8 Working with Advance Python

Exercises

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A. Fill in the blanks.

1. Python is a **high-level** programming language which has object-oriented features.
2. Python is a very popular **open-source** software development language that offers enhanced process control capabilities.
3. Anaconda prompt allows to launch **Jupyter notebook** through the kernel and IPython is the default kernel for Jupyter notebook.
4. Python **package** is a collection of modules, that are related to each other.
5. **Pandas** is a software library written for the Python programming language for data manipulation and analysis.
6. **Comments** are ignored by the interpreter and does not run during the program execution.
7. The **Interpreter** allocates memory and decides what can be stored in the reserved memory.
8. **input()** function is used to accept values from the user at the runtime of a program.
9. The **flow of control** statement is also known as decision making statement in Python programming.
10. Python **loops** are the group of statements executed frequently until the condition become False.

B. State whether these statements are True or False.

1. OpenCV is a library for functions mainly with real-time Computer Vision. **True**
2. Python statements are the sentences which we write as instructions in a Python Program. **True**
3. The single line comments are written in Python using triple quotes. **False**
4. Functions are the pre-defined (case-sensitive) words. These words have special meaning by default. **False**
5. Python interprets the type of the variable according to the value stored in the variable. **True**
6. Tuple data type is a collection of data type and has no duplicate elements. **False**
7. Python if-else statement is useful when you have two choices. It executes the first block if the condition is True. **True**
8. Python programming language does not allow to use one loop inside another loop. **False**

9. If the elements of a data structure result in a sequence or a linear list then it is called a non-linear data structure. **False**

10. A set is defined as a unique collection of unique elements that do not follow a specific order. **True**

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C. Multiple Choice Questions (MCQs).

1. Python is developed under an _____ approved, making it freely usable and distributable, even for commercial use.

   a. Open-source license ✓ b. Open-ended license ☐

   c. Open-path license ☐ d. Only-programmer license ☐

2. Python Programming was developed by _____ in 1991.

   a. Bill Gates ☐ b. Mark Zuckerberg ☐

   c. Guido van Rossum ✓ d. Ada Lovelace ☐

3. Python _____ works and performs the execution of a program for a result.

   a. Compiler ☐ b. Interpreter ✓

   c. Assistant ☐ d. Algorithm ☐

4. Select the correct statements from the following?

   a. Python libraries are extremely powerful tools ☐

   b. Python uses the Database API ☐

   c. Python is a general-purpose programming language ☐

   d. All of the above ✓

5. This is a Python library that is developer-friendly and easy to use for building games.

   a. PyGame ✓ b. PythonGame ☐

   c. TensorFlow ☐ d. NumPy ☐

6. This is the most commonly used Python distribution for data-science and comes pre-installed with most popular libraries and tools.

   a. Tkinter ☐ b. PyQt ☐

   c. Anaconda ✓ d. PyGTK ☐

7. Which of the following is an unordered collection of data values, and has an efficient key-value to make it more optimised?

   a. Tuple ☐ b. Dictionary ✓

   c. List ☐ d. Set ☐

8. Which of the following will you use if you have only one condition to execute or one possibility of output?

a. Simple if statement ☑ b. if-else statement ☐

c. if-elif-else ladder ☐ d. Nested if statement ☐

9. Which of the following is a fundamental concept of any programming language, essential for algorithms and flowcharts?

a. Deep Learning ☐ b. Machine Learning ☐

c. Data Structure ☑ d. Operating System ☐

10. Which of the following is not a Data Type in Python?

a. Numeric Data Type ☐ b. String Data Type ☐

c. List Data Type ☐ d. Alphanumeric Data Type ☑

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D. Answer the following questions.

1. **What is Python? What are the benefits of using Python?**

Ans. Python is a high-level programming language which has object-oriented features. It helps programmers to write clear and logical program code for several projects.

Python has its interpreter which is a program that executes the other programs. When we write Python scripts, it converts source code written by us into intermediate language which is again translated into the native language or machine language that is executed.

Python is mainly used for web development and software development, data analytics, Machine Learning, and even designing. That is why Python is now one of the most widespread and extensively used programming languages in the world.

Benefits: Python uses new lines to complete a script, as opposed to other programming languages which often use semicolons or parentheses. Python is an object-oriented language where object-oriented approach is followed to write a program. Python is easy to understand and acquire. Python is developed under an open-source license (OSI) approved, making it freely usable and distributable, even for commercial use.

2. **What is the difference between List and Tuple?**

Ans.

