

SHREE SWAMINARAYAN POLYTECHNIC

**SHREE SWAMINARAYAN GURUKUL CAMPUS, OPP. TRAFFIC POLICE STATION,
SECTOR-22, GANDHINAGAR**

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LAB MANUAL OF Python Programming (4330701)

Student Name	
Enrolment No	
Semester	
Branch	
Batch	

COMPUTER DEPARTMENT

**SHREE SWAMINARAYAN POLYTECHNIC,
SECTOR-22, GANDHINAGAR**

Satsang Shiksha Parishad Sanchalit

Shree Swaminarayan Polytechnic

Sector-22 Gandhinagar-382022, Gujarat

Certificate

This is to Certify that Mr. /Ms.....

Of Semester and Branch

Enrollment No. has satisfactorily completed his/her

Practical and Term Work in the Subject within four walls

of institute for Academic year of 20 - 20

Date of Submission:

Subject
In-charge

Head of the
Department



SHREE SWAMINARAYAN POLYTECHNIC

SECTOR-22, GANDHINAGAR - 382022

Branch: Computer

Semester: 3rd

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1.		Environment Setup Install and configure the Python environment. Run basic Python commands to verify the Python environment		
2.		Input-Output Write a program to read your name, contact number, email, and birthdate and print those details on the screen.		
3		Variables, operators, Expressions i. Write a program to convert temperature from Celsius to Fahrenheit. Equation to convert Celsius to Fahrenheit: $F = (9/5) * C + 32.$ ii. Write a program to compute the slope of a line between two points (x_1, y_1) and (x_2, y_2) . $\text{Slope} = \frac{y_2 - y_1}{x_2 - x_1}$ iii. Write a program to calculate simple and compound interest. $\text{Simple Interest} = \frac{P * R * T}{100}$ $\text{Compound Interest} = P * \left(1 + \frac{R}{100 * n}\right)^{n * T}$ iv. Write a program to get change values in Quarter, Dime, Nickels and Pennies, and calculate the value of change in Dollars. Consider Quarter = 0.25 \$, Dime = 0.10 \$, Nickels = 0.05 \$ and Penny = 0.01 \$. v. Write a program to find a maximum of given three numbers (Use ternary operator). vi. Write a program to calculate area and volume of Sphere. $\text{Area of Sphere} = 4 \pi r^2$ $\text{Volume of Sphere} = \frac{4}{3} \pi r^3$ vii. Write a program that computes the real roots of a given quadratic equation (Use math library). $\text{Discriminant } \Delta = b^2 - 4 a c$ $\text{Real Roots} = \frac{-b \pm \sqrt{\Delta}}{2 a}$ viii. Write a program to determine the length of ladder required to reach a given height when leaned against the house. The height and the angle of the ladder are given as inputs (Use math Library).		

4.	<p>Decision-Making Structures</p> <ul style="list-style-type: none"> i. A year is a Leap year if it is divisible by 4, unless it is a century year that is not divisible by 400 (1800 and 1900 are not leap years, 1600 and 2000 are leap years). Write a program that calculates whether a given year is a leap year or not. ii. Many companies pay time-and-a-half for any hours worked above 40 hours in a given week. Write a program to input the number of hours worked and hourly rate and calculate the total wages for the week. iii. The Body Mass Index (BMI) is calculated as a person's weight (in kg), divided by the square of the person's height (in meters). If the BMI is between 19 and 25, the person is healthy. If the BMI is below 19, then the person is underweight. If the BMI is above 25, then the person is overweight. Write a program to get a person's weight (in kgs) and height (in cms) and display a message whether the person is healthy, underweight or overweight. $BMI = \frac{\text{Weight in kg}}{(\text{Height in m})^2}$ <ul style="list-style-type: none"> iv. Write a program to read the marks and assign a grade to a student. Grading system: A (≥ 90), B (80-89), C (70-79), D (60-69), E (50-59), F (< 50). (Use the Switch case) 											
5.	<p>Loops</p> <ul style="list-style-type: none"> i. Write a program to read n numbers from users and calculate the average of those n numbers. ii. Write a program that prompts the user to enter 10 integers and displays all the combinations of picking two numbers from the 10. iii. Write programs to print below patterns: <table border="1"> <tbody> <tr><td>*</td><td>1</td></tr> <tr><td>* *</td><td>1 2</td></tr> <tr><td>* * *</td><td>1 2 3</td></tr> <tr><td>* * * *</td><td>1 2 3 4</td></tr> <tr><td>* * * * *</td><td>1 2 3 4 5</td></tr> </tbody> </table> <ul style="list-style-type: none"> iv. Write a program that displays an ASCII character table from ! to ~. Display the ASCII value of a character in decimal and hexadecimal. Display five characters per line. v. Write a program to sum the following series: $\frac{1}{3} + \frac{3}{5} + \frac{5}{7} + \frac{7}{9} + \frac{9}{11} + \frac{11}{13} + \cdots + \frac{95}{97} + \frac{97}{99}$ <ul style="list-style-type: none"> vi. A positive integer is called a perfect number if it is equal to the sum of all of its positive divisors, excluding itself. For example, 6 is the first perfect number, because $6 = 3 + 2 + 1$, the next is $28 = 14 + 7 + 4 + 2 + 1$. There are four perfect numbers that are less than 10,000. Write a program to find these four numbers. 	*	1	* *	1 2	* * *	1 2 3	* * * *	1 2 3 4	* * * * *	1 2 3 4 5	
*	1											
* *	1 2											
* * *	1 2 3											
* * * *	1 2 3 4											
* * * * *	1 2 3 4 5											

