Lab 2: Basic Python Data Types

Task: Find Total Impedance

Objective

The objective of this task is to understand how to work with Python's complex numbers to calculate the total impedance of a circuit and analyze its electrical properties, including resistive and reactive components, magnitude, and phase angle.

Task Description

In this task, the goal is to calculate the total impedance of a circuit using Python's complex number operations. The task involves combining multiple impedances and analyzing their electrical characteristics.

Procedure

Added the three given impedances using Python complex numbers.

Extracted and printed the real part (resistive component).

Extracted and printed the imaginary part (reactive component).

Computed the magnitude of the total impedance using abs().

Calculated the phase angle using cmath.phase().

In [ ]:
```python
import cmath
import math
R = 50 # ohms
L = 0.1 # H
C = 100e-6 # F
f = 60 # Hz
w = 2 * math.pi * f
Z_R = complex(R, 0)
Z_L = complex(0, w * L)
Z_C = complex(0, -1 / (w * C))
print("Resistor Impedance:", Z_R)
print("Inductor Impedance:", Z_L)
print("Capacitor Impedance:", Z_C)
```

```
Resistor Impedance: (50+0j)
Inductor Impedance: 37.69911184307752j
Capacitor Impedance: -26.525823848649225j
```