PS01CMCA31 [Python Programming]
Questions & Answers

What is Python? What are the benefits of using Python?

Python is a high-level, interpreted, general-purpose programming language. Being a general-purpose language, it can be used to build almost any type of application with the right tools/libraries.

The benefits of pythons are that it is simple and easy, portable, extensible, build-in data structure and it is an open source.

Additionally, python supports objects, modules, threads, exception-handling and automatic memory management which help in modelling real-world problems and building applications to solve these problems.

What type of language is python? Programming or scripting?

Python is capable of scripting, but in general sense, it is considered as a general-purpose programming language.

Python an interpreted language. Explain.

An interpreted language is any programming language which is not in machine-level code before runtime. Therefore, Python is an interpreted language.

How Python is interpreted?

Python language is an interpreted language. Python program runs directly from the source code. It converts the source code that is written by the programmer into an intermediate language, which is again translated into machine language that has to be executed.

How memory is managed in Python?

- Python memory is managed by Python private heap space. All Python objects and data structures are located in a private heap. The programmer does not have an access to this private heap and interpreter takes care of this Python private heap.
- The allocation of Python heap space for Python objects is done by Python memory manager. The core API gives access to some tools for the programmer to code.
- Python also have an inbuilt garbage collector, which recycle all the unused memory and frees the memory and makes it available to the heap space.

What is the difference between list and tuple?

The difference between list and tuple is that list is mutable while tuple is not. Tuple can be hashed for e.g as a key for dictionaries.

How are arguments passed by value or by reference?

Everything in Python is an object and all variables hold references to the objects. The references values are according to the functions; as a result you cannot change the value of the references. However, you can change the objects if it is mutable.

What are the built-in type does python provides?

There are mutable and Immutable types of Pythons built in types Mutable built-in types

- List
- Sets
- Dictionaries

Immutable built-in types

- Strings
- Tuples
- Numbers

What is pass in Python?

Pass means, no-operation Python statement, or in other words it is a place holder in compound statement, where there should be a blank left and nothing has to be written there.

How will you reverse a list in Python?

The function **list.reverse()** reverses the objects of a list.

What are negative indexes and why are they used?

To access an element from ordered sequences, we simply use the index of the element, which is the position number of that particular element. The index usually starts from 0, i.e., the first element has index 0, the second has 1, and so on.
When we use the index to access elements from the end of a list, it's called reverse indexing. In reverse indexing, the indexing of elements starts from the last element with the index number '−1'. The second last element has index '−2', and so on. These indexes used in reverse indexing are called negative indexes.

Is indentation optional in Python?

Indentation in Python is compulsory and is part of its syntax.
All programming languages have some way of defining the scope and extent of the block of codes; in Python, it is indentation. Indentation provides better readability to the code, which is probably why Python has made it compulsory.

Can we make multiline comments in Python?

Python does not have a specific syntax for including multiline comments like other programming languages. However, programmers can use triple-quoted strings (docstrings) for making multiline comments as when a docstring is not used as the first statement inside a method, it gets ignored by Python parser.

In Python what are iterators?

In Python, iterators are used to iterate a group of elements, containers like list.

In Python what is slicing?

A mechanism to select a range of items from sequence types like list, tuple, strings etc. is known as slicing.

What is docstring in Python?

A Python documentation string is known as docstring, it is a way of documenting Python functions, modules and classes.

How you can convert a number to a string?

In order to convert a number into a string, use the inbuilt function str(). If you want a octal or hexadecimal representation, use the inbuilt function oct() or hex().

What is module and package in Python?

In Python, module is the way to structure program. Each Python program file is a module, which imports other modules like objects and attributes.
The folder of Python program is a package of modules. A package can have modules or subfolders.

Explain how can you generate random numbers in Python?

To generate random numbers in Python, you need to import command as
import random
random.random()
This returns a random floating point number in the range [0,1)

Mention the use of // operator in Python?

It is a Floor Divisionoperator , which is used for dividing two operands with the result as quotient showing only digits before the decimal point. For instance, 10//5 = 2 and 10.0//5.0 = 2.0.

Mention five benefits of using Python?

- Python comprises of a huge standard library for most Internet platforms like Email, HTML, etc.
- Python does not require explicit memory management as the interpreter itself allocates the memory to new variables and free them automatically
- Provide easy readability due to use of square brackets
- Easy-to-learn for beginners
- Having the built-in data types saves programming time and effort from declaring variables

Mention the use of the split function in Python?