6.	<p>Lists</p> <p>i. Write a program to perform the below operations on the list:</p> <ul style="list-style-type: none"> ○ Create a list. ○ Add/Remove an item to/from a list. ○ Get the number of elements in the list. ○ Access elements of the list using the index. ○ Sort the list. ○ Reverse the list <p>ii. Write a program to read n numbers from a user and print:</p> <ul style="list-style-type: none"> ▪ Number of positive numbers. ▪ Number of negative numbers. ▪ Number of zeros. ▪ Number of odd numbers. ▪ Number of even numbers. ▪ Average of all numbers. <p>iii. Write a program that counts the occurrences of each digit in a string. The program counts how many times a digit appears in the string. For example, if the input is "12203AB3", then the output should output 0 (1 time), 1 (1 time), 2 (2 times), 3 (2 times).</p> <p>iv. Write a program to eliminate duplicate values in the list.</p> <p>v. Write a program to randomly fill in 0s and 1s into a 4x4 2- dimension list, print the list and find the rows and columns with the most number of 1s.</p>		
7	<p>Tuple, Sets and Dictionaries</p> <p>i. Write a program to perform below operations on tuple:</p> <ul style="list-style-type: none"> • Create a tuple with different data types. • Print tuple items. • Convert tuple into a list. • Remove data items from a list. • Convert list into a tuple. • Print tuple items. <p>ii. Write a program to perform below operations on set:</p> <ul style="list-style-type: none"> • Create two different sets with the data. • Print set items. • Add/remove items in/from a set. • Perform operations on sets: union, intersection, difference. <p>iii. Write a program to perform below operations on dictionary:</p> <ul style="list-style-type: none"> • Create a dictionary. • Print dictionary items. • Add/remove key-value pair in/from a dictionary. • Check whether a key exists in a dictionary. • Iterate through a dictionary. • Concatenate multiple dictionaries 		

		<p>iv. Write a program that is given a dictionary containing the average daily temperature for each day of the week, and prints all the days on which the average temperature was between 40 and 50 degrees.</p> <p>v. Write a program to repeatedly prompt the user to enter the capital of a state. Upon receiving the user's input, the program reports whether the answer is correct. Assume the states and their capitals are stored in dictionaries as key value pairs.</p>		
8		<p>Function</p> <ul style="list-style-type: none"> i. Write a program that defines a function (shuffle) to scramble a list into a random order, like shuffling a deck of cards. ii. Write a program that defines a function to return a new list by eliminating the duplicate values in the list. iii. Write a program to print Fibonacci sequence up to n numbers using recursion. Fibonacci sequence is defined as below: <p style="text-align: center;"><i>Fibonacci Sequence = 1 1 2 3 5 8 13 21 ...</i></p> <p style="text-align: center;"><i>where n^{th} term $x_n = x_{n-1} + x_{n-2}$</i></p> <ul style="list-style-type: none"> iv. Write a program that defines a function to determine whether input number n is prime or not. A positive whole number $n > 2$ is prime, if no number between 2 and \sqrt{n} (inclusive) evenly divides n. If n is not prime, the program should quit as soon as it finds a value that evenly divides n. v. Write a program that defines a function to find the GCD of two numbers using the algorithm below. The greatest common divisor (GCD) of two values can be computed using Euclid's algorithm. Starting with the values m and n, we repeatedly apply the formula: $n, m = m, n \% m$ until m is 0. At that point, n is the GCD of the original m and n (Use Recursion). vi. Write a program that lets the user enter the loan amount, number of years, and interest rate, and defines a function to calculate monthly EMI, total payment and display the amortization schedule for the loan. 		

