Python Assignment - 2

1) What the data types in python? Explain

→ Datatypes are the classification or classification or categorization of data items. Data types represent a kind of value which determines what operations can be performed on that data. Numeric, non-numeric and Boolean (true / False) data are the most used data types.

Following are the standard or built-in datatypes of Python:

i) Numeric :-

A numeric value is any representation of data which has a numeric value. Python identifies three types of numbers:

(a) Integer - Positive or negative whole numbers (without a fractional part). eg: 12, 3

(b) Float - Any real number with a floating point representation in which a fractional component is denoted by a decimal symbol or scientific notation. eg: 12.3, 6.8

(c) Complex number - A number with a real and imaginary component represented as x+yj. x and y are floats and j is -1 (Square root of -1 called an Imaginary number). eg: 2+3j

ii) Boolean :-

→ Data with one of two built-in value True or False.

→ Boolean objects that are equal to true are truthy (true) and those equal to False are Falsy

→ Non Boolean objects can be evaluated in boolean context as well and determined to be true

or false.
It is denoted by the class bool.

ii) Sequence type:-

→ In python sequence is the ordered collect of similar or different data types
→ Sequences allows to store multiple values i organized and efficient fashion
→ There are several sequence types in python:

a) String
b) List
c) Tuple

(a) String:- String is a collection of one or m characters put in a single quote, double quote triple quote
• In python there is no character datatype, a cha -acter is a string of length one.
• It is represented by "str" class

(b) List:
• Lists are just like an arrays, declared in other languages
• Lists need not be homogeneous.
• A single list may contain int, strings and obje
• Lists are mutable, they can be altered even afte their creation
• It is represented by "list" class

(c) Tuple:
• Tuple is an ordered collection of python objects much like a list. It is represented by "tuple" class.
• The sequence of values stored in a tuple can be of any type and they are indexed by integer

• Difference between tuple is immutable and tuple are hashable whereas lists are not.

iv) Set :—

→ In python, set is an unordered collection of datatype that is iterable, mutable and has no duplicate elements.

→ The order of elements in a set is undefined though it may consist of various elements.

→ The main advantage of using a set, as opposed to a list is that has highly optimized method for checking whether a specific element is contained in the set.

v) Dictionary :—

→ Dictionary in python is an unordered collection of data values, used to store data values like map, which is unlike of other datatype.

→ That hold only single value as an element, dictionary holds key: value pair

→ Key - value is provided in the dictionary is separated by a colon(:), whereas each key is separated by a 'comma'.

2) Briefly explain history of python.

→ *Python is a widely used general-purpose, high-level programming language.

* It was initially designed by Guido van Rossum in 1991 and developed by Python software Foundation.

* It was mainly developed for emphasis on code readability, and its syntax allows programmers to express concepts in fewer lines of code.
* The Programming language which python is said to have succeeded in ABC programming language, which had the Interfacing with the Amoeba operating system and had the feature of exception handling.
* He had taken .Seen some issues with ABC but liked most of features.
* He had taken the syntax of ABC, and some of its good features
* The Inspiration for the name came from BBC's TV show - "Monty Python's Flying Circus', as he was a big fan of the TV show.
* Also he wanted a short, unique and slightly mysterious name for his Invention and hence named it "Python"
* Python has been an Inspiration for many other coding languages such as Ruby, Cobra, Boo, Groovy, Julia, Swift GO, etc.

3) Explain all the Operators in python.

→(i) Arithmetic Operators: Arithmetic operators are used to perform mathematical operations like addition, subtraction, multiplication and division.

Operator	Description	Syntax
+	Addition: adds two operands	x+y
-	Subtraction: Subtracts two operands	x-y

*	Multiplication: multiplies two operands	x * y
/	Division (float): divides the first operand by the second	x / y
//	Division (floor): divides the first operand by the secon	x // y
%	Modulus: returns the remainder when first operand is divided by the second	x % y
**	Power: returns first raised to power second	x ** y

ii) Relational Operators: Relational operators compares the values. It either returns True or False according to the condition.

Operator	Description	Syntax
>	Greater than: True if left operand is greater than the right.	x > y
<	Less than: True if left operand is less than the right	x < y
==	Equal to: True if both operands are equal	x == y

!=	Not equal: True if operands are not equal	x != y
>=	Greater than or equal to: True if left operand is greater than or equal to the right	x >= y
<=	Less than or equal to: True if left operand is less x than or equal to the right	x <= y

iii) Logical operators : Logical operators perform Logical AND, Logical OR and Logical NOT operations

Operator	Description	Syntax
and	Logical AND: True if both the operands are true	x and y
or	Logical OR: True if Either of the operands is true	x or y
not	Logical AND: True if operand is false	not x

iv) Bitwise Operators : Bitwise operators acts on bits and performs bit by bit operation

Operator	Description	Syntax
&	Bitwise AND	x & y
|	Bitwise OR	x | y
~	Bitwise NOT	~ x

^	Bitwise XOR	x^y
>>	Bitwise right shift	x>>
<<	Bitwise left shift	x<<

v) Assignment Operators : Assignment operators are used to assign values to the variables.

