

SILIGURI INSTITUTE OF TECHNOLOGY

LABPRATORY MANUAL

PROGRAMMING WITH PYTHON

# SILIGURI INSTITUTE OF TECHNOLOGY

## VISON

Siliguri Institute of Technology is To be a recognized institution offering high quality education, opportunities to students to become globally employable Engineers/Professionals in best ranked industries and research organization.

## MISSION

To impart quality technical education for holistic development of students who will full fil the needs of the industry/society and be actively engaged in making a successful career in industry/research/higher education in India & abroad

### PROGRAM EDUCATIONAL OBJECTIVES (PEO) :

The graduates will be:

- Competent professionals with knowledge of Computer Science & Engineering to pursue variety of careers/higher education.
- Proficient in successfully designing innovative solutions to real life problems that are technically sound, economically viable and socially acceptable.
- Efficient team leaders, effective communicators and capable of working in multi-disciplinary environment following ethical values.
- Capable of adapting to new technologies and constantly upgrade their skills with an attitude towards lifelong learning.

### PROGRAM OUTCOMES (PO)

Engineering Graduates will be able to:

- Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 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.
- 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.
- 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.

**Programming with Python :**

## Course Objective

**C01: Student will be able to install, set path variable of Python 2.7 versions and write, test, and debug simple Python programs.**

**C02: To implement Python programs with conditionals and loops.**

**C03: Use functions for structuring Python programs.**

**C04: Represent compound data using Python lists, tuples, dictionaries.**

**C05: Importing module, Read and write data from/to files in Python.**

### LABORATORY

Maulana Abul Kalam Azad University of Technology,  
(Formerly West Bengal University of Technology) West Bengal

**Syllabus for B. Tech in Information Technology  
(Applicable from the academic session 2018-2019)**

**Subject Code : PCC-CS 393**

**Category: Professional Core course**

**Subject Name : IT Workshop (Sci Lab/MATLAB/Python/R)**

**Semester : Third L-T-P : 1-0-3 Credit:3**

Pre-Requisites: No-prerequisite

Programming with Python

Introduction :

History, Features, Setting up path, Working with Python, Basic Syntax, Variable and Data Type, Operator

Conditional Operator :

If, if-else, Nested if-else, looping : For, While, Nested loops

Control Statements:

Break, Continue, pass

String Manipulation:

Accessing String Basic Operations, String slices, Function and Methods.

List :

Introduction, Accessing list, Operations, Working with lists, Function and Methods.

Tuple :

Introduction, Accessing tuples, Operations, Working, Functions and Methods.

Dictionary:

Introduction, Accessing values in dictionaries, Working with dictionaries, Properties

Function :

Defining a function, Calling a function, Types of functions, Function Arguments, Anonymous functions, Global and local variables.

Module :

Importing module, Math module, Random module, Packages, Composition, Input-Output

Printing on screen, Reading data from keyboard, Opening and closing file, Reading and writing files, Functions.

Exception Handling:

Exception, Exception Handling, Except clause, Try ? finally clause, User Defined Exceptions.

