Basic Electrical Engineering formula Sheet

Resistors in Series

$$R_{eq} = R_1 + R_2 + R_2$$

Resistors in Parallel

$$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \cdots \frac{1}{R_n}$$

Kirchhoff's Voltage Law

Sum of all voltages in a loop is equal to zero.

$$\sum Voltages = 0$$

Kirchhoff's Current Law

Sum of all currents entering and leaving a node is equal to zero.

Inductive Reactance

$$X_L = 2\pi f L$$

X_L = Inductive reactance

f = Frequency in hertz

L = Inductance in henry

Capacitive Reactance

$$X_C = \frac{1}{2\pi f C}$$

X_C = Capacitive reactance

f = **Frequency**

C = **Capacitance in Farads**

Ohm's Law for AC

$$E = IZ$$

$$I = \frac{E}{Z}$$

$$Z = \frac{E}{I}$$

E = Voltage
I = Current in Ampere
Z = Impedance in ohms

Impedance in Series

$$Z_{series} = Z_1 + Z_2 + Z_3$$

Impedance in Parallel

$$Z_{parallel} = \frac{1}{\frac{1}{Z_1} + \frac{1}{Z_2} + \frac{1}{Z_3}}$$

Decibel Formulas

$$A_{V(dB)} = 20 \log A_{V(ratio)}$$

$$A_{I(dB)} = 20 \log A_{I(ratio)}$$

$$A_{P(dB)} = 10 \log A_{P(ratio)}$$

$$A_{V(ratio)} = 10^{\frac{A_{v(dB)}}{20}}$$

$$A_{I(ratio)} = 10^{\frac{A_{I(dB)}}{20}}$$

$$A_{V(ratio)} = 10^{\frac{A_{P(dB)}}{10}}$$

True Power (P)

$$P = I^2 R$$

$$P = \frac{E^2}{R}$$

Measure in watts

Reactive Power (Q)

$$Q = I^2 X$$

$$Q = \frac{E^2}{X}$$

Measure in Volt-Amps-Reactive

Apparent Power (S)

$$S = I^2 Z$$

$$S = \frac{E^2}{Z}$$

Measure in Volt-Amps