

Equation sheet - Electrotechnology

Note: The symbols used on this sheet follow AS1046 pt 1. There are alternate recognised symbols in use. The list does not contain every equation used in the course. Transposition of equations will be necessary to solve problems

$$Q = It$$

$$v = \frac{s}{t}$$

$$a = \frac{\Delta v}{t}$$

$$F = ma$$

$$W = Fs$$

$$W = mgh$$

$$W = Pt$$

$$\eta\% = \frac{\text{output}}{\text{input}} \times \frac{100}{1}$$

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

$$P = VI$$

$$P = I^2 R$$

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

$$R_2 = \frac{R_1 A_1 l_2}{A_2 l_1}$$

$$R_h = R_c (1 + \alpha \Delta t)$$

$$R = \frac{\rho l}{A}$$

$$R_T = R_1 + R_2 + R_3$$

$$V_T = V_1 + V_2 + V_3$$

$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

$$I_T = I_1 + I_2 + I_3$$

$$V_2 = V_T \frac{R_2}{R_1 + R_2}$$

$$I_2 = I_T \frac{R_1}{R_1 + R_2}$$

$$R_x = \frac{R_A R}{R_B}$$

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

$$\tau = RC$$

$$\frac{1}{C_T} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3}$$

$$C_T = C_1 + C_2 + C_3$$

$$C = \frac{A \epsilon_o \epsilon_r}{d}$$

$$F_m = IN$$

$$H = \frac{F_m}{l}$$

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

$$\Phi = \frac{F_m}{S}$$

$$S = \frac{l}{\mu_o \mu_r A}$$

$$V = N \frac{\Delta \Phi}{\Delta t}$$

$$e = Blv$$

$$L = \frac{\mu_o \mu_r AN^2}{l}$$

$$L = N \frac{\Delta \Phi}{\Delta I}$$

$$V = L \frac{\Delta I}{\Delta t}$$

$$\tau = \frac{L}{R}$$

$$F = Bil$$

$$T = Fr$$

$$E_g = \frac{\Phi Z n P}{60 a}$$

$$P = \frac{2 \pi n T}{60}$$

$$t = \frac{1}{f}$$

$$f = \frac{n p}{120}$$

$$V = 0.707 V_{\max}$$

$$I = 0.707 I_{\max}$$

$$V_{\text{ave}} = 0.637 V_{\max}$$

$$I_{\text{ave}} = 0.637 I_{\max}$$

$$v = V_{\max} \sin \phi$$

$$i = I_{\max} \sin \phi$$

$$I = \frac{V}{Z}$$

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

$$\cos \phi = \frac{P}{S}$$

$$S = VI$$

$$f_o = \frac{1}{2\pi\sqrt{LC}}$$

$$\tan \phi = \sqrt{3} \left(\frac{W_2 - W_1}{W_2 + W_1} \right)$$

$$V' = 4.44\Phi fN$$

$$X_L = 2\pi fL$$

$$\cos \phi = \frac{R}{Z}$$

$$P = VI \cos \phi$$

$$V_L = \sqrt{3}V_P$$

$$Q = mC\Delta t$$

$$\frac{V_1}{V_2} = \frac{N_1}{N_2}$$

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

$$S = \sqrt{P^2 + Q^2}$$

$$Q = VI \sin \phi$$

$$I_L = \sqrt{3}I_P$$

$$\frac{I_2}{I_1} = \frac{N_1}{N_2}$$

$$N_{syn} = \frac{120f}{p}$$

$$V_{reg} \% = \frac{(V_{NL} - V_{FL})}{V_{FL}} \times \frac{100}{1}$$

$$I_{ST} = \frac{1}{3} \times I_{DOL}$$

$$T_{ST} = \left(\frac{V_{ST}}{V} \right)^2 \times T_{DOL}$$

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

$$V_L = 0.45V_{ac}$$

$$V_L = 1.35V_{line}$$

$$PRV = 2.45V_{ac}$$

$$V_{ripple} = 0.1895V_{line}$$

$$H = I^2Rt$$

$$K = \frac{F}{P}$$

$$s\% = \frac{(n_{syn} - n)}{n_{syn}} \times \frac{100}{1}$$

$$V_{reg} \% = \frac{(V_{NL} - V_{FL})}{V_{NL}} \times \frac{100}{1}$$

$$T_{ST} = \frac{1}{3} \times T_{DOL}$$

$$I_{motorst} = \frac{\%TAP}{100} \times I_{DOL}$$

$$E = \frac{I}{d^2}$$

$$V_L = 0.9V_{ac}$$

$$PRV = \sqrt{2}V_{ac}$$

$$V_{ripple} = \sqrt{2}V_{ac}$$

$$H(Q) = MCoCr(T_f - T_i)$$

$$E = F/a$$

$$F = 4\pi I$$

$$f_r = \frac{s\% \times f}{100}$$

$$T = \frac{\Phi ZIP}{2\pi a}$$

$$I_{ST} = \frac{V_{ST}}{V} \times I_{DOL}$$

$$I_{linest} = \left(\frac{\%TAP}{100} \right)^2 \times I_{DOL}$$

$$\eta_v = \frac{\Phi_v}{P}$$

$$V_L = 1.17V_{phase}$$

$$PRV = 2\sqrt{2}V_{ac}$$

$$V_{ripple} = 0.707V_{phase}$$

$$\%Eff = \frac{MCoCr(T_f - T_i)}{VI t}$$

$$L = \frac{I}{a}$$

$$E = \frac{I \cos \theta}{d^2}$$