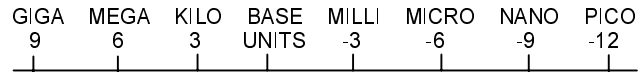


1. METRIC TERMS

- a. 1,000,000,000 ----- Billion - GIGA - G
- b. 1,000,000 ----- Million - MEGA - M
- c. 1,000 ----- Thousand - Kilo - K
- d. $\frac{1}{1,000}$ ----- Thousandth - MILLI - m
- e. $\frac{1}{1,000,000}$ ----- Millionth - MICRO - μ
- f. $\frac{1}{1,000,000,000}$ ----- Billionth - NANO - n
- g. $\frac{1}{1,000,000,000,000}$ ----- Trillionth - PICO - p

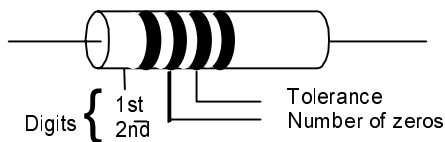
2. METRIC CONVERSION SCALE



To convert to base units move decimal point \rightarrow

- To convert to base units move decimal point \leftarrow

3. Resistor Color Code



Band color and digit represented:

- | | | | |
|----------|----------|------------|--------------|
| 0 Black | 4 Yellow | 8 Grey | 20% no color |
| 1 Brown | 5 Green | 9 White | |
| 2 Red | 6 Blue | 5% Gold | |
| 3 Orange | 7 Violet | 10% Silver | |

4. DC Circuits

a. OHM's law

$$E = IR$$

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

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

b. Resistors in series

$$R_T = R_1 + R_2 + R_3 + \dots$$

$$I_T = I_1 = I_2 = I_3 = \dots$$

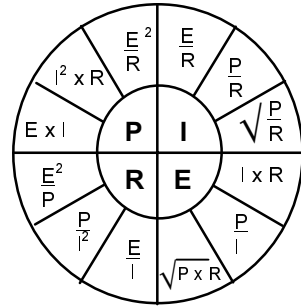
$$E_T = E_1 + E_2 + E_3 + \dots$$

c. Resistors in parallel

$$R_T = \frac{R_1 \times R_2}{R_1 + R_2}$$

$$R_T = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots}$$
 ... Different value resistors

$$R_T = \frac{R}{N}$$
 Same value resistors



5. SYMBOLS

LETTER SYMBOL	MEANING	UNIT OF MEASURE
E, V	Voltage	Volt
I	Current	Ampere
R	Resistance	Ohm
C	Capacitor	Farad
L	Inductor	Henry
X _C	Capacitive Reactance	Ohm
X _L	Inductive Reactance	Ohm
Z	Impedance	Ohm

6. AC Circuits

a. Conversion of values

$$E_{RMS} = 0.707 E_{PK}$$

$$E_{PK} = 1.414 E_{RMS}$$

b. Series RLC Circuit

$$I_T = I_R = I_L = I_C$$

$$E_T = \sqrt{E_R^2 + (E_L - E_C)^2}$$

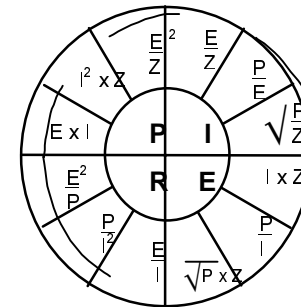
$$Z = \sqrt{R^2 + (X_L - X_C)^2}$$

Parallel RLC Circuit

$$E_T = E_R = E_L = E_C$$

$$I_T = \sqrt{I_R^2 + (I_L - I_C)^2}$$

$$Z = \frac{E_T}{I_T}$$



7. Capacitor

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

- b. Capacitors in series add like resistors in parallel.
- c. Capacitors in parallel add like resistors in series.

8. Inductor

a. $X_L = 2\pi fL$

- b. Inductors in series add like resistors in series.
- c. Inductors in parallel add like resistors in parallel.

9. Time Constants

- a. $TC = RC$ Time it takes a capacitor to charge to 63.2% of applied voltage.
- b. $TC = \frac{L}{R}$ Time it takes an inductor to charge to 63.2% of available current.

Where: T = Time constant in seconds
 R = Resistance in ohms
 C = Capacitance in farads
 L = Inductance in henries

5T = Discharge or FULL charge

10. Transformer relationships

- a. Voltage turns ratio

$$\frac{N_P}{N_S} = \frac{E_P}{E_S}$$

- b. Current turns ratio

$$\frac{N_P}{N_S} = \frac{I_S}{I_P}$$

- c. Impedance turns ratio

$$\frac{N_P}{N_S} = \sqrt{\frac{Z_P}{Z_S}}$$

- d. Efficiency (%)

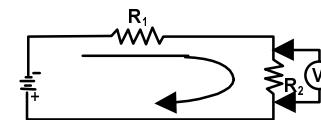
$$\text{Eff.} = \frac{\text{output}}{\text{input}} \times 100$$

11. SUMMARY OF CHARACTERISTICS OF SERIES AND PARALLEL RESONANT CIRCUITS

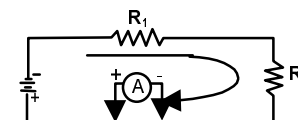
	Series Resonant Circuit	Parallel Resonant Circuit
Reactance (X)	$X_L = X_C$	$X_L = X_C$
Impedance (Z)	Minimum	Maximum
Current (I_T)	Maximum	Minimum
Circuit at Resonance	Resistive	Resistive
Circuit below Resonance	Capacitive	Inductive
Circuit above Resonance	Inductive	Capacitive
Frequency (fr)	$\frac{1}{2\pi\sqrt{LC}}$	$\frac{1}{2\pi\sqrt{LC}}$
Quality (Q) of Circuit	$\frac{X_L}{R}$	$\frac{X_L}{R}$
Bandwidth (BW)	$\frac{fr}{Q}$	$\frac{fr}{Q}$

12. USING METERS

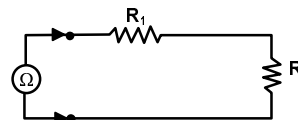
- a. Measuring voltage: Observe polarity and connect meter across component or source.



- b. Measuring current: Open circuit, observe polarity, and connect meter into the circuit.



- c. Measuring resistance: Disconnect power source, connect meter across circuit or component- no polarity.



13. ANTENNA LENGTH

Formulas assume velocity of propagation equal 95% of the velocity of light

$$L \text{ (ft)} = \frac{468}{f \text{ MHz}} \quad \text{(for half-wave antenna)}$$

$$L \text{ (ft)} = \frac{234}{f \text{ MHz}} \quad \text{(for quarter-wave antenna)}$$

DC/AC FORMULA DATA

MOSs: ALL ELECTRONIC MAINTENANCE

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