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Modules

- i. Write a program that defines functions (mean and deviation), that computes mean and standard deviation of given numbers. The formula for the mean and standard deviation of n numbers is given as:

$$\text{mean} = \sum_{i=1}^n x_i = \frac{x_1 + x_2 + \dots + x_n}{n}$$

$$\text{deviation} = \sqrt{\frac{\sum_{i=1}^n (x_i - \text{mean})^2}{n-1}}$$

- ii. Write a program that plays the popular scissor-rock-paper game. (A scissor can cut a paper, a rock can knock a scissor, and a paper can wrap a rock.) The program randomly generates a number 0, 1, or 2 representing scissor, rock, and paper. The program prompts the user to enter a number 0, 1, or 2 and displays a message indicating whether the user or the computer wins, loses, or draws.
- iii. Write a program to print the dates of all the Sundays in a given year.
- iv. Write a program to display a graph for ReLU (Rectified Linear Unit) function. ReLU function is defined as below:
- $$y = \max(0, x)$$
- Consider the range of x from -5 to 5.
- v. Write a program to create a list representing the results of 100 students in a test, where each element represents a student's marks (between 0 to 10), and display a histogram for the result.
- vi. Create a user defined module with simple functions for: addition, subtraction, multiplication, division, modulo, square, factorial. Write a program to import the module and access functions defined in the module.

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String Processing

- i. Write a program to check whether a given string is palindrome or not.
- ii. Write a program to read a string containing letters, each of which may be in either uppercase or lowercase, and return a tuple containing the number of vowels and consonants in the string.
- iii. Write a program to read a date in the format DD/MM/YYYY and print the same date in MM-DD-YYYY format.
- iv. Write a program that checks whether two words are anagrams.
- v. Write a program that allows users to enter six-digit RGB color codes and converts them into base 10. In this format, the first two hexadecimal digits represent the amount of red, the second two the amount of green, and the last two the

		<p>Write a program that plays the popular scissor-paper-scissors game. For example: If a user enters FF6347, then the output should be Red (255), Green (99) and Blue (71).</p> <p>vi. Numerologists claim to be able to determine a person's character traits based on the "numeric value" of a name. The value of a name is determined by summing up the values of the letters of the name, where "a" is 1 "b" is 2 "c" is 3 and so on up to "z" being 26. For example, the name "Python" would have the value $16 + 25 + 20 + 8 + 15 + 14 = 98$. Write a program that calculates the numeric value of a name provided as input.</p>		
11.		<p>File Handling</p> <ul style="list-style-type: none"> i. Write a program to perform the below operations on files: <ul style="list-style-type: none"> • Create a text file and write a string to it. • Read an entire text file. • Read a text file line by line. • Write a string to a file. • Write a list of strings to a file. • Count the number of lines, words in a file. ii. Write a program that reads a text file and counts the occurrences of each alphabet in the file. The program should prompt the user to enter the filename. iii. Write a program that reads a text file and displays all the numbers found in the file. iv. Write an automated censor program that reads the text from a file and creates a new file where all of the four-letter words have been replaced by "****". You can ignore punctuation, and you may assume that no words in the file are split across multiple lines. iv. Write a program that reads a text file and calculates the average word length and sentence length in that file. v. Write a program that reads two strings stored in two different text files and prints a string containing the characters of each string interleaved. Remove white spaces from both strings before string interleaving. For example, Two strings "Hello World" and "Sky is the Limit" should generate output "HSeklyiosWtohrellLdimit" 		

Date of Submission :

Faculty Sign :

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Branch: Computer

Semester: 3rd

Subject: 4330701– Python Programming

Practical 1

Aim: - Install & configure python software. Step- step Python installation.

Let's start by installing Python. You can download it for free from the official python. Python can be installed on.

Window

Mac OS

Linux

Installing Python on Windows :

If you are on windows ,there is more than one way to install python. You can download the 32 bit or 64 bit version of python using a :

- Web installer
- Executable(.exe) installer • Zip File

We'll download Python 3.7.0 using the executable installer (python - 3.7.0 - amd64.exe) . Why this kind of installer ? Because it has flexible user interface and contains all we need to write and run our scripts in Python .

Once you download the installer , run it and follow the steps below .

