Circuits

$$V = IR$$

V: voltage; R: resistance; I: current

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

P: power

$$Q = It$$

Q: charge; t: time (s)

$$R_S = R_1 + R_2 + R_3$$

R_S: total series resistance

$$R_P^{-1} = R_1^{-1} + R_2^{-1} + R_3^{-1}$$

R_P: reciprocal of total parallel resistance

$$\mathcal{E} = I(R + r)$$

$\mathcal{E}$: EMF (V); r: internal resistance

Electric Fields

$$E_w = QV = \frac{1}{2}mv^2$$

- E_w: work done
- Q: charge of particle
- V: potential difference
- m: mass of particle
- v: velocity of particle

Capacitors

$$Q = CV$$

- Q: charge (C)
- C: capacitance (F)

energy stored in a capacitor

$$E = \frac{1}{2}QV = \frac{1}{2}CV^2 = \frac{Q^2}{2C}$$

Wheatstone Bridges

at balance ($V = 0$): $\dfrac{R_1}{R_2} = \dfrac{R_3}{R_4}$

Alternating Current

$$V_{\text{peak}} = \sqrt{2} V_{\text{rms}} \qquad I_{\text{peak}} = \sqrt{2} I_{\text{rms}}$$

$$P_O = \frac{I_{\text{peak}}^2}{2} R$$

power output of an alternating current