The use of the split function in Python is that it breaks a string into shorter strings using the defined separator. It gives a list of all words present in the string.

What are python modules? Name some commonly used built-in modules in Python?

Python modules are files containing Python code. This code can either be functions classes or variables. A Python module is a .py file containing executable code.
Some of the commonly used built-in modules are:

- os
- sys
- math
- random
- data time
- JSON

Is python case sensitive?

Yes. Python is a case sensitive language.

What is type conversion in Python?

Type conversion refers to the conversion of one data type iinto another.

int() – converts any data type into integer type
float() – converts any data type into float type
ord() – converts characters into integer
hex() – converts integers to hexadecimal
oct() – converts integer to octal
tuple() – This function is used to convert to a tuple.
set() – This function returns the type after converting to set.
list() – This function is used to convert any data type to a list type.
dict() – This function is used to convert a tuple of order (key,value) into a dictionary.
str() – Used to convert integer into a string.
complex(real,imag) – This functionconverts real numbers to complex(real,imag) number.

Is indentation required in python?

Indentation is necessary for Python. It specifies a block of code. All code within loops, classes, functions, etc is specified within an indented block. It is usually done using four space characters. If your code is not indented necessarily, it will not execute accurately and will throw errors as well.

What are functions in Python?

A function is a block of code which is executed only when it is called. To define a Python function, the **def** keyword is used.

Example:

```
def MyFunc():
    print("Hi, Welcome to GDCST")

MyFunc(); #calling the function
```

What is __init__?

__init__ is a method or constructor in Python. This method is automatically called to allocate memory when a new object/ instance of a class is created. All classes have the __init__ method.

What is self in Python?

Self is an instance or an object of a class. In Python, this is explicitly included as the first parameter. However, this is not the case in Java where it's optional. It helps to differentiate between the methods and attributes of a class with local variables.

The self variable in the init method refers to the newly created object while in other methods, it refers to the object whose method was called.

How does break, continue and pass work?

Break : Allows loop termination when some condition is met and the control is transferred to the next statement.

Continue : Allows skipping some part of a loop when some specific condition is met and the control is transferred to the beginning of the loop

Pass : Used when you need some block of code syntactically, but you want to skip its execution. This is basically a null operation. Nothing happens when this is executed.

What does [::-1} do?

[::-1] is used to reverse the order of an array or a sequence.

For example:

```
import array as arr
My_Array=arr.array('i',[1,2,3,4,5])
My_Array[::-1]
```

Output: array('i', [5, 4, 3, 2, 1])

[::-1] reprints a reversed copy of ordered data structures such as an array or a list. the original array or list remains unchanged.

How do you write comments in python?

Comments in Python start with a # character. However, alternatively at times, commenting is done using docstrings(strings enclosed within triple quotes).

Example:

```
#Comments in Python start like this
print("Comments in Python start with a #")
```

Output: Comments in Python start with a #

How will you capitalize the first letter of string?

In Python, the capitalize() method capitalizes the first letter of a string. If the string already consists of a capital letter at the beginning, then, it returns the original string.

How will you convert a string to all lowercase?

To convert a string to lowercase, lower() function can be used.

Example:

str=”GDCST”

What is the difference between append() and extend() methods?

Both append() and extend() methods are methods used to add elements at the end of a list.

append(element): Adds the given element at the end of the list that called this append() method

extend(another-list): Adds the elements of another list at the end of the list that called this extend() method

What are loop interruption statements in Python?

There are two types of loop interruption statements in Python that let users terminate a loop iteration prematurely, i.e., not letting the loop run its full iterations.

Following are the two types of loop interruption statements:

Python break statement: This statement immediately terminates the loop entirely, and the control flow of the program is shifted directly to the outside of the loop.

Python continue statement: Continue statement terminates the current loop iteration and moves the control flow of the program to the next iteration of the loop, letting the user skip only the current iteration.

What do you understand by Tkinter?

Tkinter is an in-built Python module that is used to create GUI applications. It is Python’s standard toolkit for GUI development. Tkinter comes with Python, so there is no installation needed. We can start using it by importing it in our script.

How to comment multiple lines in python?

Multi-line comments appear in more than one line. All the lines to be commented are to be prefixed by a #. You can also a very good **shortcut method to comment multiple lines**. All you need to do is hold the ctrl key and **left click** in every place wherever you want to include a # character and type a # just once. This will comment all the lines where you introduced your cursor.

What is the purpose of is, not and in operators?