Operator	Description	Syntax
=	Assign value of right side of expression to left side operand	x=y+3
+=	Add AND : Add right side operand with left side operand and then assign to left operand	a+=b a=a+b
-=	Subtract AND: Subtract right operand from left operand and then assign to left operand	a-=b a=a-b
*=	Multiply AND: Multiply right operand with left operand and then assign to left operand	a*=b a=a*b
/=	Divide AND: Divide left operand with right operand and then assign to left operand	a/=b a=a/b

%=	Modulus AND: Takes modulus using left and right operands and assign result to left operand	a%=b a = a%b
//=	Divide (floor) AND: Divide left operand with right operand and then assign the value (floor) to left operand	a//=b a=a//b
**=	Exponent AND: Calculate exponent (raise power) value using operands and assign value to left operand	a**=b a=a**b
&=	Performs Bitwise AND on operands and assign value to left operand	a&=b a=a&b
|=	Performs BitwiseOR on operands and assign value to left operand	a|=b a=a|b
^=	Performs Bitwise XOR on operands and assign value to left operand	a^=b a=a^b

>>=	Performs Bitwise right shift on operands and assign value to left operand	a>>=b a=a>>b
<<=	Performs Bitwise left shift on operands and assign value to left right operand	a<<=b a=a<<b

vi) Special Operators : There are some special type of operators like -

* Identity Operators - "is" and "is not" are the Identity operators both are used to check if two values are located on the same part of the memory. Two variables that are equal does not imply that they are identical.

Operator	Description
is	True if the operands are identical
is not	True if the operands are not identical

* Membership operators - "in" and "not in" are the membership operators; used to test whether a value or variable is in a sequence.

Operator	Description
in	True if value is found in the sequence
not in	True if value is not found in the sequence

4) Explain the features of Python.

→ • Python is a dynamic, high-level, free open source and Interpreted programming language. It supports object-oriented programming as well as procedural oriented programming.

• In Python, we don't need to declare the type of variable because it is a dynamic typed language.

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

(i) Easy to code: Python is high level programming language. Python is very easy to learn language as compared to other language like C, C#, java script, java etc. It is also developer-friendly language.

(ii) Free and open source: Since, it is open-source, this means that source code is also available to the public.

(iii) Object-oriented Language: Python supports object-oriented language and concepts of class, Objects encapsulation etc. One of the key features of python is object-oriented programming.

(iv) GUI Programming Support: Graphical users 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.

(v) 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.

(vi) Extensible feature: Python is a Extensible language. We can write our some python code into c or c++ language and also we can compile that code in c/c++ language.

(vii) 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 platform such as Linux, Unix and Mac then we do not need to change it, we can run this code on any platform.

(viii) Python is Integrated Language: Python is also an Integrated language because we can easily Integrated python with other language like c, c++ etc.

(ix) Interpreted Language: Python is an Interpreted Language because python code is executed line by line at a time like other language 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.

(x) Large standard Library: Python has a large standard library which provides 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.

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

5) Justify why python is interactive interpreted language.

→ Interpreted Python :-

* Unlike C/C++ etc, Python is an interpreted object-oriented programming language.
* By interpreted it is meant that each time a program is run the interpreter checks through the code for errors and then interprets the instructions into machine-readable bytecode.
* An interpreter is a translator in computer's language which translates the given code line-by line in machine readable bytecodes.
* And if any error is encountered it stops the translation until the error is fixed.
* Unlike C language, which is a compiled programming language.
* The compiler translates the whole code in one-go rather than line by line.

* This is the reason why in C language, all the errors are listed during compilation only.
* This is the basic difference between Interpreted language and compiled language.

Interactive Python :—

* Python is Interactive.
* When a Python statement is entered, and is followed by the Return key, if appropriate, the result will be printed on the screen, Immediately, in the next line.
* This is particularly advantageous in the debugging process.
* In Interactive mode of operation, Python is used in a similar way as the Unix Command line or the terminal.
* Interactive Python is very much helpful for the debugging purpose.
* If you have any doubts like: whether a syntax is correct, whether the module you are importing exists or anything like that, you can be sure within seconds using Python Interactive mode.
* It simply returns the >>> prompt or the corresponding output of the statement if appropriate and returns error for incorrect statements.