**PYTHON ASSIGNMENT**

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**Part A – Conceptual Questions**

**Q.1] What are the key features of Python that make it suitable for data engineering?**

* Easy to learn, readable syntax with extensive libraries (pandas, NumPy, PySpark) for handling data.
* Strong support for data manipulation, automation, and integration with databases and big data tools.

**Q.2] Explain the difference between a variable and a constant in Python.**

* Variable: Value can change during program execution (example: x = 5, later x = 10).
* Constant: Value should not be changed once assigned (by convention written in uppercase, e.g., PI = 3.14).

**Q.3] List Python's main built-in data types and give one example of each.**

* Numeric (int, float) → x = 10
* Sequence (list, tuple, range) → my\_list = [1, 2, 3]
* Text (str) → name = "John"
* Set types (set, frozenset) → s = {1, 2, 3}
* Mapping (dict) → d = {"a": 1, "b": 2}

**Q.4] What is the difference between mutable and immutable data types? Give examples.**

* Mutable: Can be changed after creation (list, dict, set).
* Immutable: Cannot be changed after creation (str, tuple, int).

**Q.5] Difference between list, tuple, and set.**

* List: Ordered, mutable, allows duplicates → [1, 2, 2].
* Tuple: Ordered, immutable, allows duplicates → (1, 2, 2).
* Set: Unordered, mutable, no duplicates → {1, 2}.

**Q.6] What is zero-based indexing? Explain with an example.**

* Indexing starts from 0, meaning first element is at position 0.
* Example: list = [10, 20, 30]; list[0] = 10.

**Q.7] How do you check the type of a variable in Python?**

* Using type() function.
* Example: type(123) → <class 'int'>.

**Q.8] What is the difference between is and == in Python?**

* is: Checks memory identity (if two objects are the same in memory).
* ==: Checks equality of values.

**Q.9] Name Python’s sequence types and explain their usage.**

* list → ordered, mutable collection.
* tuple → ordered, immutable collection.
* range → sequence of numbers used in loops.

**Q.10] What are identity and membership operators in Python? Give examples.**

* Identity (is, is not) → Checks if two variables point to same object.
* Membership (in, not in) → Checks if value exists in a sequence.
* Example: 5 in [1, 2, 5] → True.

**Q.11] Explain the difference between append() and insert() in lists.**

* append(): Adds element at the end → list.append(4).
* insert(): Adds element at specific index → list.insert(1, 5).

**Q.12] What is tuple unpacking? Show an example.**

* Assigning tuple elements to multiple variables at once.
* Example: a, b, c = (1, 2, 3).

**Q.13] How do you add an item to a set? Can sets have duplicate elements?**

* Use add() method → s.add(4).
* Sets cannot have duplicate elements.

**Q.14] What is the difference between remove() and discard() in a set?**

* remove(): Removes element, throws error if not found.
* discard(): Removes element, does nothing if not found.

**Q.15] Explain what a slice is in Python and give an example.**

* Slice extracts a portion of sequence using indices.
* Example: list[1:4] → returns elements from index 1 to 3.

**Q.16] 16.​ What is the difference between strip(), lstrip(), and rstrip() in strings?​**

* strip(): Removes spaces from both ends.
* lstrip(): Removes spaces from left side.
* rstrip(): Removes spaces from right side.

**Q.17] Name any 5 string methods and their usage.​**

* upper(): Converts to uppercase.
* lower(): Converts to lowercase.
* split(): Splits string into list.
* join(): Joins list into string.
* replace(): Replaces part of string.

**Q.18] How do you find the number of elements in a tuple?​**

* Use len() function.
* Example: len((1, 2, 3)) → 3.

**Q.19] What is the difference between union() and update() in sets?​**

* union(): Returns a new set with combined elements.
* update(): Adds elements of another set to the existing set.

**Q.20] Can a tuple contain mutable objects? Explain with an example.​**

* Yes, tuples are immutable but can hold mutable objects inside.
* Example: t = ([1, 2], 3); here list inside tuple can be modified.