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4th sem CSE Sec: C

Assignment - 2 Python

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(1) What are data types in python? Explain

(A) Every values in python has a datatype. Since everything is an object in python programming data types are actually classes and variable are instance of these classes

There are various data types in python. Some of the important types are listed below

Python Numbers:- Integers, floating point numbers and complex numbers fall under python numbers They are defined as int, float and complex classes in python

we use the type() function to know which class a variable or a value belongs to and isinstance() function is used to check if an object belongs to a particular class

```
a=5
print(a, "is of type", type(a))
a= 2.0
print(a, "is of type", type(a))
a= 1+2j
print(a, "is complex number?", isin
```

O/p:- 5 is of type <class 'int'>
2.0 is of type <class 'float'>
(1+2j) is complex number? True

Integers can be of any length it is only limited by the memory available

Python list :-

list is an ordered sequence of items it is one of the most used data type in python and is very flexible. All the items in a list do not need to be of the same type.

Declaring a list is pretty straight forward items seperated by the commas are enclosed within brackets [ ].

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```
a: [ 1, 2.2, 'python' ]
```

we can use the slicing operator [ ] to extract an item or a range of items from a list. The index starts from 0 in python.

```
a = [5, 10, 15, 20, 25, 30, 35, 40]
# a[2] : 15
print ("a[2] ", a[2])
# a[0:3] : [5, 10, 15]
print ("a[0:3] : ", a[0:3])
# a[5:] : [30, 35, 40]
print ("a[5:] : ", a[5:])
```

O/P:-

```
a[2] : 15
a[0:3] : [5, 10, 15]
a[5:] : [30, 35, 40]
```

Python Tuple :

Tuple is an ordered sequence of items same as a list The only difference is that tuples are immutable. Tuply once created cannot be modified Tuples are used to write protect data and are usually faster than lists as they cannot change dynamically. It is defined within parenthesis ( ) where items are seperated by commas.

```
t = (5, 'program', 1+3j)
```

we can use this slicing operator [ ] to extract items but we cannot change its value.

Phython strings

string is sequence of unicode characters we can use single quotes or double quotes to represent strings Can be denoted using triple quotes, ''' ''' or """ """

```
s = "This is a string"
print(s)
s = '''A multiline
      string'''
print(s)
```

O/P:
```
This is a string
A multiline
string.
```

just like a list and tuple, the slicing operator [ ] can be used with strings. They are immutable.

Python set:- It is an unordered collection of unique items. set is defined by values seperated by comma inside braces { }. Items in a set are not ordered

```
a = {5, 2, 3, 1, 4}
print("a =", a)
print(type(a))
```

O/P:- a = {1, 2, 3, 4, 5}
<class 'set'>

we can perform set operations like union, intersection on two sets. They have unique values. They eliminate duplicates

Ex:
```
a = {1, 2, 2, 3, 3}
print(a)
```
O/P = {1, 2, 3}

Python Dictionary:-
Dictionary is an unordered collection of key value pairs. It is generally used when we have a huge amount of data. Dictionaries are optimized for retrieving data. In python dictionaries are defined within braces { } with each item being a pair in the form key:value key and value can be of any type.