Experiment NO.	Topic	Title																	
1	BASIC	A).Install Python and Set Path variable																	
		B). Running instructions in Interactive interpreter and a Python Script																	
		C). Write a program to purposefully raise Indentation Error and Correct it. [ Display your name and Department in two separate line ]																	
2	Operator	A). Write a program to compute distance between two points taking input from the user (Pythagorean Theorem)																	
		B). Write a program add.py that takes 2 numbers as command line arguments and prints its sum.																	
3	Conditional Statement	A) Write a program to check a given number is even or odd.																	
		B) Write a program to check a given year is leap year or not.																	
		C) Write a program to calculate real roots of a quadratic equation.																	
4	Loop Statement	A) Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero. [using range() method]																	
		B) Write a program to calculate the Sum of even Fibonacci numbers below 4 Thousand.																	
		C) Write a program to calculate GCD of two number.																	
		D) Write a program to print the following pattern : i) <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>*</td><td></td><td></td></tr><tr><td>*</td><td>*</td><td></td></tr><tr><td>*</td><td>*</td><td>*</td></tr></table> ii) <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td></td><td></td><td></td><td></td><td></td></tr></table> iii) <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td></td><td></td><td>*</td><td></td><td></td></tr></table>	*			*	*		*	*	*								*
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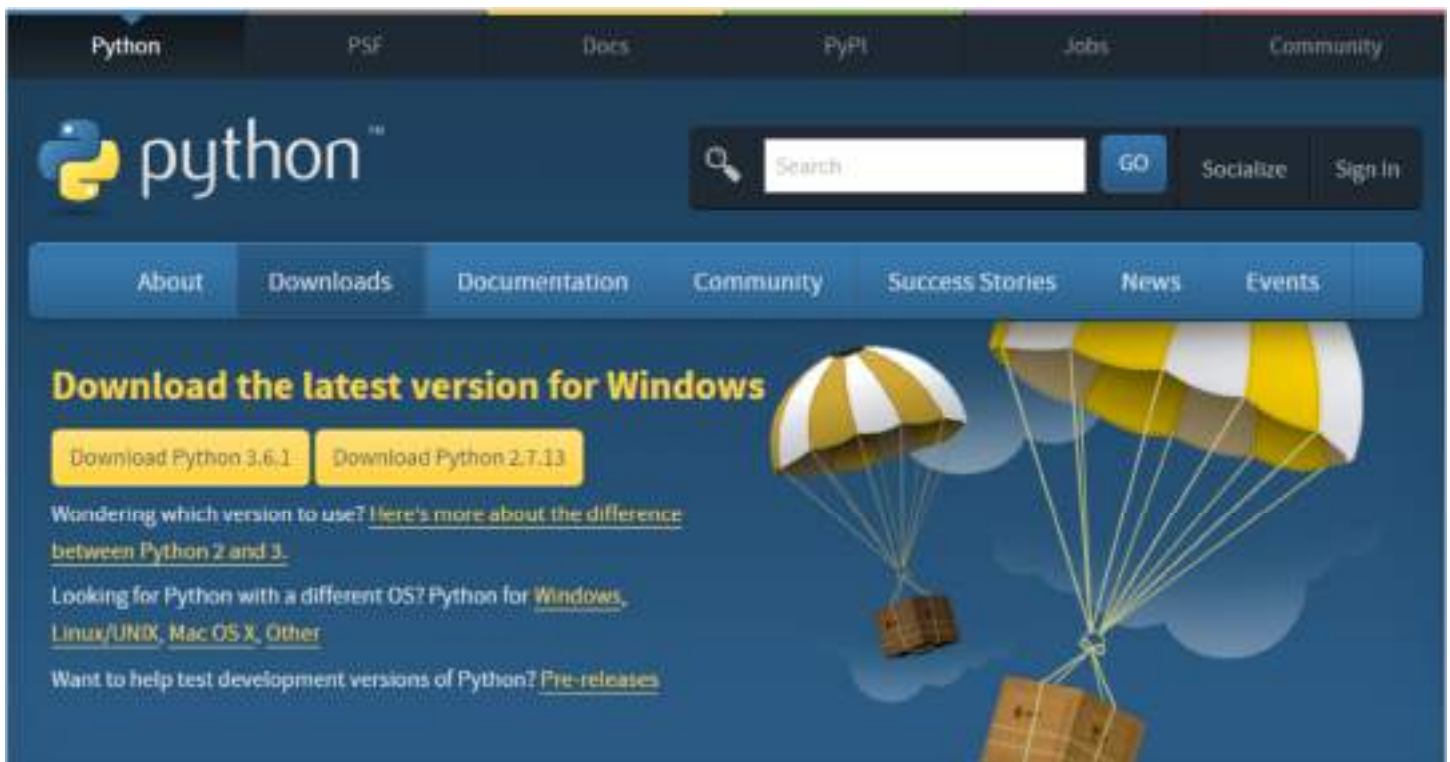
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5	String Operation	<p>A) Write a program to count no of vowel in a string( using in operator )</p> <p>B) Write a program to perform following operation on strong:</p> <p>i) The total number of characters in the string</p> <p>ii) The last three characters of the string</p> <p>iii) Print The string backwards direction</p> <p>iv) Print The string in all caps</p>																			
6	Tuple and Set	<p>A)Write a program to initialize and Display tuple data structure.</p> <p>B) Write a program to initialize and Display two Set data structure and do the following operation :</p> <p>i) union ii)intersection ii)difference</p>																			
7	List	<p>A) Print the total number of items in the list</p> <p>B) Print the list in reverse order.</p> <p>C) Remove the first and last items from the list, sort the remaining items, and print the result.</p> <p>D) Write a program that generates a list of 20 random numbers between 1 and 100.</p> <p>(a) Print the list.</p> <p>(b) Print the average of the elements in the list.</p> <p>(c) Print the largest and smallest values in the list.</p> <p>(d) Print the second largest and second smallest entries in the list</p> <p>(e) Print how many even numbers are in the list.</p> <p>E) Write a program that takes any two lists L and M of the same size and adds their elements together to form a new list N whose elements are sums of the corresponding elements in L and M. For instance, if L=[3,1,4] and M=[1,5,9], then N should equal [4,6,13].</p> <p>F)Write a program to perform multiplication of two square matrices</p>																			
8	Function	<p>A) Write a function called rectangle that takes two integers m and n as arguments and prints out an m n box consisting of asterisks. Shown below is the output of rectangle(2,4).</p> <pre>**** ****</pre> <p>B) Write a function called sum_digits() that is given an integer num and returns the sum of the digits of num.</p> <p>c)The digital root of a number n is obtained as follows: Add up the digits n to get a new number. Add up the digits of that to get another new number. Keep doing this until you get a number that has only one digit. That number is the digital root.</p> <p>For example, if n = 45893, we add up the digits to get 4 + 5 + 8 + 9 + 3 = 29. We then add up the digits of 29 to get 2 + 9 = 11. We then add up the digits of 11 to get 1 + 1 = 2. Since 2 has only one digit, 2 is our digital root.</p> <p>Write a function that returns the digital root of an integer n. [Note: there is a shortcut, where the digital root is equal to n mod 9, but do not use that here.]</p> <p>C)Write a program to multiply two list using lambda function</p> <p>D) Write a program to filter out only odd number from a list.</p>																			
9	Dictionary	<p>A)Write a Python script to store(ascending and descending order) in to a dictionary by value.</p> <p>B)Write a Python script to insert a new key in to a dictionary.</p> <p>C)Write a program to take a list of student's (name, age, marks) input from key board. Print average marks and details of highest scorer using dictionary data structure.</p>																			
10	File	<p>A)Write a program to copy the content of one file in to another file.</p> <p>B)Write a program to count the frequency of each word from a file.</p>																			
11	Module	<p>A)Write a program to display i)Current date and time ii)Current year iii)Month of year iv)Week number of year v)Week day of the week vi)Day of year vii)Day of week</p> <p>B)Plot the the roll number and average marks of a list of student in a class( import matplotlib module)</p>																			

