

AC Circuit Overview

ChatGPT said:



Here are some key terms and definitions related to Alternating Current (AC) extracted from your document:

1. **Alternating Current (AC):** An electric current that periodically reverses direction. In contrast, direct current (DC) flows only in one direction.
2. **RMS (Root Mean Square) Value:** The RMS value of an AC current or voltage is equivalent to a DC value that would produce the same amount of heat in a resistor. For sinusoidal AC, the RMS value is $I_{rms} = \frac{I_{max}}{\sqrt{2}}$ where I_{max} is the peak value of the current.
3. **Inductive Reactance (X_L):** The opposition that an inductor offers to AC, given by $X_L = \omega L$, where ω is the angular frequency and L is the inductance.
4. **Capacitive Reactance (X_C):** The opposition that a capacitor offers to AC, defined as $X_C = \frac{1}{\omega C}$, where C is the capacitance.
5. **Impedance (Z):** The total opposition to the flow of AC in a circuit containing resistance, inductance, and capacitance, given by $Z = \sqrt{R^2 + (X_L - X_C)^2}$.
6. **Power Factor:** The cosine of the phase angle (ϕ) between the voltage and current in an AC circuit. It represents the fraction of the total power that is used for useful work.
7. **Resonance in AC Circuits:** Occurs in a series RLC circuit when the inductive reactance equals the capacitive reactance ($X_L = X_C$), leading to the total impedance being minimum and the current being maximum.
8. **Transformer:** A device that transfers electrical energy between two or more circuits through electromagnetic induction. It can increase (step-up) or decrease (step-down) AC voltages.

These terms represent fundamental concepts in the study of alternating current .