ETA® International Common Formulas

For use on all Basic Electronics Exams – Associate CET (CETa), Basic Systems Technician (BST), Electronics Modules (EM1-5), Student Electronics Technician (SET) as well as the General Communications Technician-Level 1 (GCT1) Exam

Conversion Factors

π (Pi) = 3.14	1 meter = 3.28 feet
2π = 6.28	1 inch = 2.54 centimeters
logπ = 0.497	1 radian = 57.3˚

Resonant Frequency Formulas

*Where **f** is in kHz, **L** is in microhenries, **C** is in microfarads*

$f_{kHz} = 159.2 / \sqrt{LC}$

*Where **f** is in Hz, **L** is in Henries, **C** is in Farads*

$$f_{resonant} = \frac{1}{2\pi\sqrt{LC}}$$

Frequency & Wavelength Formulas

f = frequency, λ = wavelength

0.5λ = 180˚ = half wave and 0.25λ = 90˚ = quarter wave

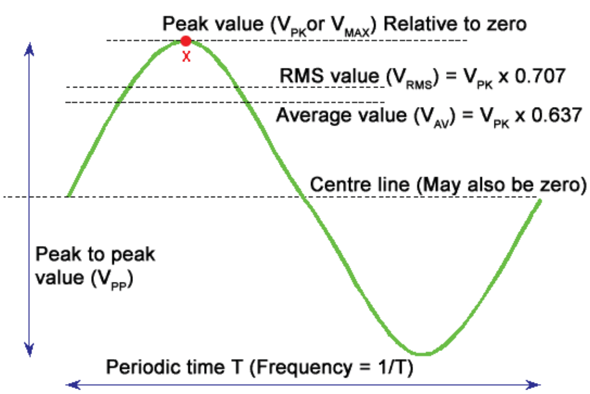
$f_{kHz} = (3 \times 10^8) / \lambda_{meters}$ or $f_{mHz} = 984 / \lambda_{feet}$

$\lambda_{meters} = (3 \times 10^8) / f_{kHz}$ or $\lambda_{feet} = 984 / f_{mHz}$

c = ƒ x λ *where **c** is the speed of light*

Sine Wave Conversion

- Effective value (RMS) = 0.707 x Peak Value = 1.11 x Average Value
- Peak Value = 1.414 x Effective Value (RMS) = 1.57 x Average Value
- Average Value over positive half period = 0.637 x Peak Value = 0.9 x Effective Value (RMS)
- Identify: Waveform, Peak (amplitude), RMS, 1 cycle over time period (frequency), Peak to peak, and practical average



Voltage Gain In Decibels

Gain dB = $20\log(V_{out} / V_{in})$

Ratio Of 2 Power Levels In Decibels

Gain dB = $10\log_{10}(P_2 / P_1)$

Resistors In Series

$R = R_1 + R_2 + R_3 \ldots$

Resistors In Parallel

$1 / R = (1 / R_1) + (1 / R_2) + (1 / R_3) \ldots$

Inductors Connected In Series

$L = L_1 + L_2 + L_3 \ldots$

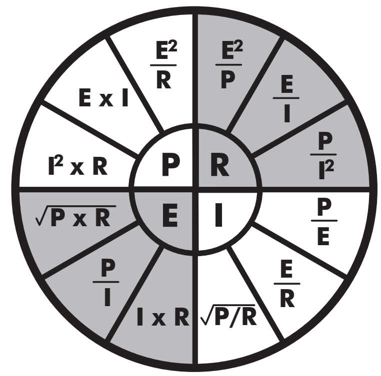
Inductors Connected In Parallel

$1 / L = (1 / L_1) + (1 / L_2) + (1 / L_3) \ldots$

International System of Units (SI)

Prefix	Symbol	Multiplier	Power of Ten
Terra	T	trillion	10^{12}
Giga	G	billion	10^{9}
Mega	M	million	10^{6}
kilo	k	thousand	10^{3}
none	none	1	10^{0}
milli	m	1/thousandth	10^{-3}
micro	μ	1/millionth	10^{-6}
nano	n	1/billionth	10^{-9}
pico	p	1/trillionth	10^{-12}

Ohm's Law



E = Voltage I = Current
P = Power R = Resistance

PEMDAS Rule

Parentheses, Exponents, Multiplication, Division, Add, Subtract

Reactance Of Inductors

*Where X_L is reactance, **ƒ** is frequency, and **L** is inductance*

$X_L = 2 \times \pi \times f \times L$

Time Constants

***T** (Greek Tau), **R** (ohms), **C** (Farads), **L** (Henries)*

RL circuit: 1 T (sec) = L(H) / R(Ω)

RC circuit: 1 T (sec) = R(Ω) x C(F)

Compute Charge Or Quantity of Electricity

*where **Q** is the charge (in Coulombs), **C** is the capacitance (in Farads), and **V** is the potential difference (in Volts)*

Q = C x V

Energy Storage In A Capacitor

*where **W** is the energy (in Joules), **C** is the capacitance (in Farads), and **V** is the potential difference (in Volts)*

$W = \frac{1}{2} C \times V^2$

Capacitors Connected In Parallel

$C = C_1 + C_2 + C_3 + \ldots$

Capacitors Connected In Series

$1 / C = (1 / C_1) + (1 / C_2) + (1 / C_3) + \ldots$

Reactance Of Capacitors

$X_C = 1 / (2 \times \pi \times f \times C)$

Impedance For A Series Circuit

where **Z** is impedance

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

Impedance For R And X In Parallel

$$Z = \frac{RX}{\sqrt{R^2 + X^2}}$$

Battery Internal Resistance

$V_{out} = EMF - (R_{int} \times I_{out})$

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