12	Exception Handling	A)Write a program to take two number as a input and divide them and show i) value error ii)zero division error

## Experiment 1:

### Procedure to Install and Run programs in Python:

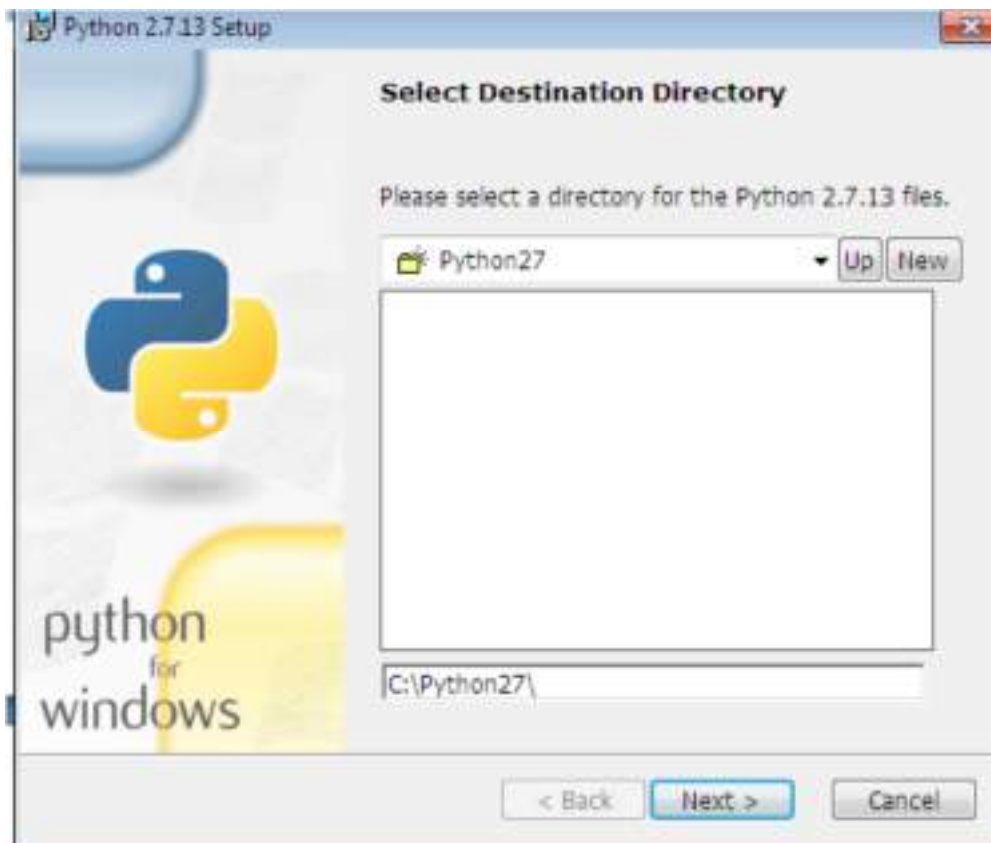
In order to install python, Visit <https://www.python.org>. When we visit the Python for Windows download page, we will immediately see the division. Right at the top, square and center, the repository asks if you want the latest release of Python 2 or Python 3 (2.7.13 and 3.6.1, respectively) as shown in below Figure.



The version we want depends on our end goal. Here we will install Python 2.7.13. Click on Download Python 2.7.13 then python-2.7.13.msi file will be downloaded. Run the installer, then a window will be opened as shown below. Select "Install for all users," and then click "Next".



After Clicking on “Next”, a window will be opened as shown below. On the directory selection screen, leave the directory as “Python27” and click “Next”.