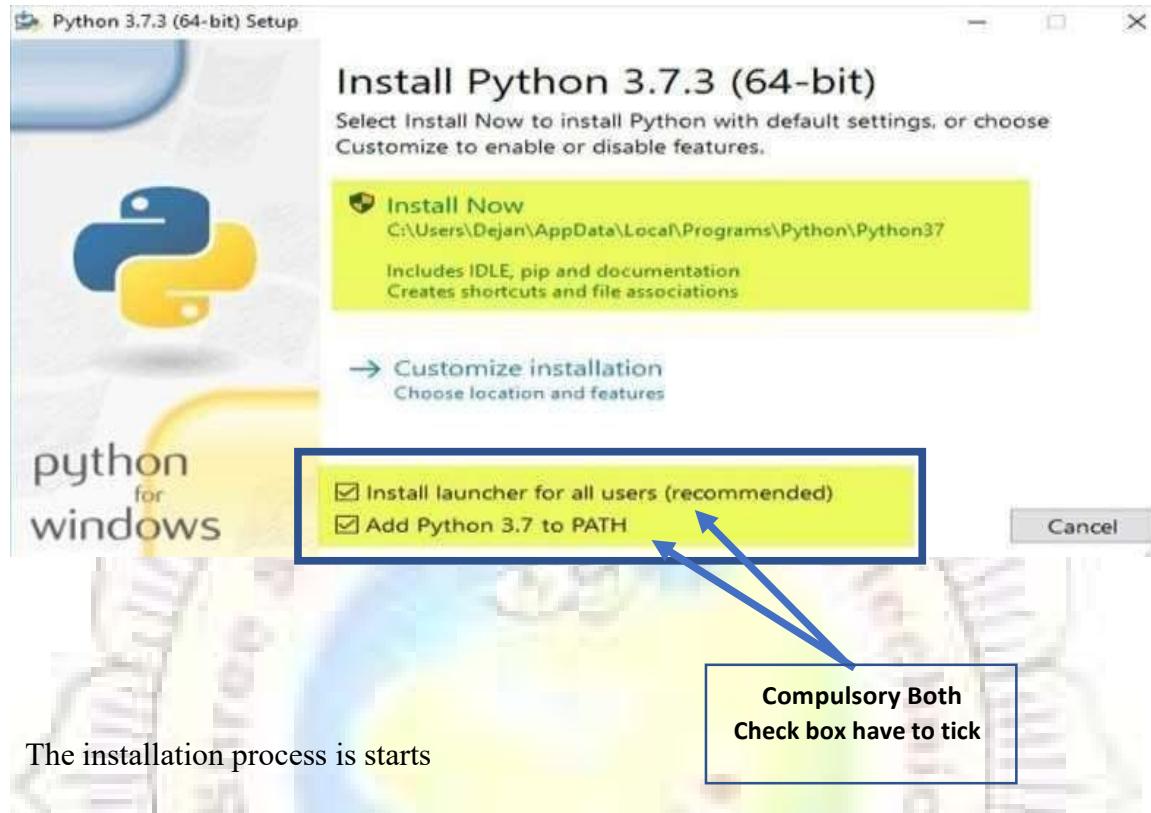
In the first installation window , we can choose type of installation . Install Now or Customize . If you don't want to change the installed tools or settings , choose the first option . Also , be sure to check the Add Python 3.7 to PATH box at the bottom of the window to inform your OS where it can find the Python executable so that it may be invoked from the command line .

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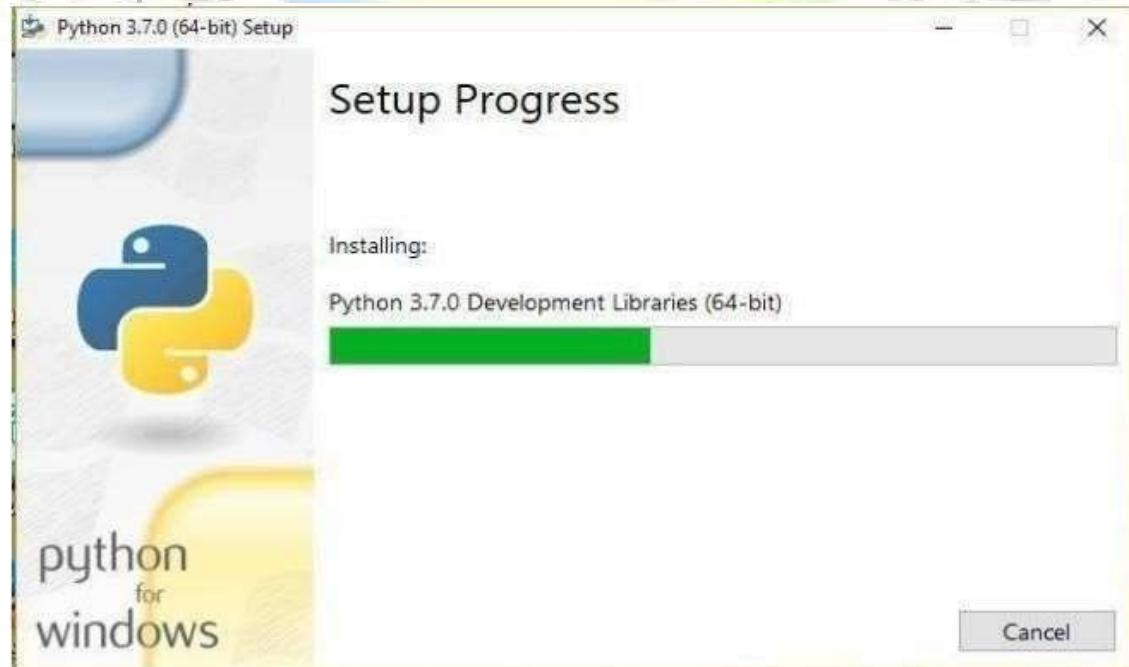
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The installation process starts



