Formula Elektrik

$$P = \sqrt{3} * I_L * V_L * cos\theta \qquad P = I_L * V_L * cos\theta$$

$$z[galangan\ bumi] = \frac{240V}{1.5 * 10\% * I[arus\ bawaan]}$$

$$VA = \sqrt{3} * I_L * V_L$$

$$I = \frac{kVA}{\sqrt{3} * V} \qquad 1kVA = 0.8kW \qquad 1HP = 0.746kW$$

$$cos\theta = \frac{kw}{kVA} \qquad sin\theta = \frac{kVAR}{kVA} \qquad tan\theta = \frac{kVAR}{kW}$$

$$P[kW] - effective\ power \quad \theta[kVAR] - reactive\ power$$

$$VA = \sqrt{P^2 + \theta^2} \qquad Cos\theta = \left(\frac{P}{VA}\right)$$

$$kVA = \sqrt{kWh^2 + kVAR^2} \qquad Cos\theta = \left(\frac{kWh}{kVA}\right) = \left(\frac{kWh}{\sqrt{kWh^2 + kVAR^2}}\right)$$

$$c/k = \frac{kVAR[first\ step]}{\sqrt{3} * 415 * \left(\frac{1000}{5}\right)[CT\ yang\ digunakan]}$$

$$kVAR = kW(tan\theta_1 - tan\theta_2)$$

$$tan\theta_1 = \left(\frac{kVAR_1}{kW}\right) \qquad kVAR_1 + kWtan\theta$$

$$tan\theta_2 = \left(\frac{kVAR_2}{kW}\right) \qquad kVAR_2 = kWtan\theta_2$$

Polarization Index = $\frac{Resistance\ after\ \ 10\ minutes}{Resistance\ after\ 1\ minutes}$

The recommended minimum value of polarization index for ac and dc motors and generators is ***2.0***

Motor

Horsepower = $\left(\frac{Torque\ (lb-ft) * RPM}{5252}\right)$, Torque (lb-ft) = $\left(\frac{Horsepower * 5252}{RPM}\right)$

Kilowatts = $\left(\frac{Torque\ (N-m) * RPM}{9550}\right)$, Torque (N-m) = $\left(\frac{Kilowatts * 9550}{RPM}\right)$

$I_{FL} = (\frac{HP * 746}{V * pf * eff})$ $\quad\quad$ $I_{FL} = (\frac{kW * 1000}{V * pf * eff})$

$I_s = I_{FL} * gandaan\ arus\ mula$

$rpm = \frac{Hz * 120}{pole}$ $\quad\quad$ $slip = \left(\frac{1500 - 1420}{1500}\right) * 100$

Transformer

Voltage transformer ratio (K) , $\frac{E_2}{E_1} = \frac{N_2}{N_1}$ = K

If $N_2 > N_1$, K > 1 ianya step-up transformer and if $N_2 < N_1$, K < 1 ianya step-down transformer
For ideal transformer, input VA = output VA

$V_1 I_1 = V2_2 I_2$ atau $\frac{I_2}{I_1} = \frac{V_1}{V_2} = \frac{1}{K}$, $I_2 = (\frac{V_1 * I_1}{V_2})$, $I_1 = (\frac{V_2 * I_2}{V_1})$

Susutan Voltan

1. Spesifikasi bekalan elektrik yang dibekalkan kepada pengguna-pengguna domestik mengikut standard MS IEC 60038 adalah seperti berikut :-
   i. Bekalan voltan nominal satu fasa 230V AU, julat +10%, -6%;
   ii. Bekalan voltan nominal tiga fasa 400V AU, julat +10%, -6%;
   iii. Frekuensi yang dibenarkan ialah 50Hz ± 1%

$$S_V = \frac{mV\ dari\ jadual * I * L\ panjang\ dalam\ meter}{1000}$$

2. Susutan voltan dalam suatu kabel dengan Hukum $\Omega = V = RI$, rintangan konduktor $R = \frac{P_L}{a}$

   R = rintangan konduktor dalam ohm **Ω**
   P = kerintangan bahan konduktor dalam mikro ohm milimeter
   kuprum 17.5μ**Ω** mm
   alluminium 28.5μ**Ω** mm
   L = panjang konduktor dalam milimeter
   a = luas keratan rentas konduktor dalam milimeter persegi