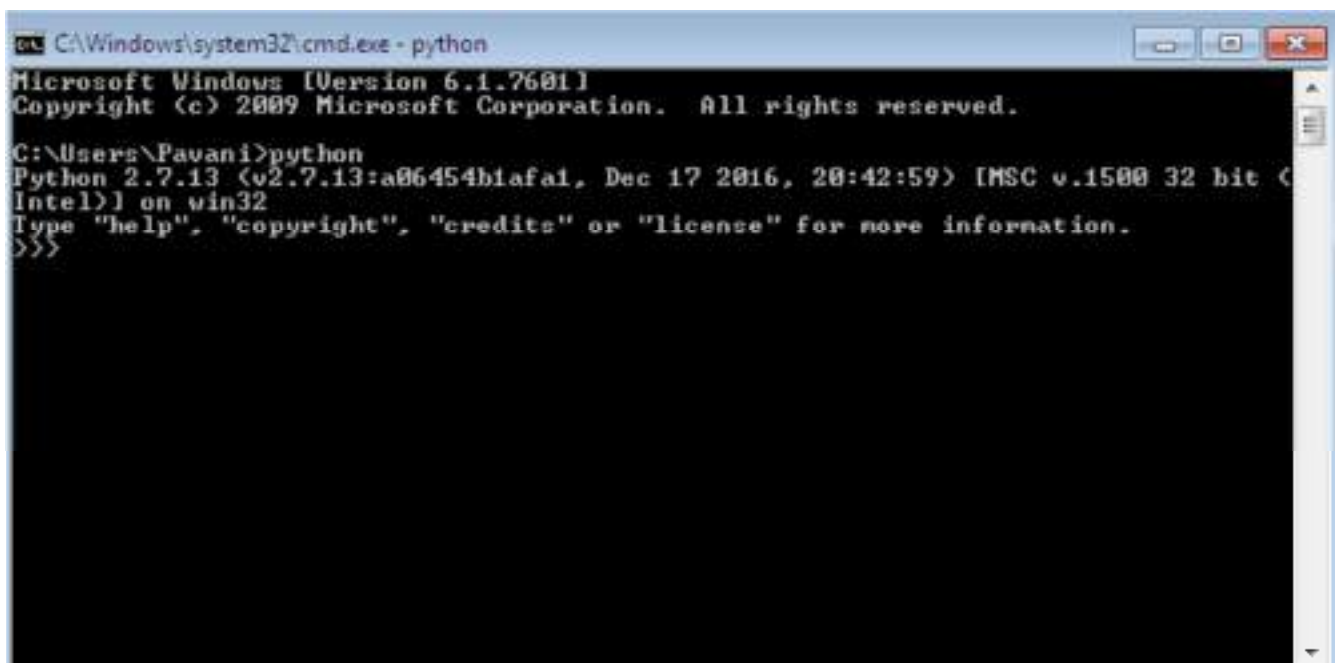




After Clicking on “Next”, a window will be opened as shown below. On the customization screen, scroll down, click “Add python.exe to Path,” and then select “Will be installed on local hard drive.” then click “Next.”



We don't have to make any more decisions after this point. Just click through the wizard to complete the installation. When the installation is finished, set the variable path. After setting up the path, we can confirm the installation by opening up Command Prompt and type the following command as shown below.



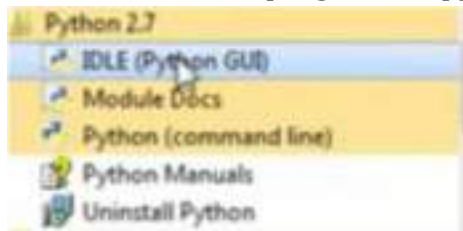
Now, we can say that Python 2.7.13 is installed on our machine.

Different Ways of Invoking Python:

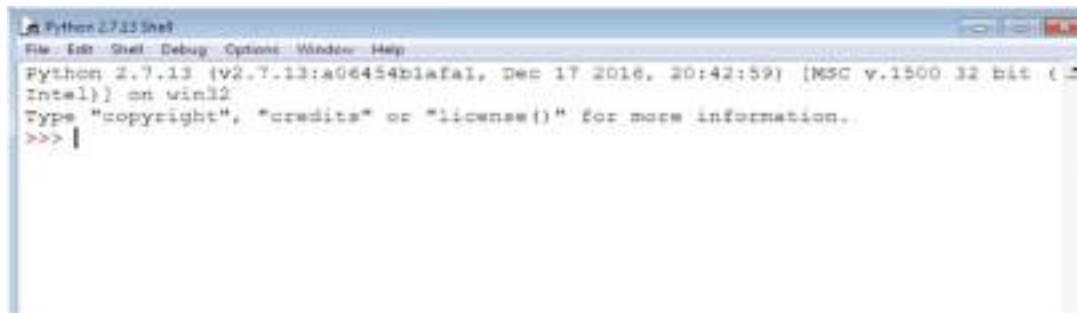
- Python GUI
- Python command line
- Command prompt from windows

Python GUI:

Click on start -> all programs -> python 2.7 -> IDLE(Python GUI).

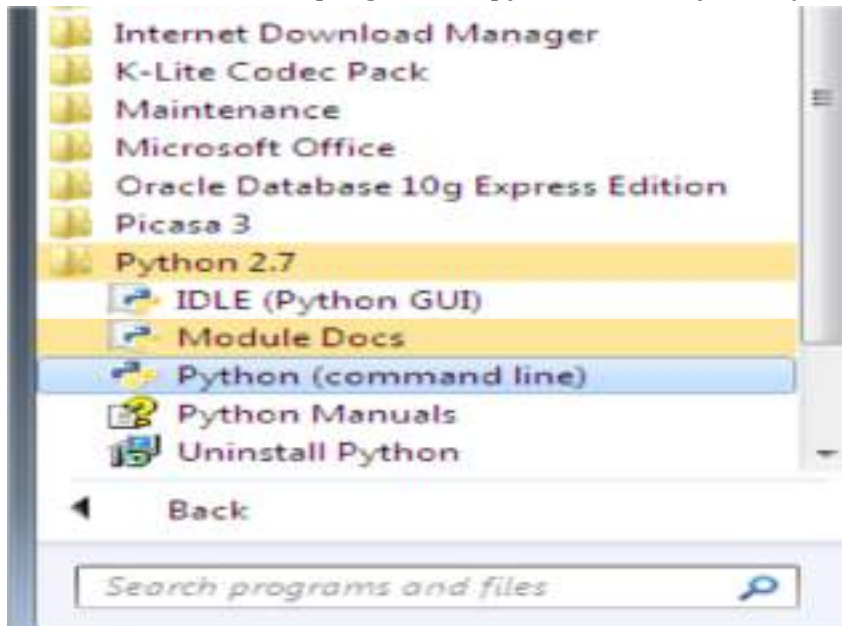


After Clicking on IDLE(Python GUI), a window will be opened as shown below. Python command line: Click on