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On the last window, click the close button.



In your start menu , you should see the list of Python 3.7 tool ‘



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Practical 2

AIM: Create a program to print your name, mobile number, and date of birth.

Print() Function

- Python print() function prints the message to the screen or any other standard output device.

- Syntax:

```
print(value(s), sep=' ', end = '\n', file=file, flush=flush)
```

- Parameters:

value(s) : Any value, and as many as you like. Will be converted to string before printed
sep='separator' : (Optional) Specify how to separate the objects, if there is more than one.Default : ‘ ’

end='end': (Optional) Specify what to print at the end.Default : ‘\n’

file : (Optional) An object with a write method. Default :sys.stdout

flush : (Optional) A Boolean, specifying if the output is flushed (True) or buffered (False). Default: False

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Give the answer of following questions.

Que 1 : What is a print() function in python.

Ans.

Que 2 : Create a program to print 5 Student name and marks.

Ans.

Signature: _____

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Practical 3

AIM:

- i. Write a program to convert temperature from Celsius to Fahrenheit. Equation to convert Celsius to Fahrenheit:

$$F = (9/5) * C + 32.$$

- ii. Write a program to compute the slope of a line between two points (x_1, y_1) and (x_2, y_2) .

$$\text{Slope} = \frac{y_2 - y_1}{x_2 - x_1}$$

- iii. Write a program to calculate simple and compound interest.

$$\text{Simple Interest} = \frac{P * R * T}{100}$$

$$\text{Compound Interest} = P * \left(1 + \frac{R}{100 * n}\right)^{n * T}$$

- iv. Write a program to get change values in Quarter, Dime, Nickels and Pennies, and calculate the value of change in Dollars. Consider Quarter = 0.25 \$, Dime = 0.10 \$, Nickels = 0.05 \$ and Penny = 0.01 \$.

- v. Write a program to find a maximum of given three numbers (Use ternary operator).

- vi. Write a program to calculate area and volume of Sphere.

$$\text{Area of Sphere} = 4 \pi r^2$$

$$\text{Volume of Sphere} = \frac{4}{3} \pi r^3$$

- vii. Write a program that computes the real roots of a given quadratic equation (Use math library).

$$\text{Discriminant } \Delta = b^2 - 4 a c$$

$$\text{Real Roots} = \frac{-b \pm \sqrt{\Delta}}{2 a}$$

- viii. Write a program to determine the length of ladder required to reach a given height when leaned against the house. The height and the angle of the ladder are given as inputs (Use math Library).

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Solution: -



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Practical 4

AIM:

- i. A year is a Leap year if it is divisible by 4, unless it is a century year that is not divisible by 400 (1800 and 1900 are not leap years, 1600 and 2000 are leap years). Write a program that calculates whether a given year is a leap year or not.
- ii. Many companies pay time-and-a-half for any hours worked above 40 hours in a given week. Write a program to input the number of hours worked and hourly rate and calculate the total wages for the week
- iii. The Body Mass Index (BMI) is calculated as a person's weight (in kg), divided by the square of the person's height (in meters). If the BMI is between 19 and 25, the person is healthy. If the BMI is below 19, then the person is underweight. If the BMI is above 25, then the person is overweight. Write a program to get a person's weight (in kgs) and height (in cms) and display a message whether the person is healthy, underweight or overweight.

$$BMI = \frac{\text{Weight in kg}}{(\text{Height in m})^2}$$

- iv. Write a program to read the marks and assign a grade to a student.
Grading system: A ($>=90$), B (80-89), C (70-79), D (60-69), E (50-59), F (<50)

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1) If-else statements

In the above syntax, if the condition of "if statement" will be true, then all the statements which are written under if statement will execute, otherwise else part always execute.

Syntax:

if condition:

 statement(s)

else:

 Statement(s)

2) Nested if Statements

When a series of decision are involved, we may have to use more than one if-else statement in the nested form.

