

Resistance (R):

Resistance is a property of an electrical component that opposes the flow of electric current.

It is measured in ohms ( $\Omega$ ).

The higher the resistance, the lower the current flow for a given voltage.

Inductance (L):

Inductance is the property of an electrical component to store energy in a magnetic field.

It is measured in henries (H).

Inductors resist changes in current flow, causing a delay or "inductive reactance" in AC circuits.

Capacitance (C):

Capacitance is the ability of an electrical component to store and release electrical energy.

It is measured in farads (F).

Capacitors resist changes in voltage, causing a delay or "capacitive reactance" in AC circuits.

R-L-C Series Circuit:

In a series circuit, the components are connected end-to-end, so the same current flows through each element.

In an R-L-C series circuit, a resistor (R), inductor (L), and capacitor (C) are connected in series.

The total impedance (Z) of the circuit is the sum of the individual impedances of the components ( $Z = R + j\omega L + 1/(j\omega C)$ ), where j is the imaginary unit and  $\omega$  is the angular frequency.

The current in a series R-L-C circuit depends on the applied voltage and the impedance of the circuit.

R-L-C Parallel Circuit:

In a parallel circuit, the components are connected across the same voltage source, so the voltage across each element is the same.

In an R-L-C parallel circuit, a resistor (R), inductor (L), and capacitor (C) are connected in parallel.

The total admittance ( $Y$ ) of the circuit is the sum of the individual admittances of the components ( $Y = 1/R + j\omega C + 1/(j\omega L)$ ).

The total current in a parallel R-L-C circuit depends on the applied voltage and the total admittance of the circuit.

It's important to note that the behavior of R-L-C circuits can vary significantly depending on the frequency of the applied voltage, as the impedance and admittance of inductors and capacitors are frequency-dependent. Therefore, the concepts of impedance and admittance are used to analyze and design R-L-C circuits in AC systems.

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