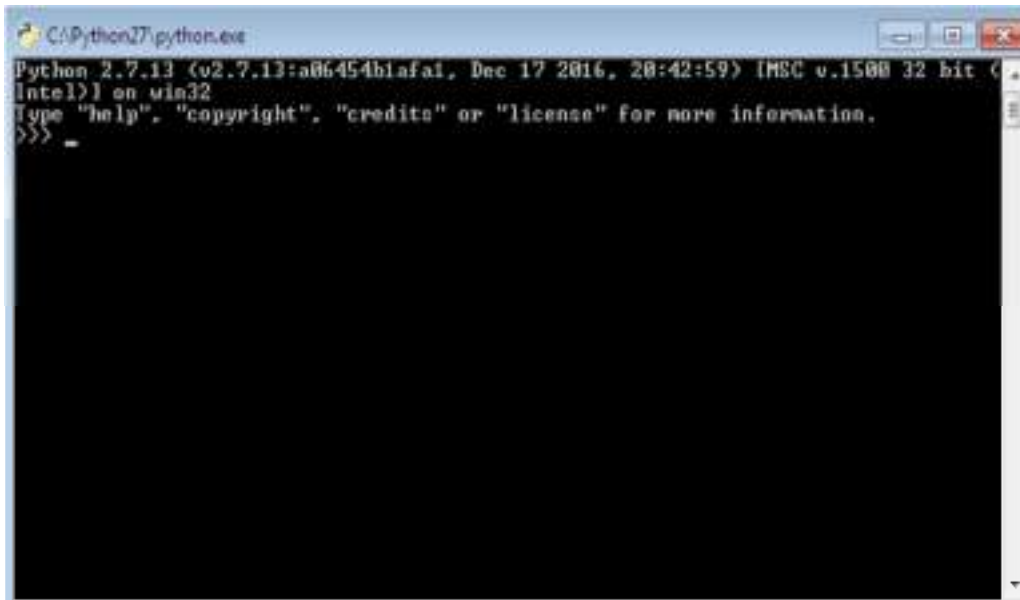


Python command line:

Click on start -> all programs -> python 2.7 -> Python (Command line).



After Clicking on Python (command line), a window will be opened as shown below:



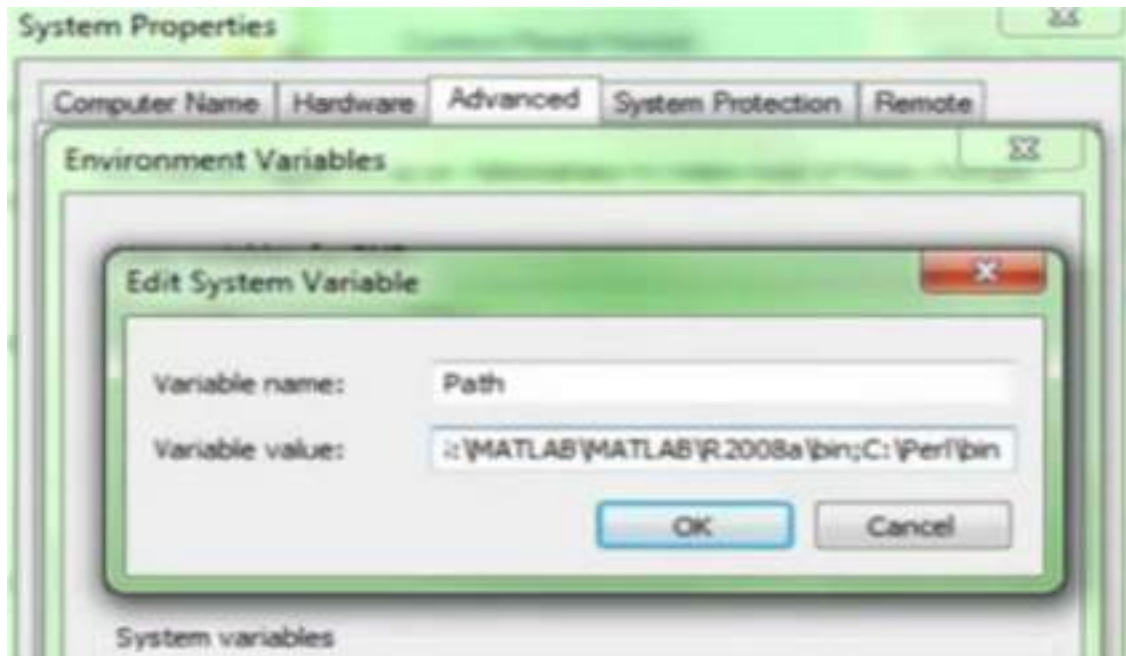
Command prompt from windows:

To open Python from Windows command prompt, We need to **set path**. The procedure to set the path is as follows :

