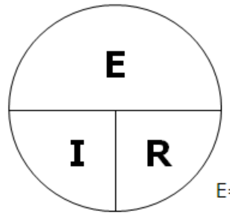
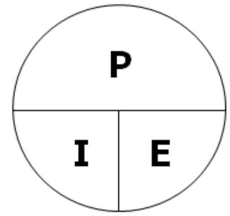
Ohm's Law and Power Calculations

$E = I * R$



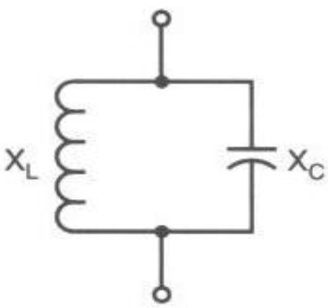
$P = I * E$



E=Voltage (Volts)
I=Current (Amps)
R=Resistance (Ohms)
P=Power (Watts)

$$db=10\log_{10}\frac{Pm}{Pref}$$

Pm = Measured Power, Pref = Reference Power



$$X_L = 2\pi fL$$

$$X_C = \frac{1}{2\pi fC}$$

The resonant frequency of a circuit is:

$$f_r = \frac{1}{2\pi\sqrt{LC}}$$

The resonant frequency is the frequency where $X_L = X_C$.

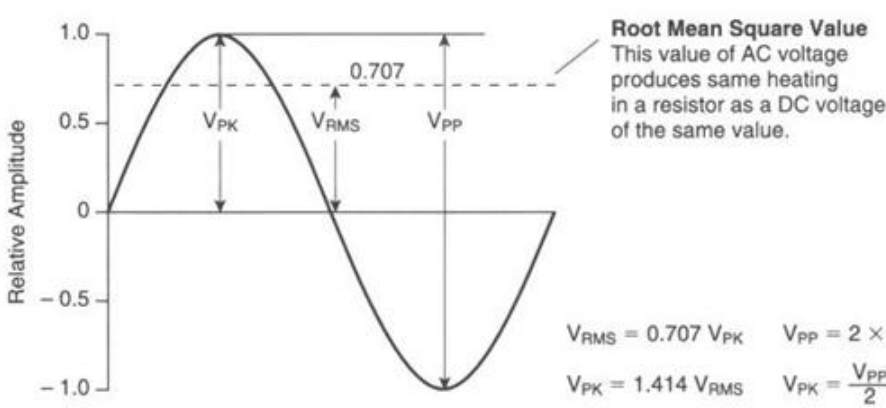
$$\therefore 2\pi fL = \frac{1}{2\pi fC}$$

$$f^2 = \frac{1}{(2\pi L)(2\pi C)}$$

$$f^2 = \frac{1}{(2\pi)^2 LC}$$

$$\therefore f_r = \frac{1}{2\pi\sqrt{LC}}$$

RMS, Peak and Peak to Peak Voltages



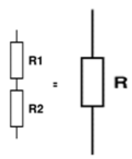
$V_{RMS} = 0.707\ V_{PK}$ $\quad V_{PP} = 2 \times V_{PK}$

$V_{PK} = 1.414\ V_{RMS}$ $\quad V_{PK} = \frac{V_{PP}}{2}$

$$PEP = \frac{((V_{pp}/2)*.707)^2}{R_{Load}}$$

$$E_{rms} = \sqrt{PEP * R}$$

Resistors in Series

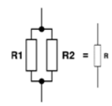


Resistors in Series are additive.

$$R_T = R_1 + R_2 + R_3 + R_N....$$

Resistors in Parallel

When Resistors are connected in parallel, their combined resistance is less than the resistance of the smallest resistor.



Two Resistors formula (Product of over Sum) $RT = \frac{R1*R2}{R1+R2}$

Two or more.. (Reciprocal) $\frac{1}{RT} = \frac{1}{R1} + \frac{1}{R2} + \frac{1}{R3} + \frac{1}{R......}$

Calculating Turns Ratio

Each winding of a transformer contains a certain number of turns of wire. The *turns ratio* is defined as the ratio of turns of wire in the primary winding to the number of turns of wire in the secondary winding. Turns ratio can be expressed using the formula

$$\text{Ratio} = \frac{Np}{Ns}$$

Np = Number of turns in the Primary
Ns = Number of turns in the Secondary

Impedance Matching

Maximum power is transferred from one circuit to another through a transformer when the impedances are equal, or matched. A transformer winding constructed with a definite turns ratio can perform an impedance matching function. The turns ratio will establish the proper relationship between the primary and secondary winding impedances. The ratio between the two impedances is referred to as the *impedance ratio* and is expressed by using the following equation.

$$\frac{Np}{Ns} = \sqrt{\frac{Zp}{Zs}}$$

Where Np = Number of turns in Primary
Ns = Number of turns in Secondary
Zp = Impedance of Primary
Zs = Impedance of Secondary

Capacitors in Series

When capacitors are connected in series, the total capacitance is less than any one of the series capacitors' individual capacitances. If two or more capacitors are connected in series, the overall effect is that of a single (equivalent) capacitor having the sum total of the plate spacings of the individual capacitors. An increase in plate spacing, with all other factors unchanged, results in decreased capacitance.

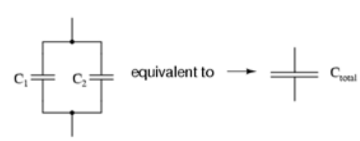
Two Capacitors $CT = \frac{C1*C2}{C1+C2}$

Two or more..

$$\frac{1}{CT} = \frac{1}{C1} + \frac{1}{C2} + \frac{1}{C3} + \frac{1}{C......}$$

Capacitors in Parallel

When capacitors are connected in parallel, the total capacitance is the sum of the individual capacitors' capacitances. If two or more capacitors are connected in parallel, the overall effect is that of a single equivalent capacitor having the sum total of the plate areas of the individual capacitors. An increase in plate area, with all other factors unchanged, results in increased capacitance.



Capacitors in Parallel are additive.

$$CT = C1 + C2 + C3 + C...$$