

# AC Waveform & Circuit Cheat Sheet (Theory Only)

## AC Waveform Definitions

- **Form Factor:** Ratio of the RMS value to the average value of an AC waveform.
- **Peak Factor (Crest Factor):** Ratio of the peak value to the RMS value of an AC waveform.

## Phasor Representation

- **Rectangular Form:** Represents a complex number using real and imaginary parts.
- **Polar Form:** Represents a complex number using magnitude and phase angle.

## Concepts in AC Circuits

- **Impedance:** The total opposition to AC current, consisting of resistance and reactance.
- **Resistance (R):** Opposition to current, independent of frequency.
- **Inductive Reactance (XL):** Opposition caused by an inductor, increasing with frequency.
- **Capacitive Reactance (XC):** Opposition caused by a capacitor, decreasing with frequency.
- **Admittance:** Reciprocal of impedance, representing how easily AC current flows.

## Types of AC Circuits

- **R-L Circuit:** Contains a resistor and inductor; current lags voltage.
- **R-C Circuit:** Contains a resistor and capacitor; current leads voltage.
- **RLC Series Circuit:** Contains a resistor, inductor, and capacitor in series, affecting phase angle.
- **RLC Parallel Circuit:** Components are connected in parallel, affecting circuit response.

## Power in AC Circuits

- **Active Power (Real Power):** Power that performs useful work, measured in watts.
- **Reactive Power:** Power that oscillates between source and load, measured in VAR.
- **Apparent Power:** Combination of active and reactive power, measured in VA.
- **Complex Power:** Represents both active and reactive power in a single expression.
- **Power Factor:** Ratio of active power to apparent power, indicating efficiency.

## Resonance in AC Circuits

- **Series Resonance:** Condition where inductive and capacitive reactances cancel, maximizing current.
- **Parallel Resonance:** Condition where impedance reaches a maximum, minimizing current.
- **Bandwidth:** Range of frequencies where circuit operates effectively.
- **Quality Factor (Q-Factor):** Represents sharpness of resonance, indicating circuit efficiency.

## Three-Phase Balanced AC Circuits

- **Star (Y) Connection:** Common connection where phase voltage is lower than line voltage.
- **Delta ( $\Delta$ ) Connection:** Connection where phase and line voltages are equal.
- **Power Measurement (Two Wattmeter Method):** Method to measure power in a three-phase system using two wattmeters.

This cheat sheet covers essential AC circuit theory without formulas. Let me know if you need further explanations!