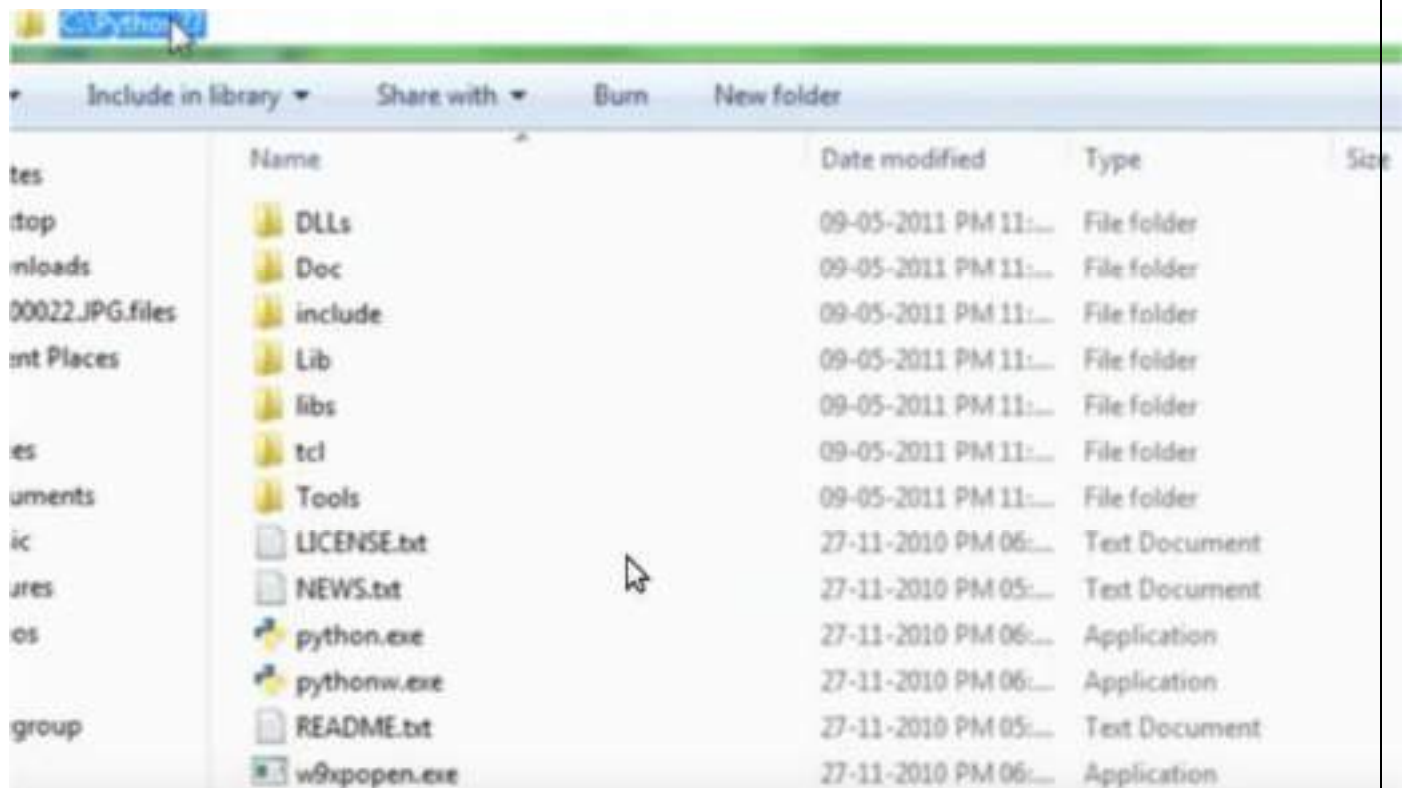
Go to My Computer -> right click and open properties, then a window will be opened as shown below:



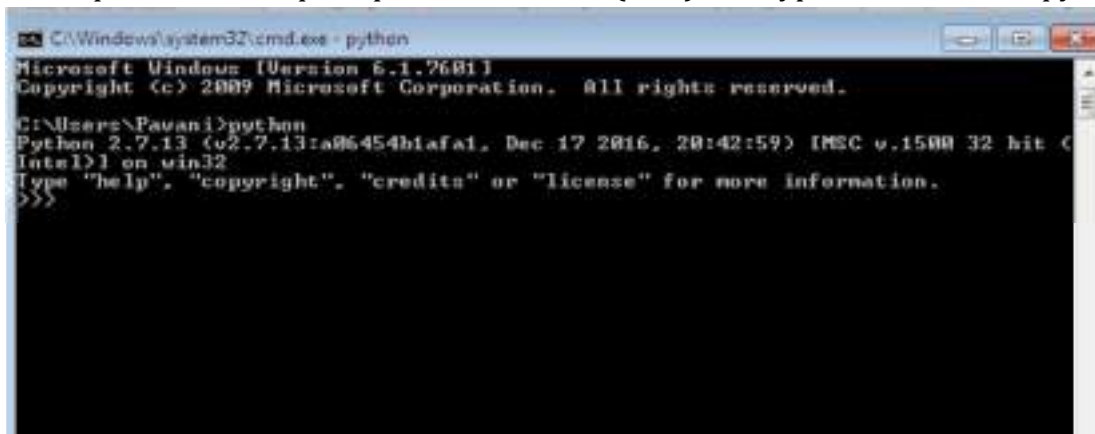
Now, Click on Advanced system settings -> Environmental Variables -> system variables and under system variable, click on Path variable and click on Edit. Then, a window will be opened as follows:



Add python path in variable value and click on **OK** as follows:



Now Open Command prompt from windows (cmd), and type the command “python” as follows:



## Experiment : 1(C)

Write a program to purposefully raise Indentation Error and Correct it.