In the below syntax:

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condition-1, condition-2, and condition-3 all are true, then statement which is written under condition-3 will execute.

condition-1, condition-2 all are true but condition-3 is false, then statement(s) which are written under condition-3's else part will be executed.

condition-1 is true but condition-2, is false, then it will not check for condition-3, and statement(s) which are written under condition-2's else part will be executed.

condition-1 is false then condition-2 and condition-3 never be executed and condition-1's else part will execute.

Syntax: if

 condition-1:

 if condition-2:

 if condition-3:

 statement-1

 else:

 statement-2

 else:

 statement-3

 else:

 statements-4

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4) elif ladder statements

In Python, elif ladder statement is the same as an else-if statement of other programming languages. Sometimes we need to check some conditions when if condition is false.

In the above syntax, if the condition-1 will be false, then it will check condition-2 and if condition-2 will also be false, then it will check condition-3. If condition-3 will be false, then it will check condition-n and if condition-n will also be false, then the default else statement always execute.

Syntax:

```
if condition-1:  
    Statement-1  
  
elif condition-2:  
    Statement-2  
  
elif condition-3:  
    Statement-3  
  
elif condition-n:  
    Statement-n  
  
else:  
    Statement
```

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Give the answer of following questions.

Que 1 : Suppose you are given a number and are asked to check if it is an even number or not. How would you do it?

Ans.

Que 2 : Why was the output wrong?

```
#program to check if num1 is less than num2 num1=5,  
num2 = 5, if (num1 < num2):  
    print("num1 is less than num2") else:  
        print("num2 is less than num1") Output:  
        num2 is lesser than num1
```

Ans.

Signature:_____

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Practical 5

AIM:

- i. Write a program to read n numbers from users and calculate the average of those n numbers.
- ii. Write a program that prompts the user to enter 10 integers and displays all the combinations of picking two numbers from the 10.
- iii. Write programs to print below patterns:

*	1
**	1 2
***	1 2 3
****	1 2 3 4
*****	1 2 3 4 5

- iv. Write a program that displays an ASCII character table from ! to ~. Display the ASCII value of a character in decimal and hexadecimal. Display five characters per line.
- v. Write a program to sum the following series: 1 3 + 3 5 + 5 7 + 7 9 + 9 11 + 11 13 + ⋯ + 95 97 + 97 99.
- vi. A positive integer is called a perfect number if it is equal to the sum of all of its positive divisors, excluding itself. For example, 6 is the first perfect number, because $6 = 3 + 2 + 1$, the next is $28 = 14 + 7 + 4 + 2 + 1$. There are four perfect numbers that are less than 10,000. Write a program to find these four numbers.

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Loop in python

Python programming language provides the following types of loops to handle looping requirements. Python provides three ways for executing the loops. While all the ways provide similar basic functionality, they differ in their syntax and condition checking time.

1) While Loop:

In python, while loop is used to execute a block of statements repeatedly until a given condition is satisfied. And when the condition becomes false, the line immediately after the loop in the program is executed.

Syntax :

```
while expression:  
    statement(s)
```

2). for in Loop

For loops are used for sequential traversal. For example: traversing a list or string or array etc. In Python, there is no C style for loop, i.e., for ($i=0; i<n; i++$). There is “for in” loop which is similar to for each loop in other languages. Let us learn how to use for in loop for sequential traversals.

Syntax:

```
for iterator_var in sequence:  
    statements(s)
```

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3). Nested loop

Python programming language allows to use one loop inside another loop. Following section shows few examples to illustrate the concept.

Syntax:

```
for iterator_var in sequence:  
    for iterator_var in sequence:  
        statements(s)  
        statements(s)
```

Loop Control Statements

Loop control statements change execution from its normal sequence.

When execution leaves a scope, all automatic objects that were created in that scope are destroyed. Python supports the following control statements. Click the following links to check their detail.

1) break statement

Terminates the loop statement and transfers execution to the statement immediately following the loop.

2) continue statement

Causes the loop to skip the remainder of its body and immediately retest its condition prior to reiterating.

3) pass statement

The pass statement in Python is used when a statement is required syntactically but you do not want any command or code to execute.

