Assignment 1

Q1) **What is Python ? Why is it so popular ?**

An interpreted high-level general-purpose language, Python focuses on code readability with its use of significant indentation. Dynamically-typed and garbage-collected, it supports multiple programming paradigms, including structured (particularly, procedural), object-oriented and functional programming

Dutch programmer Guido van Rossum started working on creating Python programming language back in the late 1980s and the language was first released in 1991 as Python 0.9.0. Since then many versions of it have been released. Python 2.0 was released in 2000 with new features, including list comprehensions and a garbage collection system using reference counting. 2008 saw the release of Python 3.0, a major revision of the language. Python 2 was discontinued with version 2.7.18 in 2020.

In the three decades that it has been around, Python has done remarkably well and is among the fastest growing coding languages. Today it is used in web development, development of web applications, AI, machine learning, operating systems, mobile application development, data analytics, data visualization and video games. What has led to Python dominating the list of popular programming languages? A host of reasons have contributed towards this. We look at them in detail in the section below

Why is Python So Popular?

1) Easy to Learn and Use

2) Mature and Supportive Python Community

3) Support from Renowned Corporate Sponsors

4) Hundreds of Python Libraries and Frameworks

5) Versatility, Efficiency, Reliability, and Speed

6) Big data, Machine Learning and Cloud Computing

7) First-choice Language

8) The Flexibility of Python Language

9) Use of python in academics

10) Python is the best performance booster in the automation of software testing also

Q.02) What are the key features of Python ?

There are many features in Python, some of which are discussed below :

1. Easy to code:

Python is a high-level programming language. Python is very easy to learn the language as compared to other languages like C, C#, Javascript, Java, etc. It is very easy to code in python language and anybody can learn python basics in a few hours or days. It is also a developer-friendly language.

2. Free and Open Source:

Python language is freely available at the official website and you can download it from the given download link below click on the Download Python keyword.

Download Python

Since it is open-source, this means that source code is also available to the public. So you can download it as, use it as well as share it.

3. Object-Oriented Language:

One of the key features of python is Object-Oriented programming. Python supports object-oriented language and concepts of classes, objects encapsulation, etc.

4. GUI Programming Support:

Graphical User interfaces can be made using a module such as PyQt5, PyQt4, wxPython, or Tk in python.

PyQt5 is the most popular option for creating graphical apps with Python.

5. High-Level Language:

Python is a high-level language. When we write programs in python, we do not need to remember the system architecture, nor do we need to manage the memory.

6. Extensible feature:

Python is a Extensible language. We can write us some Python code into C or C++ language and also we can compile that code in C/C++ language.

7. Python is Portable language:

Python language is also a portable language. For example, if we have python code for windows and if we want to run this code on other platforms such as Linux, Unix, and Mac then we do not need to change it, we can run this code on any platform.

8. Python is Integrated language:

Python is also an Integrated language because we can easily integrated python with other languages like c, c++, etc.

9. Interpreted Language:

Python is an Interpreted Language because Python code is executed line by line at a time. like other languages C, C++, Java, etc. there is no need to compile python code this makes it easier to debug our code. The source code of python is converted into an immediate form called bytecode.

10. Large Standard Library

Python has a large standard library which provides a rich set of module and functions so you do not have to write your own code for every single thing. There are many libraries present in python for such as regular expressions, unit-testing, web browsers, etc.

11. Dynamically Typed Language:

Python is a dynamically-typed language. That means the type (for example- int, double, long, etc.) for a variable is decided at run time not in advance because of this feature we don't need to specify the type of variable

Q.03) What type of language is Python ? Programming or Scripting ?

Compiled languages are written in a code that can be executed directly on a computer's processor. A compiler is a special program that processes statements written in a particular programming language and turns them into machine language or "code" that a computer's processor uses.

An interpreted language is any programming language that isn't already in "machine code" prior to runtime. Unlike compiled languages , an interpreted language's translation doesn't happen beforehand. Translation occurs at the same time as the program is being executed.

Python as a programming language has no saying about if it's an compiled or interpreted programming language, only the implementation of it. The terms interpreted or compiled is not a property of the language but a property of the implementation. Python program runs directly from the source code . so, Python will fall under byte code interpreted. The .py source code is first compiled to byte code

as .pyc. This byte code can be interpreted (official CPython), or JIT compiled (PyPy). Python source code (.py) can be compiled to different byte code also like IronPython (.Net) or Jython (JVM). There are multiple implementations of Python language . The official one is a byte code interpreted one. There are byte code JIT compiled implementations too.

As concluding remarks, Python(Cpython) is neither a true compiled time nor pure interpreted language but it is called interpreted language.

Python is a scripting language as it executes each and every line of code is a chronological order just like the lines of a theatre script is executed

Q.04) What is pep 8 ?

PEP or Python Enhancement Proposal is a set of rules that specify how to format Python code for maximum readability. It is an official design document that provides relevant information to the Python Community, such as describing a new Python feature or a Python process. PEP 8 is an important document that includes the style guidelines for Python Code. Anyone who wishes to contribute to the Python open-source community must strictly abide by these style guidelines.

Q.05) **Python an interpreted language. Explain**

An interpreter is a kind of program that executes other programs. When you write Python programs , it converts source code written by the developer into intermediate language which is again translated into the native language / machine language that is executed.

The python code you write is compiled into python bytecode, which creates file with extension .pyc . The bytecode compilation happened internally, and almost completely hidden from developer. Compilation is simply a translation step, and byte code is a lower-level, and platform-independent , representation of your source code. Roughly, each of your source statements is translated into a group of byte code instructions. This byte code translation is performed to speed execution byte code can be run much quicker than the original source code statements.

The .pyc file , created in compilation step, is then executed by appropriate virtual machines. The Virtual Machine just a big loop that iterates through your byte code instructions, one by one, to carry out their operations. The Virtual Machine is the runtime engine of Python and it is always present as part of the Python system, and is the component that truly runs the Python scripts . Technically, it's just the last step of what is called the Python interpreter.

Q.06) How is memory managed in Python ?

- Memory management in Python involves a private heap containing all Python objects and data structures.
- Interpreter takes care of Python heap and that the programmer has no access to it.
- The allocation of heap space for Python objects is done by Python memory manager.
- The core API of Python provides some tools for the programmer to code reliable and more robust program.
- Python also has a build-in garbage collector which recycles all the unused memory.
- When an object is no longer referenced by the program, the heap space it occupies can be freed.
- The garbage collector determines objects which are no longer referenced by the sprogram frees the occupied memory and make it available to the heap space.
- The gc module defines functions to enable /disable garbage collector:

  gc.enable() -Enables automatic garbage collection.

  gc.disable() - Disables automatic garbage collection.

Q.07) What is namespace in Python ?

Namespaces are one honking great idea .Namespaces are the constructs used for organizing the names assigned to the objects in a python program. In this article, we will understand the concept of names and namespace in python.