Description:

Most of the programming languages like C, C++, Java use braces { } to define a block of code. Python uses indentation.

A code block (body of a function, loop etc.) starts with indentation and ends with the first unintended line. The amount of indentation is depends on our choice, but it must be consistent throughout that block. Generally, Four whitespaces are used for indentation and is preferred over tabs. The enforcement of indentation in Python makes the code look neat and clean. This results

into Python programs that look similar and consistent. Incorrect indentation will result into Indentation Error.

**Program that shows Indentation Error:**

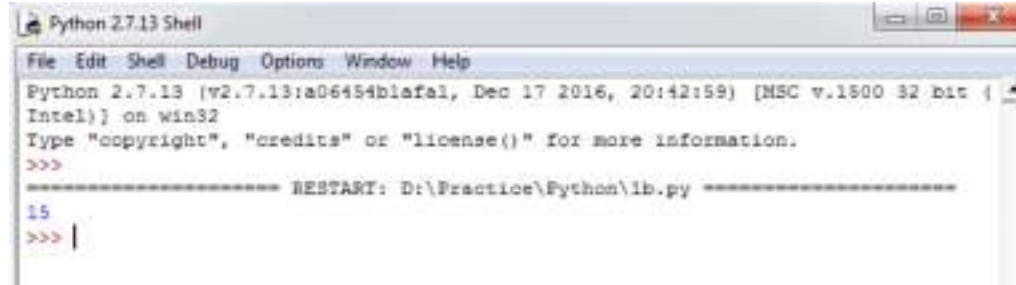
```
a = 10
b = 5
    c = a + b
print c
```

**Output:**



**Program without Indentation Error:**

```
a = 10
b = 5
c = a + b
print c
```



**Experiment 2(A) :**

**Write a program to compute distance between two points taking input from the user (Pythagorean Theorem).**

**Description:** The Pythagorean theorem is the basis for computing distance between two points. Let  $(x_1, y_1)$  and  $(x_2, y_2)$  be the co-ordinates of points on xy-plane. From Pythagorean theorem, the distance between two points is calculated using the formulae:

$$\text{Distance } D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Distance between two point A(x1,y1) and B(x2,y2)

```
import math as m
```

```
print(" Enter the Co ordinate of first point")
```

```
x1=int(input())
```

```
y1=int(input())
```

```
print("Enter the co ordinate of second point")
x2,y2=[int (x) for x in input("Enter x and y seperated by space").split()]
print(x2,y2)
d=m.sqrt((x2-x1)*(x2-x1) + (y2-y1)**2)
print(m.ceil(d))
print(m.floor(d))
```

### **# 2\_B ) Program for Arithmetic operation like addition ,multiplication ,division ....**

```
'''
x=int(input("Enter first number"))
y=int(input("enter second number"))
print(" Addition result=",x-y)
print(" Multiplication result=",x*y)
print(" Division result=",x/y)
print(" modular result=",x%y)
print(" integer division result=",x//y)
'''
```

### **#3\_A ) Check given number is even or odd...**

```
'''
x=int(input("Enter The number"))
if (x%2==0):
    print("The Number",x, "is Even")
else:
    print("The Number",x,"is Odd")
'''
```

### **#3\_B ) Check given yuear is leap year or not...**

```
'''
x=int(input("Enter The Year"))
if(x%400==0 or x%100!=0 and x%4==0 ):
    print("The year",x,"is leap year")
else:
    print("The Year",x,"Is not leap year")
'''
```

### **#3\_C Check a given charactor is alphabet ,digit or specal char or not**

```
ch=input("enter any symbol from keybord")
```

```
print("Ascii value of the Symbol is",ord(ch))
if((ch>='A' and ch<='Z') or (ch>='a' and ch<='z')):
    print("The Symbol",ch,"is alphabet")
elif(ch>='0' and ch<='9'):
    print("The symbol",ch,"is Digit")
else:
    print("The symbol",ch,"Is Special charactor")
```

**# 4\_A print serasse of number and count down of this number .**

```
'''
x=int(input("Enter a number "))
y=x
while(x>0):
    print(x)
    x=x-1
# countdown using range method

for i in range(y,0,-1):
    print(i)
```

**# 4\_B Sum of even fibo nacci number below 4000**

```
a=-1
b=1
s=0
c=a+b
while(c<=4000):
    a=b
    b=c
    c=a+b
    if(c%2==0):
        print(c)
        s=s+c
print("Sum of all even fibo nacci bello 4000 is =",s)
```

**# 4\_c GCD of two number**

```
x=int(input("Enter First number"))
y=int(input("enter second number"))
m=x
n=y
while(x!=y):
```

```
if(x>y):
    x=x-y
else:
    y=y-x
print(" Gcd of ",m, "and",n,"is=",x)
```

#### # 4d\_patt\_i Print pattaen :

```
x=int(input("Enter no of row"))
for i in range(0,x+1):
    for j in range(0,i+1,1):
        if(i>j):
            print("*",end="")
        else:
            print()
```

#### # 4d\_patt\_ii Print pattaen :

```
x=int(input("Enter no of row"))
for i in range(0,x):
    for k in range(0,x-i+1):
        print(" ",end="")
    for j in range(0,i+1):
        print(" * ",end="")
    print()
```

