine of ",z," is ",cmath.asin(z))
print("The arc cosine of ",z," is ",cmath.acos(z))
print("The arc tangent of ",z," is ",cmath.atan(z))

#5. Finding the Exponantial of the sepcified value
print("\nFinding the Exponantial of the sepcified value using
math.exp()")
print("e raised to 1 is ",math.exp(1))
print("e raised to 65 is ",math.exp(65))
print("e raised to -6.89 is ",math.exp(-6.89))

#6.Finding absolute value in float
print("\nFinding absolute value in float using math.fabs() and
abs()")
print("Absolute value of -63 is (using fabs) ",math.fabs(-63))
print("Absolute value of -63 is (using abs) ",abs(-63))
```

```
#7. Finding Factorial of a Number
print("\nFinding Factorial of a Number using math.factorial()")
print("Factorial of 5 is ",math.factorial(5))
print("Factorial of 6 is ",math.factorial(6))
print("Factorial of 10 is ",math.factorial(10))

#8.Rounding Number down to the nearest integer
print("\nRounding down to nearest integer using Floor()
function")
print("Round of -1.5 is ",math.floor(-1.5))
print("Round of -1.4 is ",math.floor(-1.4))
print("Round of -1.3 is ",math.floor(-1.3))
print("Round of -1.2 is ",math.floor(-1.2))
print("Round of -1.1 is ",math.floor(-1.1))
print("Round of 0 is ",math.floor(0))
print("Round of 0.1 is ",math.floor(0.1))
print("Round of 0.2 is ",math.floor(0.2))
print("Round of 0.3 is ",math.floor(0.3))
print("Round of 0.5 is ",math.floor(0.5))
print("Round of 0.9 is ",math.floor(0.9))

#9.Returning th reminder of x/y
print("\nReturning Remainder using fmod() function")
print("remainder of 20/4 is",math.fmod(20,4))
print("remainder of 20/3 is",math.fmod(20,3))
print("remainder of 15/6 is",math.fmod(15,6))
print("remainder of -10/3 is",math.fmod(-10,3))

#10.Returning mantissa and exponent of number
print("\nReturning mantissa and exponent of number using frexp()
function")
print("(Mantissa and Exponent) of 4 is",math.frexp(4))
print("(Mantissa and Exponent) of -4 is",math.frexp(-4))
print("(Mantissa and Exponent) of 7 is",math.frexp(7))
```

```
#11.Print the Sum of all items
print("\nPrint the Sum of items using fsum() function")
print("Sum of [1,2,3,4,5] is ",math.fsum([1,2,3,4,5]))
print("Sum of [100,400,340,500] is
",math.fsum([100,400,340,500]))
print("Sum of (1.7,0.3,1.5,4.5) is
",math.fsum((1.7,0.3,1.5,4.5)))

#12.Finding Gcd of the two integer
print("\nFinding the Gcd of Integer using gcd() function")
print("Gcd of 3 and 6 is ",math.gcd(3,6))
print("Gcd of 6 and 12 is ",math.gcd(6,12))
print("Gcd of 36 and 12 is ",math.gcd(36,12))

#13.Compare the closeness of two values
print("\nComparing Closeness using isclose() function")
print("Is 1.21 close to 1.21 :",math.isclose(1.21,1.21))
print("Is 1.223 close to 1.4566 :",math.isclose(1.223,1.4566))
print("Is 1.233 close to 1.233000001
:",math.isclose(1.233,1.233000001))
print("Is 1.227 close to 1.230 :",math.isclose(1.227,1.230))

#14. Comparing Closeness upto provided values
print("\nComparing Closeness using isclose() and abs_tol
function")
print("Is 8.005 close to 8.450 upto 0.4 :",
math.isclose(8.005,8.450,abs_tol =0.4))
print("Is 8.005 close to 8.450 upto 0.5 :",
math.isclose(8.005,8.450,abs_tol =0.5))

#15.Raised to Function
print("\nGetting x to the power y using pow() function")
print("9 to the power 3 is", math.pow(9,3))
```

```
#16.Returning the Natural logarithm of Different Number
print("\nReturning the Natural logarithm of Different Number
using log() function")
print("Natural log of 2.7183 is ",math.log(2.7183))
print("Natural log of 2 is ",math.log(2))
print("Natural log of 1 is ",math.log(1))

#17.Returning the base-10 logarithm of Different Number
print("\nReturning the base-10 logarithm of Different Number
using log10() function")
print("base-10 log of 2.7183 is ",math.log10(2.7183))
print("base-10 log of 2 is ",math.log10(2))
print("base-10 log of 1 is ",math.log10(1))

print("\nSome Basic parameter using math lib:")
#Print the Value of e
print("Value of e is ",math.e)