Operators are special functions. They take one or more values and produce a corresponding result.

is: returns true when 2 operands are true (Example: "a" is 'a')
not: returns the inverse of the boolean value
in: checks if some element is present in some sequence

What is the usage of help() and dir() function in Python?

Help() and dir() both functions are accessible from the Python interpreter and used for viewing a consolidated dump of built-in functions.

1. Help() function: The help() function is used to display the documentation string and also facilitates you to see the help related to modules, keywords, attributes, etc.
2. Dir() function: The dir() function is used to display the defined symbols.

How can the ternary operators be used in python?

The Ternary operator is the operator that is used to show the conditional statements. This consists of the true or false values with a statement that has to be evaluated for it.

Syntax: The Ternary operator will be given as:

[on_true] if [expression] else [on_false]x, y = 25, 50big = x if x < y else y

What does len() do?

It is used to determine the length of a string, a list, an array, etc.

Example:

```
str="GDCST"
len(str)
```

What is the difference between deep and shallow copy?

Shallow copy is used when a new instance type gets created and it keeps the values that are copied in the new instance. Shallow copy is used to copy the reference pointers just like it copies the values. These references point to the original objects and the changes made in any member of the class will also affect the original copy of it. Shallow copy allows faster execution of the program and it depends on the size of the data that is used.

Deep copy is used to store the values that are already copied. Deep copy doesn't copy the reference pointers to the objects. It makes the reference to an object and the new object that is pointed by some other object gets stored. The changes made in the original copy won't affect any other copy that uses the object. Deep copy makes execution of the program slower due to making certain copies for each object that is been called.

How are classes created in Python?

How can we create a class in Python?

Class in Python is created using the **class** keyword.

Example :

```
class Test:
        def __init__(self):
            print("Constructor")
```

Does python support multiple inheritance?

Multiple inheritance means that a class can be derived from more than one parent classes. Python does support multiple inheritance, unlike Java.

What is Polymorphism in Python?

Polymorphism means the ability to take multiple forms. So, for instance, if the parent class has a method named ABC then the child class also can have a method with the same name ABC having its own parameters and variables. Python allows polymorphism.

Define encapsulation in Python?

Encapsulation means binding the code and the data together. A Python class in an example of encapsulation.

What does an object() do?

It returns a featureless object that is a base for all classes. Also, it does not take any parameters.

Help() and dir()?

The python help function is used to display the documentation of modules, functions, classes, keywords etc.

The help function has the following syntax:

help([object])

If the help function is passed without an argument, then the interactive help utility starts up on the console.

dir() is a powerful inbuilt function in, which returns list of the attributes and methods of any object (say functions , modules, strings, lists, dictionaries etc.) OR The dir() function returns all properties and methods of the specified object, without the values.

This function will return all the properties and methods, even built-in properties which are default for all object.

The dir() function has the following syntax:

dir([object])

Key features of Python

- Python is an **interpreted** language. That means that, unlike languages like *C* and its variants, Python does not need to be compiled before it is run. Other interpreted languages include *PHP* and *Ruby*.
- Python is **dynamically typed**, this means that you don't need to state the types of variables when you declare them or anything like that. You can do things like x=111 and then x="I'm a string" without error
- Python is well suited to **object orientated programming** in that it allows the definition of classes along with composition and inheritance. Python does not have access specifiers (like C++'s public, private).
- In Python, **functions** are **first-class objects**. This means that they can be assigned to variables, returned from other functions and passed into functions. Classes are also first class objects
- **Writing Python code is quick** but running it is often slower than compiled languages. Fortunately, Python allows the inclusion of C-based extensions so bottlenecks can be optimized away and often are. The **numpy** package is a good example of this, it's really quite quick because a lot of the number-crunching it does isn't actually done by Python
- Python finds **use in many spheres** – web applications, automation, scientific modeling, big data applications and many more. It's also often used as "glue" code to get other languages and components to play nice.

Explain Inheritance in Python with an example.

Inheritance allows One class to gain all the members(say attributes and methods) of another class. Inheritance provides code reusability, makes it easier to create and maintain an application. The class from which we are inheriting is called super-class and the class that is inherited is called a derived / child class.

They are different types of inheritance supported by Python:

1. Single Inheritance – where a derived class acquires the members of a single super class.
2. Multi-level inheritance – a derived class d1 in inherited from base class base1, and d2 are inherited from base2.
3. Hierarchical inheritance – from one base class you can inherit any number of child classes
4. Multiple inheritance – a derived class is inherited from more than one base class.