#### # 4d\_patt\_iii Print pattaen :

```
x=int(input("Enter no of row"))
for i in range(0,x):
    for k in range(0,i+1):
        print(" ",end="")
    for j in range(0,x-i):
        print("*",end="")
    print()
```

'''

#### # 5 A write a program to count no of vowel in a srting ...

'''

```
s=input("Enter a string")
s=s.lower()
c=0
for item in s:
    if item in ('a','e','i','o','u'):
        c=c+1
print(" Total vowel = ",c)
```



```
'''
```

```
# 5_B write a program to perform the following operation in a srting ...
```

```
s=input("Enter a string")
print(" Total no of charactor is=",len(s))
print(" last 3 charactor is=",s[-3:])
print(" Reverse String is = ",s[-1::-1])
print(" All capital of string= ",s.upper())
```

```
'''
```

```
# 6_A_Initialize and display tuple and set
```

```
t=(1,2,"Kritt",'a',1,'d',23.7)
# in set all element are unique do not contain duplicate element(automatic delete)
s={"kritt",3,5,9,23.0,3}
```

```
print(t)
print(s)
```

```
'''
```

```
# 6_B_Initialize and display two set and do the following operation
```

```
# initialize empty set
```

```
s1=set()
s2=set()
while (1):
```

```
    item=input("Enter set item for set 1: ")
    s1.add(item)
    print(" Press 1 for continue and For quit press 0 ")
    ch=int(input())
    if ch==0:
        break
    else:
        continue
```

```
print(" item of first set = :",s1)
```

```
while (1):
```

```
    item=input("Enter set item for set 2: ")
    s2.add(item)
    print("Press 1 for continue and For quit press 0")
    ch=int(input())
    if ch==0:
```

```

    break
else:
    continue

print("Total item of First SET = ",s1,"Total item of Second set = :",s2)

print("Union of SET 1 and SET 2 is=: ",s1.union(s2))
#print(s1|s2)
print("Intersection of SET 1 and SET 2 is =: ",s1.intersection(s2))
#print(s1&s2)
print("Difference of SET 1 and SET 2 is =: ",s1.difference(s2))
#print(s1-s2)

# list Operation ....
# initialize a list
'''
L=[1,2,8,4,3]

#insert a item in to list

item=int(input(" Enter item for insert .."))
L.append(item)
print(L)

#count no of item in the list
c=len(L)
print("Total no of element is =",c)
print(" Print in reverse order",L[::-1])
L.remove(L[0])
print(L)
L.pop()
print("After remove last element",L)
#print decending order
L.sort(reverse=True)
print(" Sotred order",L)

# Program 7_D generate 20 random number between 1 to 100

import random
L=[]
for i in range(5):
    x=random.randint(1,100)
    L.append(x)
print(L)

```

```

m=max(L)
n=min(L)
s=sum(L)
a=s/len(L)
print(" max=",m,"min=",n,"sum=",s,"Average=",a)
L.sort()
print(L)
print("Second Highest =",L[-2])
print("Second lowest=",L[1])
c=[i for i in L if i%2==0]
print("No of Even =",len(c))

```

### **#Program 7\_E Take two list and add them store in to third list**

```

import random

L=[]
M=[]

for i in range(5):
    x=random.randint(1,100)
    L.append(x)
print(L)
for i in range(5):
    x=random.randint(1,100)
    M.append(x)
print(M)

N=[ 0 for i in range(5)]
for j in range(5) :
    N[j]=L[j]+M[j]
print("Addition od Two list =",N)
'''

# multiply two matrox...
M=[[1,2,3],[1,1,2],[2,2,1]]
N=[[1,2,1],[1,1,2],[1,2,1]]
R=[]
for i in range(3):
    l=[]
    for j in range(3):
        l.append(0)
    R.append(l)
print(M,N,R)

```

```
for i in range(3):
    for j in range(3):
        for k in range(3):
            R[i][j]=R[i][j]+M[i][k]*N[k][j]
print(" Matrix Result ")
for i in R:
    print(i)
```

'''

**# 8\_A program print rectangle with \* using function..**

```
def rect(r,c):
    for i in range(r):
        for j in range(c):
            print("*",end="")
```

print()

```
print("Enter no of row")
r=int(input())
print("Enter no of collumn")
c=int(input())
rect(r,c)
```

**# 8\_B program print some of digit using function..**

```
def sum_dig(n):
    s=0
    while(n>0):
        r=n%10
        s=s+r
        n=n//10
    return(s)
```

```
print(" Enter the number ")
n=int(input())
```

```
print("SUM of digit if a number",n," is =",sum_dig(n))
```

**# 8\_C program finding digital root using function.**

```
def sum_dig(n):
    s=0
    while(n>0):
```

```
    r=n%10
    s=s+r
    n=n//10
return(s)
```

```
print(" Enter the number ")
n=int(input())
sod=sum_dig(n)
while(sod>9):
    sod=sum_dig(sod)
    print(sod)
print(" Digital root is =",sod)
'''
```

**# 8\_D program add two list using lambda function ( both list must be in same in size.**

```
L1=[1,3,2,5]
L2=[3,5,1,2]
res=map(lambda x,y:x*y,L1,L2)
```

```
print(list(res))
```

```
# lambda with filter function
L=[2,1,4,5,8,9,23,10,3]
res1=list(filter(lambda x :(x%2==1),L))
print("Odd number in list ")
print(res1)
```