```
>>> d = {1:'value', 'key':2}
>>> type(d)
<class 'dict'>
```

(2) Briefly explain history of python. 3057

(A) 1. python laid its foundation in the late 1980

2. The implementation of python was started in the december 1989 by Guido van Rossum at CWI in Netherland

3. In February 1991, van Rossum published the code (labeled version 0.9.0) to alt.sources

4. In 1994 python 1.0 was released with new features like: lamda, map, filter and reduce

5. python 2.0 added new features like: list, comprehensions, garbage collection system

6. On December 3, 2008, python 3.0 (also called "Py3k") was released. It was designed to rectify fundamental flaw of the language.

7. ABC programming language is said to be the predecessor of python language which was capable of Exception Handling and interfacing with Amoeba operating system

8. python is influenced by following programming languages

* ABC language
* modula-3

Python version list

Python programming language is being updated regularly with new features and supports. There are lots of updations in python versions, started from 1994 to current release.

python version list shown below

Python version	Released Date
Python 1.0	Jan 1994
Python 1.5	Dec 31, 1997
Python 1.6	Sep 5, 2000
Python 2.0	October 16, 2000
Python 3.1	June 27, 2009
Python 3.2	Feb 20, 2011
Python 3.3	Sep 29, 2012
Python 3.4	March 16 2014
Python 3.5	Sep 13, 2015
Python 3.6	Dec 23, 2016
Python 3.7	June 27, 2018.

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(3) Explain all the operators in python

(A) operators are the special symbols in python that carry out arithmetic or logical computation. The value that the operator operates on is called the operand. For ex:- >>> 2+3 5. Here, + is the operator that performs addition 2 and 3 are the operands and is the output of the operation.

Types of operators:

1. Arithmetic operators
2. Comparision operators
3. Assignment operators
4. logical operators
5. Bitwise operators
6. Membership operators
7. Identity operators

1. Arithmetic operators:-

These are used to perform arithmetic operations between two operands.

operator	Description
+ (Addition)	It is used to add two operands. For ex:- if a = 20 b = 10 ⇒ a+b = 30
- (subtraction)	It is used to subtract the second operand from the first operand if the first operand is less than the second operand, the value result negative Ex:- If a = 20, b = 10 ⇒ a-b = 10
/ (Divide)	It return the quotient after dividing the first operand by the second Ex:- If a = 20, b = 10 ⇒ a/b = 2
* (Multiplication)	It is used to multiply one operand with the other, Ex:- If a = 20 b = 10 ⇒ a*b = 200.
% (remainder)	It returns the remainder after dividing the first operand by the second Ex:- If a = 20, b = 10 ⇒ a%b = 0
** (exponent)	It is an exponent operator represented as it calculates the first operand power to second operand.
// (floor division)	It gives the floor value of the quotient produced by dividing the two operands.

2. Comparision operators:-

These are used to comparing the value of the two operands and returns boolean true or false accordingly

operator	Description
==	The value of two operands is equal then the condition becomes true.
!=	If the value of two operands is not equal then the condition becomes true
<=	If the first operand is less than or equal to the second operand then condition is true.
>=	If the first operand is greater than or equal to the second then the condition is true.
>	If the first operator is greater than the second then it is true
<	If the first operand is less than the second then it is true.

3. Python assignment operators:-

The assignment operators are used to assign the value of the right expression to the left operand.

operator	Description
=	It assigns the value of the right expression to the left operand.
+=	It increases the value of the left operand by the value of the right operand and assign the modified value back to left operand.
-=	It decreases the value of the left operand by the value of the right operand and assign the modified value back to left operand.
*=	It multiplies the value of the left operand by the value of the right operand and assign modified value back to left operand

4. Bitwise operator:-

The bitwise operators perform bit by bit operation on the values of the two operands

operator	Description
& (binary and)	If both the bits at the same place in two operands are 1, then 1 is copied to the result. other wise, 0 is copied
| (binary or)	The resulting bit will be zero if both the bits are zero otherwise the resulting bit will be 1.

^ (binary xor) — The resulting bit will be 1 if both the bits are different otherwise the resulting bit will be 0.

~ (negation) — It calculates the negation of each bit of the operand

5. Logical operators

The logical operators are used primarily in the expression evaluation to make a decision

operator	Description
and	If both the expressions are true then the condition will be true If a and b are the two expressions, a → true, b → true ⇒ a and → true.
or	If one of the expressions is true then the condition will be true If a and b are the two expressions, a → true, b → false ⇒ a or b → true.
not	If an expression a is true then not (a) will be false and vice versa.

6. Membership operators:

Python membership operators are used to check the membership of value inside a python data structure. If the value present in data structure, then the resulting value is true otherwise it returns false.

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operator	Description
in	It is evaluated to be true if the first operand is found in the second.
not in	It is evaluated to be true if the first operand is not found in the second

Identity operators

operator	Description
is	It is evaluated to be true if the reference present at both sides point to the same object
is not	It is evaluated to be true if the reference present at both the side do not point to the same object

(4) Explain the features of python?

(A) python provides lots of features that are listed below

(1) Easy to learn and use

python is easy to learn and use. It is developer friendly and high level programming language

(2) Expressive language.

Python language is more expressive means that it is more understandable and redable

(3) Interpreted language

It is an interpreted language i.e, interpreter executes the code line by line at a time. This makes debugging easy and thus suitable for beginn

(4) Cross platform language. (3057)

python can run equally on different platforms such as windows, Linux, Unix and macintosh etc.; so we can say that python is a portable language

(5) Free and open source:

python language is freely available at official web address. The source code is also available. so it is open source

6. Object oriented language

It supports object oriented language and concepts of classes and objects come into existence

7. Extensible: It implies that other languages such as c/c++ can be used to compile the code and thus it can be used further in our python code

8. Large standard library:

It has a large and broad library and provides rich set of module and functions for rapid application development

9. GUI programming support:

Graphical user Interfaces can be developed using python

10) Integrated

It can be easily integrated with languages like c, c++, Java etc.,

15) Justify why python is interactive 3057
interpreted language.

(A) unlike c/c++ python is an interpreted object oriented language By interpreted it is meant that each time a program is run the interpreter checks through the code to errors & then interprets the instructions into machine readable byte code.

An interpreter is a translator in computer language which translates the given code line by line in machine readable byte code and if any errors fixed.

unlike c language, which is compiled programming language. This compiler translates all the errors are listed during compilation only

when a python statement is entered, and is followed by the return key. If appriate, 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 why as the unix command line or the terminal interactive python is very much helpful for the debugging purpose.

so it simply returns the ">>>" prompt on the corresponding output of the statement if appropriate are return error for return key. If appropriate the result will be printed on the screen immediately in the next line. This is particularly advantageous

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