#Print the Positive Infintiy
print("Value of Positive Infinity is  ",math.inf)
#Print the Negative Infintiy
print("Value of Negative Infinity is ",-math.inf)
```

Output Of Program a:

```
PS F:\College Stuff\Vishal Mahajan SE IT SEM 4\Python Lab\EXP2> python .\MathsFunction.py

Converting Radians into degress using math.degrees()
pi/2 in degrees is  90.0
pi/4 in degrees is  45.0
pi in degrees is  180.0
pi/37 in degrees is  4.864864864864865

Converting Degrees into radians using math.radians()
90 in radians is 1.5707963267948966
45 in radians is 0.7853981633974483
180 in radians is 3.141592653589793
4.86 in radians is 0.08482300164692443
```

```
Getting values of Sin, Cos and tan in radians using math.sin(), math.cos() and math.tan()
Sin(pi/2) is  1.0
Cos(pi/2) is  6.123233995736766e-17
tan(pi)   is  -1.2246467991473532e-16

Getting arc Values (Output is in Radians) using math.asin(), math.acos() and math.atan()
Sin inverse of 1 is  1.5707963267948966
Cos inverse of 0 is 1.5707963267948966
Tan inverse of 1 is 0.7853981633974483

Complex Number using  1.0  and  1.0  is  (1+1j)

Getting Inverse of Complex Number using cmath.asin(), cmath.acos() and cmath.atan()
The arc sine of  (1+1j)  is  (0.6662394324925153+1.0612750619050357j)
The arc cosine of  (1+1j)  is  (0.9045568943023814-1.0612750619050357j)
The arc tangent of  (1+1j)  is  (1.0172219678978514+0.40235947810852507j)

Finding the Exponantial of the sepcified value using math.exp()
e raised to 1 is  2.718281828459045
e raised to 65 is  1.6948892444103338e+28
e raised to -6.89 is  0.0010179138409954387

Finding absolute value in float using math.fabs() and abs()
Absolute value of -63 is (using fabs)  63.0
Absolute value of -63 is (using abs)  63

Finding Factorial of a Number using math.factorial()
Factorial of 5 is  120
Factorial of 6 is  720
Factorial of 10 is  3628800

Rounding down to nearest integer using Floor() function
Round of -1.5 is  -2
Round of -1.4 is  -2
Round of -1.3 is  -2
Round of -1.2 is  -2
Round of -1.1 is  -2
Round of 0 is  0
Round of 0.1 is  0
Round of 0.2 is  0
Round of 0.3 is  0
Round of 0.5 is  0
Round of 0.9 is  0

Returning Remainder using fmod() function
remainder of 20/4 is 0.0
remainder of 20/3 is 2.0
remainder of 15/6 is 3.0
remainder of -10/3 is -1.0
```

```
Returning mantissa and exponent of number using frexp() function
(Mantissa and Exponent) of 4 is (0.5, 3)
(Mantissa and Exponent) of -4 is (-0.5, 3)
(Mantissa and Exponent) of 7 is (0.875, 3)

Print the Sum of items using fsum() function
Sum of [1,2,3,4,5] is  15.0
Sum of [100,400,340,500] is  1340.0
Sum of (1.7,0.3,1.5,4.5) is  8.0

Finding the Gcd of Integer using gcd() function
Gcd of 3 and 6 is  3
Gcd of 6 and 12 is  6
Gcd of 36 and 12 is  12

Comparing Closeness using isclose() function
Is 1.21 close to 1.21 : True
Is 1.223 close to 1.4566 : False
Is 1.233 close to 1.233000001 : True
Is 1.227 close to 1.230 : False

Comparing Closeness using isclose() and abs_tol function
Is 8.005 close to 8.450 upto 0.4 : False
Is 8.005 close to 8.450 upto 0.5 : True

Getting x to the power y using pow() function
9 to the power 3 is 729.0

Returning the Natural logarithm of Different Number using log() function
Natural log of 2.7183 is  1.0000066849139877
Natural log of 2 is  0.6931471805599453
Natural log of 1 is  0.0

Returning the base-10 logarithm of Different Number using log10() function
base-10 log of 2.7183 is  0.43429738512450866
base-10 log of 2 is  0.3010299956639812
base-10 log of 1 is  0.0

Some Basic parameter using math lib:
Value of e is  2.718281828459045
Value of Positive Infinity is   inf
Value of Negative Infinity is  -inf
PS F:\College Stuff\Vishal Mahajan SE IT SEM 4\Python Lab\EXP2>
```

b. Write a Python program to demonstrate any 10 inbuilt String methods.

Code:

