"Heaven's Light is Our Guide"

Rajshahi University of Engineering & Technology, Rajshahi

Department of Electrical & Computer Engineering
(ECE-20)

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Course Title: Numerical Methods & Discrete Mathematics Sessional

Lab Report 1

Topic: Learning Basics of Python

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Description:
Python is a high-level, general-purpose, and very popular programming language. Python programming language (latest Python 3) is being used in many ways:

- Machine Learning
- GUI Applications
- Web frameworks like Django
- Image processing
- Web scraping
- Test frameworks
- Multimedia
- Scientific computing
- Text processing and many more.

Its syntax is easy to understand. The lines used in python are easy to understand, they are almost like human languages.

Python has many advantages:
- Its free & open source.
- Its easy to learn, also takes less time compared to other languages.
- Despite being simple, the library of it is vast.
- Its portable.

It also has some disadvantages:
- Poor memory efficiency
- Slow speed compared to, for example, C/C++
- Database access complications
- Weak in mobile based computing

Python's architectural structure prioritises code readability and makes extensive use of indentation. Unlike other programming languages such as Java and C, Python requires fewer steps. The object-oriented approach and design of Python allow programmers to write logical and clear code for both small and large-scale applications.

Tools:
- MS Word
- Python 3.10
- IDE (VS Code)

Discussion:
Watching the video, many things can be learned; mainly he basics of python with some simple usage of the language. Since it was C, C++, Java has already been taught, watching the new python language, it seemed easy to understand.

Here are some keywords that can be taken as a lesson from the video:

print (): We can print a program's output by using print() function. For instance,

print("Hello World") => Hello World.

For a variable, say

age=22

print(age) Output will be 22.

Variable: In order to declare a, variable we just simply type a variable's name (abiding by the rules) and giving an equal sign. For example:

age=*value*

Taking input from user: We can receive input from user using 'input' keyword and store it into a variable.

For example:

```
age=input("Enter your age: ")
```

Type Conversion: Whenever we are taking input from user, the input function always returns a value as a string. Thus, to do basic math operations we may need to convert the string into a number otherwise it may show errors. So, we can convert the type like below: For example:

```
birthYear=input("Enter birth year: ")
age=2023-int(birthYear)
```

This way birthYear string is converted into an int number.

Strings: Strings in python are surrounded by either single quotation marks, or double quotation marks. There are many functions we can perform in python to strings. In python, strings are treated like objects. For example:

```
Dept_name = 'Electrical and Computer Engineering' //Declaration
```

Strings can be written inside both single & double quotation.

Arithmetic Operators: The arithmetic operations in python are same as in math. We can do addition, subtraction, multiplication, division, modulus, exponential and etc.

```
print(10+3) //Addition
print(10-3) //Subtraction
Print(10%3) //Modulus
```

In case of multiplication, division, exponential, there are a few modifications.

`print(10/3)` gives output of : 3.3333335 (We get floating point number).

But if we use double slashes (//), we get an integer value. Again,

print(10*3) = 30 //Multiplication.

Using double **, we can perform exponential operation.

Comparison Operators: In python, comparison operator returns Boolean values. For example,

print(3>2) = True. print(3==2) = False. print(3<2) = False.

Comparison operators are given below,

> , >= , < , <= , == , !=

Logical Operators: In python, there are three logical operators likewise, Logical AND, Logical OR, Logical NOT. If any logical operation satisfies the condition, then it returns true otherwise false. AND operation returns True if all the statements are satisfied otherwise False. OR operation returns True if one of the statements is satisfied otherwise False. NOT operation just simply inverses any value that we give in.

Conditional Statements: The syntax for if conditional statement is followed like below:

```
If (condition1): Statement
elif(condition2): statement
else:Statement
```

Unlike other popular languages like C/C++, in python, {} isn't use to declare a block of code, instead indentation is used

Lists: List is used whenever we want to represent a list of objects. List in python is quite similar to array in C/C++. The basic functionalities of lists are almost same. But in case of array if we put negative index. Then it shows the element from the last. For example,

```
list1 = ["A", "B", "C", "D"]
```

If we do;

```
print(list1[-1])
```

The output will be the 1st from the last, "D". Again,

```
print(list1[-2])
```

Output will be "C", the 2nd from the last.

We can also change the values of the lists. Another new thing,

```
print(list1[0:3])
```

This will show the output : A, B, C

Here, 0 implies that we start from 0th index and finish before the 3rd. But it will not modify the original list. We can also add a new element at the end, at the start or at a certain position in Lists. A List of items can also be iterated using loops.

The Range function: The range() function returns a sequence of numbers, starting from 0 by default, and increments by 1 (by default), and stops before a specified number.

```
range(start_value, stop_value, steps)
```

Tuples: Tuples in python is a kind of lists and it is immutable means we can't change them once they are created. For example,

```
numbers=(1,2,3,3) //Declaration
```

Now, if we assign a new value say, numbers[0] = 4, then it will show error. It has two functionalities like count and index. The method count shows the number of occurrences in a tuple. And the method index, returns first occurrence of the element in the tuple.

Since we'll be using python in this course, the video was really helpful to understand the basics of basics of python. Now as we go forward, the codes will be easy for us to understand.

References:

- https://taglineinfotech.com/advantages-and-disadvantages-of-python/
- https://youtu.be/kqtD5dpn9C8?si=KGuqCcfNgMBFz1zy
- https://www.geeksforgeeks.org/python-programming-language/