List	Tuple
A list is defined as ordered collection of different items.	A tuple is a built-in data structure in python that is an ordered collection of objects.
List comes with an order that uniquely identifies each item stored in a list.	Tuple comes with limited functionality.
List can be modified, added or deleted.	Tuple cannot be modified, added or deleted once created.
List can be created using the square brackets.	Tuple can be created using parentheses but the use of parentheses is optional.

3. **What is Python If Statement?**

Ans. **if Statement**

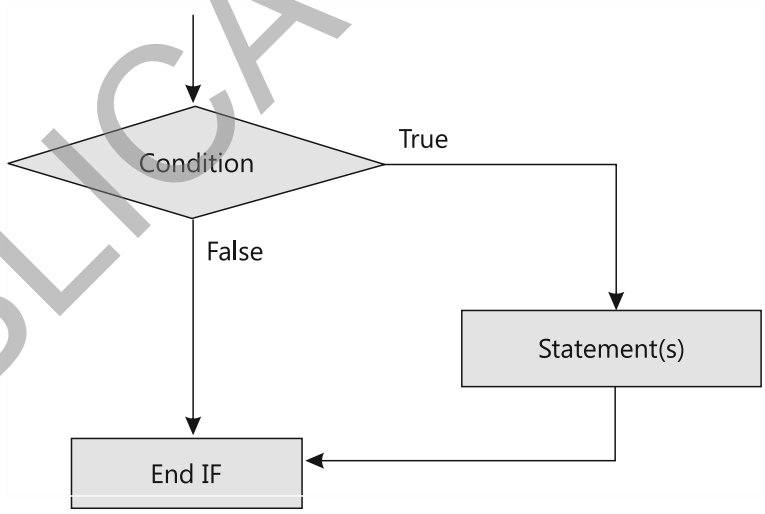
If you have only one condition to be executed or one possibility of output, simple 'if' statement is useful for the same. It executes the True condition block.

For example, if it's raining outside, you have to wait inside the room.

Let us see how it is possible:

Syntax:

```
if <condition>:
        statement(s)
```



if statement flowchart

Example Program:

```
Outside = "Raining"
if Outside=="Raining":
        print("you have to wait inside the room")
```

Output:

you have to wait inside the room

4. **Explain While loop in Python with example.**

Ans. **The 'while' Loop:** The 'while' loop is used when you have different repetitive statements with a single condition. When the condition is False, your loop will terminate by itself. 'while' loop may have else block in it.

Let us see how it can be used:

Syntax:

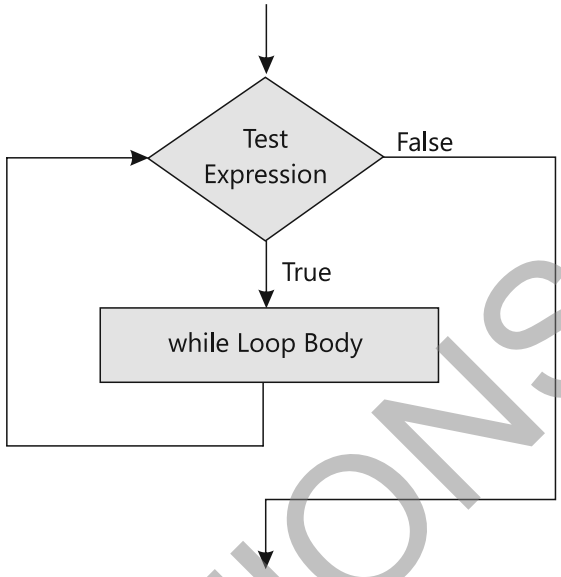
```
iterator
while <condition>:
        statement(s)
        update_statement
```

Example Program:

```
i = 1
while i < 5:
        print(i)
        i += 1
```

Output:

```
1
2
3
4
```



'while' loop flowchart

5. Explain the functions of "is," "not," and "in" operators.

Ans. The functions of "is," "not," and "in" operators are as follows:

"is" Operator: Returns True if both variables are the same object.
This operator is an Identity operator.
Identity operators are used to compare the objects, not if they are equal, but if they are actually the same object, with the same memory location.

"not" Operator: Reverse the result, returns False if the result is true.
This operator is a Logical operator.
Logical operators are used to combine conditional statements.

"in" Operator: Returns True if a sequence with the specified value is present in the object.
This operator is a Membership operator.
Membership operators are used to test if a sequence is presented in an object.