```
"""
String Lower and Upper Operation
1. string.lower() converts the string to lower case
2. string.upper() converts the string to upper case
3. string.islower() returns True if all the characters in the
string are in lower case
4. string.isupper() returns True if all the characters in the
string are in upper case
"""
print("\nString Lower and Upper Operation using string.lower()
and string.upper()")
string1="HELLO WORLD"
print("Original String is",string1)
print("\n1. Lowered String using string.lower()
is",string1.lower())
print("2. Is the string",string1," in Uppercase
:",string1.isupper())
print("3. Is the string",string1," in Lowercase
:",string1.islower())

string2="Hello World"
print("\n4. Uppered String using string.upper()
is",string2.upper())
print("Is the string",string2," in Uppercase
:",string2.isupper())

"""
String Concatenation Using + operator, join() method and
format() function
5. join() method is use to combine the strings
6. format() function is use to concatenate the strings
"""
```

```
print("\nString Concatenation")
First="Vishal"
Surname=" Mahajan"
Class=" SE IT A3"
Fullname= First+Surname
Entire= First+Surname+Class
print("The Concatenated String is ",Fullname)
print("The next Concatendated String is "+ Fullname +" Student")
print("Completed Three Variable Concat is "+Entire)

#String Concatenantion using join() method
print("\n5. The Concatented String Using .join() is
"+"".join([First,Surname,Class]))
#String Concatenantion using format() function
print("\n6. Output Using Format")
txt1="My name is {name}, I'm {age} year old".format(name="Vishal
Rajesh Mahajan",age=20)
print(txt1)
txt2="My name is {0}, I'm {1} year old".format("Vishal Rajesh
Mahajan",20)
print(txt2)
txt3="My name is {}, I'm {} year old".format("Vishal Rajesh
Mahajan",20)
print(txt3)

txt="I am {:<8} year old."
print("\nUsing :< for left align : ",txt.format(20))
txt="I am {:>8} year old."
print("Using :> for right align : ",txt.format(20))
txt="I am {:^8} year old."
print("Using :^ for center-align align : ",txt.format(20))
a="Python"
print("\nUsing * to multiply the String by 3 times : ",a*3)
```

```
"""
String Split and Replace Operation
7. string.split() method is use to split the string
8. string.replace() method is use to replace the string
"""
print("\nString Split and Replace Operation")
string3="Vishal Rajesh Mahajan"
print("Original String is ",string3)
print("7. Splitting the String using string.split() is
",string3.split())
print("   Splitting the String using string.split('a') is
",string3.split('a'))
print("8. Replacing the String using string.replace('l','b') is
",string3.replace('l','b'))

"""
9. string.find() method is use to find the string
10. string.index() method is use to find the string
11. string.count() method is use to count the string
"""
print("\nString Find, Index, Count Operation")
string4="Vishal Rajesh Mahajan"
print("Original String is ",string4)
print("9. Finding the char using string.find('l') is
",string4.find('l'))
print("10. Finding the char using string.index('l') is
",string4.index('l'))
print("11. Counting the number of char in string using
string.count('a') is ",string4.count('a'))
print("\n")
```

Output Of Program b:

```
PS F:\College Stuff\Vishal Mahajan SE IT SEM 4\Python Lab\EXP2> python .\StringFunction.py

String Lower and Upper Operation using string.lower() and string.upper()
Original String is HELLO WORLD

1. Lowered String using string.lower() is hello world
2. Is the string HELLO WORLD  in Uppercase : True
3. Is the string HELLO WORLD  in Lowercase : False

4. Uppered String using string.upper() is HELLO WORLD
Is the string Hello World  in Uppercase : False

String Concatenation
The Concatenated String is  Vishal Mahajan
The next Concatendated String is Vishal Mahajan Student
Completed Three Variable Concat is Vishal Mahajan SE IT A3

5. The Concatented String Using .join() is Vishal Mahajan SE IT A3

6. Output Using Format
My name is Vishal Rajesh Mahajan, I'm 20 year old
My name is Vishal Rajesh Mahajan, I'm 20 year old
My name is Vishal Rajesh Mahajan, I'm 20 year old

Using :< for left align :  I am 20      year old.
Using :> for right align :  I am       20 year old.
Using :^ for center-align align :  I am    20    year old.