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Practical 6

AIM:

- i. **Write a program to perform the below operations on the list:**
 - Create a list.
 - Add/Remove an item to/from a list.
 - Get the number of elements in the list.
 - Access elements of the list using the index.
 - Sort the list.
 - Reverse the list
- ii. **Write a program to read n numbers from a user and print:**
 - Number of positive numbers.
 - Number of negative numbers.
 - Number of zeros.
 - Number of odd numbers.
 - Number of even numbers.
 - Average of all numbers.
- iii. **Write a program that counts the occurrences of each digit in a string. The program counts how many times a digit appears in the string. For example, if the input is "12203AB3", then the output should output 0 (1 time), 1 (1 time), 2 (2 times), 3 (2 times).**
- iv. **Write a program to eliminate duplicate values in the list.**
- v. **Write a program to randomly fill in 0s and 1s into a 4x4 2- dimension list, print the list and find the rows and columns with the most number of 1s.**

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List

Lists are used to store multiple items in a single variable. Lists are one of 4 built-in data types in Python used to store collections of data, the other 3 are Tuple, Set, and Dictionary, all with different qualities and usage. Lists are created using square brackets:

Create a List:

```
thislist = ["apple", "banana", "cherry"]  
print(thislist)
```

Delete a List:

We can delete one or more items from a list using the Python del statement. It can even delete the list entirely.

```
# Deleting list items  
my_list = ['p', 'r', 'o', 'b', 'l', 'e', 'm']  
  
# delete one item  
del my_list[2]  
  
print(my_list)
```

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List Slicing in Python

We can access a range of items in a list by using the slicing operator `[:]` # List slicing in Python

```
my_list = ['p','r','o','g','r','a','m','i','z']
```

```
# elements from index 2 to index 4 print(my_list[2:5])
```

```
# elements from index 5 to end  
print(my_list[5:])
```

```
# elements beginning  
to end  
print(my_list[:])
```

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Python List Methods

Methods	Descriptions
append()	adds an element to the end of the list
extend()	adds all elements of a list to another list
insert()	inserts an item at the defined index
remove()	removes an item from the list
pop()	returns and removes an element at the given index
clear()	removes all items from the list
index()	returns the index of the first matched item
count()	returns the count of the number of items passed as an argument
sort()	sort items in a list in ascending order
reverse()	reverse the order of items in the list
copy()	returns a shallow copy of the list

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Give the answer of following questions.

Que 1 : Explain list slicing with example

Ans. _____

Que 2 : Is a list mutable? If yes then how?

Ans. _____

Signature: _____

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Practical 7

AIM:

- i. **Write a program to perform below operations on tuple:**
 - Create a tuple with different data types.
 - Print tuple items.
 - Convert tuple into a list.
 - Remove data items from a list.
 - Convert list into a tuple.
 - Print tuple items.
- ii. **Write a program to perform below operations on set:**
 - Create two different sets with the data.
 - Print set items.
 - Add/remove items in/from a set.
 - Perform operations on sets: union, intersection, difference
- iii. **Write a program to perform below operations on dictionary:**
 - Create a dictionary.
 - Print dictionary items.
 - Add/remove key-value pair in/from a dictionary.
 - Check whether a key exists in a dictionary.
 - Iterate through a dictionary.
 - Concatenate multiple dictionaries
- iv. **Write a program that is given a dictionary containing the average daily temperature for each day of the week, and prints all the days on which the average temperature was between 40 and 50 degrees.**
- v. **Write a program to repeatedly prompt the user to enter the capital of a state. Upon receiving the user's input, the program reports whether the answer is correct. Assume the**

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Tuple

Just like list, tuple is also an ordered collection of Python objects. The only difference between tuple and list is that tuples are immutable i.e. tuples cannot be modified after it is created. It is represented by tuple class.

Set

- Sets are used to store multiple items in a single variable.
- Set is one of 4 built-in data types in Python used to store collections of data, the other 3 are List, Tuple, and Dictionary, all with different qualities and usage.
- A set is a collection which is unordered, unchangeable, and unindexed.

Dictionary

- Dictionary in Python is an unordered collection of data values, used to store data values like a map, which, unlike other data types that hold only a single value as an element, Dictionary holds key : value pair. Key-Value is provided in the dictionary to make it more optimized.

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Practical 8

AIM:

- i. Write a program that defines a function (shuffle) to scramble a list into a random order, like shuffling a deck of cards.
- ii. Write a program that defines a function to return a new list by eliminating the duplicate values in the list.
- iii. Write a program that defines a function to return a new list by eliminating the duplicate values in the list.
 - i. Fibonacci Sequence = 1 1 2 3 5 8 13 21 ...
 - ii. where n th term $x_n = x_{n-1} + x_{n-2}$
- iv. Write a program that defines a function to determine whether input number n is prime or not. A positive whole number $n > 2$ is prime, if no number between 2 and \sqrt{n} (inclusive) evenly divides n . If n is not prime, the program should quit as soon as it finds a value that evenly divides n .
- v. Write a program that defines a function to find the GCD of two numbers using the algorithm below. The greatest common divisor (GCD) of two values can be computed using Euclid's algorithm. Starting with the values m and n , we repeatedly apply the formula: $n, m = m, n \% m$ until m is 0. At that point, n is the GCD of the original m and n (Use Recursion).
- vi. Write a program that lets the user enter the loan amount, number of years, and interest rate, and defines a function to calculate monthly EMI, total payment and display the amortization schedule for the loan.

