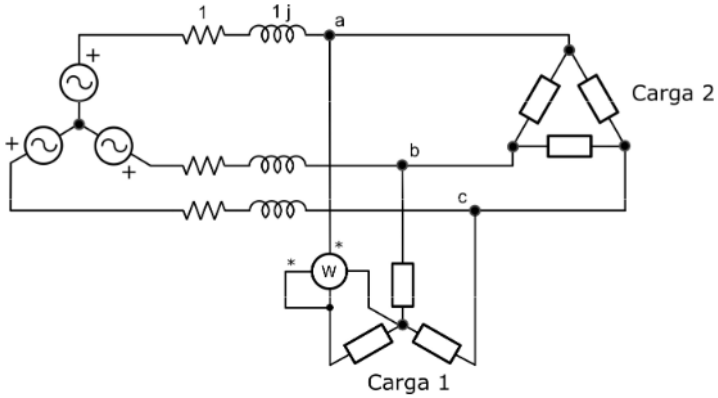
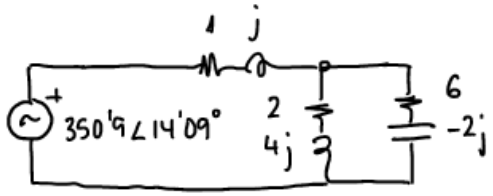
Examen 11 enero 2018 - Trifásica.



$\boldsymbol{V_g} = 350{,}9 < 14{,}09°$
$I_1 = 55{,}9$ A
$P_1 = 18750$ W
$cos\varphi_1 = 0{,}477$
$Z_2 = 18 - 6j\Omega$

Impedancia Z_1; $P_1 = 3 \cdot I_1^2 \cdot R_1$; $\varphi_1 = \text{acos}\, 0{,}477 = 63\,,45°$

$R_1 = \frac{18750}{3 \cdot 55{,}9^2} = 2\Omega$; $X_1 = R_1 tg\varphi_1 = 4\Omega$ Entonces $Z_1 = 2 + 4j\Omega$



$\frac{V_a - 350{,}9<14{,}09}{1+j} + \frac{\boldsymbol{V_a}}{2+4j} + \frac{\boldsymbol{V_a}}{6-2j} = 0$

$\boldsymbol{V_a}(\frac{1}{1+j} + \frac{1}{2+4j} + \frac{1}{6-2j}) = \frac{350{,}9<14{,}09}{1+j}$

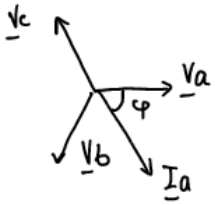
$\boldsymbol{V_a} = \frac{248{,}12<-30{,}9}{0{,}99<-40{,}9} = 250 < 10°$ V

$S_g = 3\boldsymbol{V_F}\boldsymbol{I_F^*}$;

$\boldsymbol{I} = \frac{350{,}9<14{,}09 - 250<10}{1+j} = 72{,}9 < -20{,}95°$ A ; $S_g = 3 \cdot 350{,}9 < 14{,}09 \cdot 72{,}9 < 20{,}95$

$S_g = 76737{,}6 < 35° = 62829{,}1 + 44058{,}6j$ VA

El vatímetro mide $\frac{P}{3} = 6250$ W



$W = V_a\, I_a \cdot \cos(\varphi)$

$\boldsymbol{I_1} = \frac{250<10}{2+4j} = 55{,}9 < -53{,}43°$ A

$\boldsymbol{I_2} = \frac{250<10}{6-2j} = 39{,}53 < 28{,}43°$ A

$P = 3 \cdot\ 39{,}53^2 \cdot 6 = 28127{,}2$ W

$C_\Delta = \frac{46877{,}2}{3} \cdot \frac{tg31}{(250 \cdot \sqrt{3})^2 \cdot 100\pi} = 159{,}4 \mu F$

$P = P_1 + P_2 = 18750 + 28127{,}2 = 46877{,}2\ W$

$\varphi = \varphi_v - \varphi_i = 10 - (-20{,}95) = 31°$

$\cos\varphi = \cos 31 = 0{,}857$ Con un factor de potencia de 0,857 no sería necesario compensar reactiva.

$P' = 3 \cdot V_F\ I'_F \cdot cos\varphi' \rightarrow \frac{46877{,}2}{3 \cdot 250} = I' = 62{,}5 \therefore 72{,}9$ A

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