

Circuits and electrostatics

Ohm's law = $V = IR$

Power = $P = IV = I^2R = \frac{V^2}{R}$

Series resistors = $R_{\text{Total}} = R_1 + R_2 + \dots + R_n$

Parallel resistors = $\frac{1}{R_{\text{Total}}} = \frac{1}{R_1} + \frac{1}{R_2} + \dots + \frac{1}{R_n}$

Resistance = $\frac{R}{\rho L/A}$

Current = $I = \frac{Q}{t}$

Coulomb's law = $FE = \frac{k(Q_1Q_2)}{r^2}$

Electric field (point charge) = $E = \frac{kQ}{r^2}$

Magnetism

Magnetic force = $F_m = qvB \sin\theta$

Capacitors

Capacitance = $C = \frac{Q}{V}$

Capacitance (geometry) = $C = \frac{\epsilon_0 A}{d}$

Capacitor electric field = $E = \frac{V}{d}$

Potential energy = $PEC = \frac{1}{2} QV$

Series capacitors = $\frac{1}{C_{\text{Total}}} = \frac{1}{C_1} + \frac{1}{C_2} + \dots + \frac{1}{C_n}$

Parallel capacitors = $C_{\text{Total}} = C_1 + C_2 + \dots + C_n$

Waves and oscillations

Frequency = $f = \frac{1}{T}$ where f is frequency and T is period

Velocity = $v = \lambda f$

Hooke's law = $F_s = -kx$

Harmonics for open pipes = $f_n = \frac{nv}{2L}$

Harmonics for closed pipes = $f_n = \text{nodd} \times \frac{v}{4L}$

Sound

Velocity = $v = \sqrt{\frac{B}{\rho}}$

Intensity = $I = \frac{\text{Power}}{\text{Area}}$

Intensity in decibels = $\beta = 10 \log \left(\frac{I}{I_0} \right)$

Doppler effect = $f_D = \frac{(v \pm v_D)}{(v \pm v_S)} \times f_S$

Lights and optics

Ephoton = $hf = \frac{hc}{\lambda}$

$c = 3 \times 10^8 \text{ m/s}$

Index of refraction = $n = \frac{c}{v}$

Lens equation = $\frac{1}{o} + \frac{1}{i} = \frac{1}{f}$

Magnification = $m = \frac{i}{o}$

Lens power = $P = \frac{1}{f}$