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User defined Function :

Functions that we define ourselves to do certain specific task are referred as user-defined functions. The way in which we define and call functions in Python are already discussed.

Functions that readily come with Python are called built-in functions. If we use functions written by others in the form of library, it can be termed as library functions. All the other functions that we write on our own fall under user-defined functions. So, our user-defined function could be a library function to someone else.

Advantages of user-defined functions

- User-defined functions help to decompose a large program into small segments which makes program easy to understand, maintain and debug.
 - If repeated code occurs in a program. Function can be used to include those codes and execute when needed by calling that function.
 - Programmers working on large project can divide the workload by making different functions.

Using Parameterized Function

- The function may take arguments(s) also called parameters as input within the opening and closing parentheses, just after the function name followed by a colon.

Syntax:

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Practical 9

AIM:

- i. Write a program that defines functions (mean and deviation), that computes mean and standard deviation of given numbers. The formula for the mean and standard deviation of n numbers is given as:

$$\text{mean} = \sum_{i=1}^n x_i = \frac{x_1 + x_2 + \dots + x_n}{n}$$

$$\text{deviation} = \sqrt{\frac{\sum_{i=1}^n (x_i - \text{mean})^2}{n-1}}$$

- ii. Write a program that plays the popular scissor-rock-paper game. (A scissor can cut a paper, a rock can knock a scissor, and a paper can wrap a rock.) The program randomly generates a number 0, 1, or 2 representing scissor, rock, and paper. The program prompts the user to enter a number 0, 1, or 2 and displays a message indicating whether the user or the computer wins, loses, or draws.
- iii. Write a program to display a graph for ReLU (Rectified Linear Unit) function. ReLU function is defined as below:
 $y = \max(0, x)$
Consider the range of x from -5 to 5.
- iv. Write a program to print the dates of all the Sundays in a given year.
- v. Write a program to create a list representing the results of 100 students in a test, where each element represents a student's marks (between 0 to 10), and display a histogram for the result.
- vi. Create a user defined module with simple functions for: addition, subtraction, multiplication, division, modulo, square, factorial.
Write a program to import the module and access functions defined in the module.

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Practical 10

AIM:

- i. Write a program to check whether a given string is palindrome or not
- ii. Write a program to read a string containing letters, each of which may be in either uppercase or lowercase, and return a tuple containing the number of vowels and consonants in the string.
- iii. Write a program to read a date in the format DD/MM/YYYY and print the same date in MM-DD-YYYY format.
- iv. Write a program that checks whether two words are anagrams. Two words are anagrams if they contain the same letters. For example, silent and listen are anagrams.
- v. Write a program that allows users to enter six-digit RGB color codes and converts them into base 10. In this format, the first two hexadecimal digits represent the amount of red, the second two the amount of green, and the last two the amount of blue. For example: If a user enters FF6347, then the output should be Red (255), Green (99) and Blue (71).
- vi. Numerologists claim to be able to determine a person's character traits based on the "numeric value" of a name. The value of a name is determined by summing up the values of the letters of the name, where "a" is 1 "b" is 2 "c" is 3 and so on up to "z" being 26. For example, the name "Python" would have the value $16 + 25 + 20 + 8 + 15 + 14 = 98$. Write a program that calculates the numeric value of a name provided as input.

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Practical 11

AIM:

- i. **Write a program to perform the below operations on files:**
 - Create a text file and write a string to it.
 - Read an entire text file.
 - Read a text file line by line.
 - Write a string to a file.
 - Write a list of strings to a file.
 - Count the number of lines, words in a file.
- ii. **Write a program that reads a text file and counts the occurrences of each alphabet in the file. The program should prompt the user to enter the filename.**
- iii. **Write a program that reads a text file and displays all the numbers found in the file.**
- iv. **Write an automated censor program that reads the text from a file and creates a new file where all of the four-letter words have been replaced by “****”. You can ignore punctuation, and you may assume that no words in the file are split across multiple lines.**
- v. **Write a program that reads a text file and calculates the average word length and sentence length in that file.**
- vi. **Write a program that reads two strings stored in two different text files and prints a string containing the characters of each string interleaved. Remove white spaces from both strings before string interleaving. For example, Two strings “Hello World” and “Sky is the Limit” should generate output “HSeklyiosWtohrelLdimit”.**

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