6. Explain Bitwise operators in Python programming.

Ans. Bitwise operators are used to compare (binary) numbers. Following are the Bitwise operators:

Operator	Name	Description
&	AND	Sets each bit to 1 if both bits are 1
|	OR	Sets each bit to 1 if one of two bits is 1
^	XOR	Sets each bit to 1 if only one of two bits is 1
~	NOT	Inverts all the bits
<<	Zero fill left shift	Shift left by pushing zeros in from the right and let the leftmost bits fall off
>>	Signed right shift	Shift right by pushing copies of the leftmost bit in from the left, and let the rightmost bits fall off

```
# [Example Program for Bitwise Operators].
a = 60            # 60 = 0011 1100
b = 13            # 13 = 0000 1101
c = 0
c = a & b;        # 12 = 0000 1100
print("Sequence 1 - Value of c is ", c)

c = a | b;        # 61 = 0011 1101
print("Sequence 2 - Value of c is ", c)

c = a ^ b;        # 49 = 0011 0001
print("Sequence 3 - Value of c is ", c)

c = ~a;           # -61 = 1100 0011
print("Sequence 4 - Value of c is ", c)

c = a << 2;       # 240 = 1111 0000
print("Sequence 5 - Value of c is ", c)

c = a >> 2;       # 15 = 0000 1111
print("Sequence 6 - Value of c is ", c)
```

Output:

```
Sequence 1 - Value of c is  12
Sequence 2 - Value of c is  61
Sequence 3 - Value of c is  49
Sequence 4 - Value of c is  -61
Sequence 5 - Value of c is  240
Sequence 6 - Value of c is  15
```

7. Describe the Data types in Python programming.

Ans. Python interprets the type of the variable according to the value stored in the variable. In a Python program, we have a choice to use any type of data such as real numbers, numbers with decimals, numbers without decimals, text, etc. This is known as data type in Python.

Following are the data types in Python:

Numeric Data Types

Numeric data types are used to store numeric values.

- **Integer Data Type:** A numeric value without decimal places is considered as an integer. Integers can be of any length in Python.

  For Example: 6789, -6789, 13579, -13579, etc.
- **Float Data Type:** Real numbers having decimal or floating points are considered as float.

  For Example: 12.8, 834.5, 7556.4558, etc.

String Data Type

It is a group or sequence of characters that is a combination of letters, numbers, and special symbols. It can be enclosed with single and double quotes.

For Example: 'Hello', ''Welcome to TUK World'', etc.

List Data Type

List is an abstract data type that represents a finite number of ordered values, where the same value may occur more than once. List is defined by using square brackets.

For Example: ['Mumbai', 'Delhi', 'Kolkata', 28].

Tuple Data Type

A Tuple is a collection that is ordered and unchangeable in a program. It cannot be modified, added, or deleted once created. Tuple is defined by using parentheses.

For Example: ('Mumbai', 'Delhi', 'Kolkata').

Set Data Type

Set is a collection of data type and has no duplicate elements. The order of elements in a set is undefined and it may contain various elements. Set is defined by using curly braces.

For Example: {8,9,10}.

Dictionary Data Type

Dictionary is an unordered collection of data values. Dictionary is used to store data values like a map. A key-value is provided in the dictionary to make it more optimised. A Dictionary is defined by using curly braces { }, separated by colon : and comma , . Following is an example of dictionary.

For Example:

```
dict =      {
 "Publication": "TUK",
 "Textbook": "Artificial Intelligence",
 "Code": 417
 }
print(dict)
```

8. **What is input() function? Explain with example.**

Ans. In Python, input() function is used to accept values from the user at the runtime of a program. The input() function accepts and returns the text data by default. You need to specify the data type if you want to use numbers or any other data type.

For Example:

```
# [This is an example of input() function].
name = input("What is your name?")
print("Hello", name)
```

Output:

```
What is your name? TUK
Hello TUK
```

9. What do you understand by Data structure? Explain its types.

Ans. The data structure is a fundamental concept of any programming language, essential for algorithms and flowcharts. It is the relationship between data and its representation that helps in how efficiently various functions, operations or algorithms can be applied in a data structure.

The Python data structures are containers (Storage) that organise and group data according to its type or its values. The basic data structures include list, set, tuples, and dictionary. Each of the data structures is unique and works in its own different ways.

Types of Data Structure

There are two types of data structures:

Linear data structure:	If the elements of a data structure result in a sequence or a linear list, then it is called a linear data structure.	**Examples:** Arrays, Linked List, Stacks, Queues, etc.
Non-linear data structure:	If the elements of data structure result in a way that traversal of nodes is not done in a sequential manner, then it is called a non-linear data structure.	**Examples:** Trees, Graphs, etc.

Python identifiers are the user defined names and they are used to identify the name of a variable, function, class, module, or any other object declared in the program.

Note:
- Identifiers are case sensitive.
- They can be used anywhere in the program.
- You cannot use any predefined keyword as identifier.

Identifier start with letters [A to Z], [a to z], or underscore [_], followed by zero or more letters, underscores, and numbers [0 to 9].