Formulekaart ELEKTROTECHNIEK.

De wet van Ohm.

$$U = I \times R$$

Serie schakelen van weerstanden.

$$R_t = R_1 + R_2 + R_3 + \ldots$$
$$U_1 = I \times R_1$$
$$U_2 = I \times R_2$$
$$U_3 = I \times R_3$$
$$U_t = U_1 + U_2 + U_3 + \ldots$$

Parallel schakelen van weerstanden.

$$\frac{1}{R_t} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \frac{1}{\ldots}$$
$$I_t = I_1 + I_2 + I_3 + \ldots$$
$$U = I_1 \times R_1 = I_2 \times R_2 = I_3 \times R_3 = \ldots$$

Arbeid, Vermogen.

Mechanisch

$$W = F \times s$$
$$P = \frac{F \times s}{t}$$

Natuurkundig.

$$Q = m \times c \times \Delta t$$

Elektrisch gelijkspanning.

$$W = U \times I \times t$$
$$P = U \times I = I^2 \times R = \frac{U^2}{R}$$

Elektrisch wisselspanning.

$$P_s = U \times I = \sqrt{P_W{}^2 + P_b{}^2} = I^2 \times Z$$
$$P_w = U \times I \times \cos\varphi = I^2 \times R$$
$$P_b = U \times I \times \sin\varphi = I^2 \times X_L$$

Rendement.

$$\eta = \frac{P_{nuttig}}{P_{toegevoerd}} = \frac{W_{nuttig}}{W_{toegevoerd}}$$

Sinusvormige spanningen en stromen.

$$U_{eff} = \frac{U_{\max}}{\sqrt{2}} = 0{,}707 \times U_{\max}$$
$$I_{eff} = \frac{I_{\max}}{\sqrt{2}} = 0{,}707 \times I_{\max}$$
$$f = \frac{1}{T}$$

Weerstand van geleiders.

$$R \times A = l \times \rho$$

Soortelijk geleidingsvermogen.

$$\gamma = \frac{1}{\rho}$$

Spoelen.

$$X_L = 2 \times \pi \times f \times L = \omega L$$
$$Z = \sqrt{R^2 + X_L{}^2}$$
$$\cos\varphi = \frac{R}{Z} = \frac{U_R}{U_t} = \frac{P_w}{P_s}$$
$$U_t = I \times Z = \sqrt{U_R{}^2 + U_{X_L}{}^2}$$
$$U_R = I \times R$$
$$U_{X_L} = I \times X_L$$

Condensatoren.

$$Q = C \times U$$
$$1F = 10^6\,\mu F = 10^9\,nF = 10^{12}\,pF$$
$$X_c = \frac{1}{2 \times \pi \times f \times C} = \frac{1}{\omega \times C}$$

Parallel schakelen van condensatoren.

$$Q_t = Q_1 + Q_2 + Q_3 + \ldots$$
$$C_t = C_1 + C_2 + C_3 + \ldots$$
$$\frac{1}{X_{C_t}} = \frac{1}{X_{C_1}} + \frac{1}{X_{C_2}} + \frac{1}{X_{C_3}} + \ldots$$

Serie schakelen van condensatoren.

$$Q_t = Q_1 = Q_2 = Q_3 = \ldots$$
$$\frac{1}{C_t} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \ldots$$
$$X_{C_t} = X_{C_1} + X_{C_2} + X_{C_3} + \ldots$$

Serie schakeling van spoel en condensator.

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

Bij resonantie is

$$X_L = X_C \; en \; \omega L = \frac{1}{\omega C}$$

Spanningsbronnen en elementen.

$$E = U_v + U_k$$
$$U_v = I \times R_i$$
$$U_k = I \times R_u$$
$$Q = I \times t$$

Serie schakelen van spanningsbronnen.

$$E_t = E_1 + E_2 + E_3 + \ldots$$
$$R_{i_t} = R_{i_1} + R_{i_2} + R_{i_3} + \ldots$$
$$U_V = I \times R_{i_t}$$

Transformatoren.

$$U_p : U_s = N_p : N_s$$
$$I_p : I_s = N_s : N_p$$

Bij een verliesvrije transformator is

$$P_p = P_s$$

Draaistroom

Sterschakeling.

$$U_l = U_f \times \sqrt{3}$$
$$I_l = I_f$$

Driehoekschakeling.

$$U_l = U_f$$
$$I_l = I_f \times \sqrt{3}$$

Vermogen bij ster- en driehoekschakeling.

$$P_w = U_l \times I_l \times \sqrt{3} \times \cos\varphi$$
$$P_s = U_l \times I_l \times \sqrt{3}$$
$$P_b = U_l \times I_l \times \sqrt{3} \times \sin\varphi$$

Motoren.

Procentuele slip

$$\frac{n_d - n_t}{n_d} \times 100\%$$
$$f = \frac{p \times n}{60}$$

Verlichting.

$$E = \frac{\Phi}{A}$$

Transistoren.

$$h_{FE} = \frac{I_c}{I_b}$$
$$I_E = I_B + I_C$$