Using * to multiply the String by 3 times :  PythonPythonPython

String Split and Replace Operation
Original String is  Vishal Rajesh Mahajan
7. Splitting the String using string.split() is  ['Vishal', 'Rajesh', 'Mahajan']
   Splitting the String using string.split('a') is  ['Vish', 'l R', 'jesh M', 'h', 'j', 'n']
8. Replacing the String using string.replace('l','b') is  Vishab Rajesh Mahajan

String Find, Index, Count Operation
Original String is  Vishal Rajesh Mahajan
9. Finding the char using string.find('l') is  5
10. Finding the char using string.index('l') is  5
11. Counting the number of char in string using string.count('a') is  5


PS F:\College Stuff\Vishal Mahajan SE IT SEM 4\Python Lab\EXP2>
```

Post-Exp Exercise:

a. Write a Python program to demonstrate types of operators.

Code:

```
a=int(input("Enter the First Number on which  Operation is to be
Performed : "))
b=int(input("Enter the Second Number on which Operation is to be
Performed : "))

#1. Arithmetic Operators
print("\nArithmetic Operators")
print("Addition of ",a," and ",b," is ",a+b)
print("Subtraction of ",a," and ",b," is ",a-b)
print("Multiplication of ",a," and ",b," is ",a*b)
print("Division of ",a," and ",b," is ",a/b)
print("Modulus of ",a," and ",b," is ",a%b)
print("Exponent of ",a," and ",b," is ",a**b)
print("Floor Division of ",a," and ",b," is ",a//b)

#2. Comparison Operators
print("\nComparison Operators")
print("Is ",a," greater than ",b," : ",a>b)
print("Is ",a," less than ",b," : ",a<b)
print("Is ",a," equal to ",b," : ",a==b)
print("Is ",a," not equal to ",b," : ",a!=b)
print("Is ",a," greater than or equal to ",b," : ",a>=b)
print("Is ",a," less than or equal to ",b," : ",a<=b)
```

```
#3. Bitwise Operators
print("\nBitwise Operators")
print("Bitwise AND of ",a," and ",b," is ",a&b)
print("Bitwise OR of ",a," and ",b," is ",a|b)
print("Bitwise XOR of ",a," and ",b," is ",a^b)
print("Bitwise NOT of ",a," is ",~a)
print("Bitwise Left Shift of ",a," by 2 is ",a<<2)
print("Bitwise Right Shift of ",a," by 2 is ",a>>2)

#4. Assignment Operators
print("\nAssignment Operators")
c=b
print("The Value of c is ",c)
c+=b
print("The Value of c+=b is ",c)
c-=b
print("The Value of c-=b is ",c)
c*=b
print("The Value of c*=b is ",c)
c/=b
print("The Value of c/=b is ",c)
c%=b
print("The Value of c%=b is ",c)
c**=b
print("The Value of c**=b is ",c)
c//=b
print("The Value of c//=b is ",c)

#5. Logical Operators
print("\nLogical Operators")
print("True and True is ",True and True)
print("True or False is ",True or False)
print("not True is ",not True)
```

Output Of Post-EXP Program :

```
PS F:\College Stuff\Vishal Mahajan SE IT SEM 4\Python Lab\EXP2\Post Experiment> python .\Types_of_operators.py
Enter the First Number on which  Operation is to be Performed : 63
Enter the Second Number on which Operation is to be Performed : 2

Arithmetic Operators
Addition of  63  and  2  is  65
Subtraction of  63  and  2  is  61
Multiplication of  63  and  2  is  126
Division of  63  and  2  is  31.5
Modulus of  63  and  2  is  1
Exponent of  63  and  2  is  3969
Floor Division of  63  and  2  is  31

Comparison Operators
Is  63  greater than  2  :  True
Is  63  less than  2  :  False
Is  63  equal to  2  :  False
Is  63  not equal to  2  :  True
Is  63  greater than or equal to  2  :  True
Is  63  less than or equal to  2  :  False

Bitwise Operators
Bitwise AND of  63  and  2  is  2
Bitwise OR of  63  and  2  is  63
Bitwise XOR of  63  and  2  is  61
Bitwise NOT of  63  is  -64
Bitwise Left Shift of  63  by 2 is  252
Bitwise Right Shift of  63  by 2 is  15

Assignment Operators
The Value of c is  2
The Value of c+=b is  4
The Value of c-=b is  2
The Value of c*=b is  4
The Value of c/=b is  2.0
The Value of c%=b is  0.0
The Value of c**=b is  0.0
The Value of c//=b is  0.0

Logical Operators
True and True is  True
True or False is  True
not True is  False
PS F:\College Stuff\Vishal Mahajan SE IT SEM 4\Python Lab\EXP2\Post Experiment>
```