UNIT 7: TUPLES IN PYTHON

Hey Students! Today we are starting one of the most interesting data types in Python – TUPLES!

What is a Tuple?

A Tuple is a collection which is ordered and IMMUTABLE (cannot be changed). It is similar to a list, but the main difference is that we use round brackets () instead of square brackets [].

Key Features:

- Ordered: Items have a defined order.
- Immutable: Unchangeable after creation.
- Allows Duplicates: Same value can appear multiple times.

Pro Tip!
Once a tuple is created, you cannot add, remove, or change its items. It's like a 'read-only' list!

Example of Creating a Tuple:

```
my_tuple = ('Python', 'Java', 'C++')
print(my_tuple)
```

Output:
```
('Python', 'Java', 'C++')
```

Interview Q: What is the difference between a List and a Tuple?

TUPLE OPERATIONS

Since tuples are immutable, we can't do everything we do with lists, but we can still perform many operations!

1. Accessing Items

We use index numbers (starting from 0) to access items.

```
fruits = ('apple', 'banana', 'cherry')
print(fruits[1])  # Positive indexing
print(fruits[-1]) # Negative indexing
```

Output:
banana
cherry

2. Slicing

Extract a range of items using [start:stop].

```
nums = (10, 20, 30, 40, 50)
print(nums[1:4])
```

Output:
(20, 30, 40)

3. Joining Tuples

Use the + operator to join two or more tuples.

```
t1 = (1, 2)
t2 = (3, 4)
t3 = t1 + t2
print(t3)
```

Output:
(1, 2, 3, 4)

Real-world:
Tuples are used for data that shouldn't change, like GPS coordinates (lat, long) or RGB color codes.

PACKING & UNPACKING

This is a super cool feature in Python!

Tuple Packing:

When we create a tuple, we normally assign values to it. This is called 'packing'.

```
fruits = ('apple', 'banana', 'cherry')  # Packing
```

Output:
Done!

Tuple Unpacking:

We can extract the values back into variables. This is 'unpacking'.

```
(green, yellow, red) = fruits
print(green)
print(yellow)
print(red)
```

Output:
apple
banana
cherry

Using Asterisk (*):

If the number of variables is less than the number of values, use * to collect remaining values into a list.

```
colors = ('red', 'blue', 'green', 'yellow')
(r, b, *others) = colors
print(others)
```

Output:
['green', 'yellow']

Interview Q:
How do you swap two variables using a tuple in one line?

Answer: a, b = b, a (Python internally uses tuple packing/unpacking!)

TUPLE METHODS

Python has only TWO built-in methods for tuples! (Because they are immutable)

1. count()

Returns the number of times a specified value occurs in a tuple.

```
nums = (1, 3, 7, 8, 7, 5, 4, 6, 8, 5)
x = nums.count(5)
print(x)
```

Output:
2

2. index()

Searches the tuple for a specified value and returns the position of where it was found.

```
nums = (1, 3, 7, 8, 7, 5, 4, 6, 8, 5)
x = nums.index(8)
print(x)
```

Output:
3

Common Mistake!

Trying to use .append() or .remove() on a tuple will give an AttributeError. Remember, Tuples are IMMUTABLE!

MINI EXERCISE

Q: Create a tuple with 5 numbers and find the sum of all elements.

```
t = (10, 20, 30, 40, 50)
print(sum(t))
```

Output:
150

Quick Task!
Try to convert a tuple to a list, change an item, and convert it back to a tuple. It's a common workaround!