

Ejercicios PD

$$45w + 25w = 70w$$

$$70w + 60w = 130w$$

$$P = 130w$$

$$P_{\text{React, VA}} = 0w$$

$$P_{\text{Aparente total}} = 130w$$

$$130w / 240v_{\text{rms}} = 541,6 \text{ mA}$$

$$C = 541,6 \text{ mA}$$

$$60w \div 541,6 \text{ mA} = 110,8 \text{ V}$$

$$110,8 \text{ V} \div 541,6 \text{ mA} = 204,5 \Omega$$

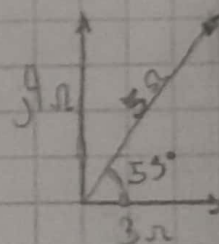
$$240 \text{ V} \div 110,8 \text{ V} = 129,2 \text{ V}$$

$$45w \div 129,2 \text{ V} = 348 \text{ mA}$$

$$25w \div 129,2 \text{ V} = 193 \text{ mA}$$

$$129,2 \text{ V} \div 348 \text{ mA} = 371,3 \Omega$$

$$129,2 \text{ V} \div 193 \text{ mA} = 667,7 \Omega$$



2-

$$Z = 3\Omega + j9\Omega - j5\Omega = 3\Omega + j4\Omega$$

$$A - \sin^{-1}(4/5) = 53,1^\circ$$

$$\sqrt{3^2 + 4^2} = 5\Omega$$

$$I = \frac{50 \text{ V}_{\text{rms}}}{5\Omega e^{j53^\circ}} = 10 \text{ A} e^{-j53^\circ}$$

$$W_R = 10^2 \cdot 3\Omega = 300w$$

$$A - W_R = 300w; W_C = 0w; W_L = 0w$$

6-

$$R = 0 \text{ var} \cdot \text{ej}$$

$$C \quad 10 \text{ A}^2 \cdot 5 \Omega = 500 \text{ var}$$

$$L \quad 10 \text{ A}^2 \cdot 9 \Omega = 900 \text{ var}$$

a-

$$R \quad 300 \text{ VA}$$

$$C \quad 500 \text{ VA}$$

$$L \quad 900 \text{ VA}$$

d-

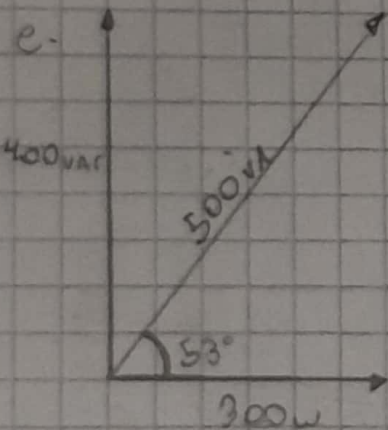
$$W_t = 300 \text{ W}$$

$$V_{\text{art}} = 400 \text{ var}$$

$$V_{\text{at}} = 500 \text{ VA}$$

$$F_p = \cos 53^\circ = 0.6$$

↑
desfase



$$f- \quad 300 \text{ W} / 60 / 60 / 60 = 1.38 \text{ mwh}$$

↑ potencia disipada en una hora
↓ minutos en hora
↓ segundos en minutos
↓ ciclos por segundo

$$g- \quad 500 \text{ var} \div 60^3 \div 2 = 1.158 \text{ mwh}$$

$$900 \text{ var} \div 60^3 \div 2 = 2.034 \text{ mwh}$$

$$2.034 \text{ var}$$

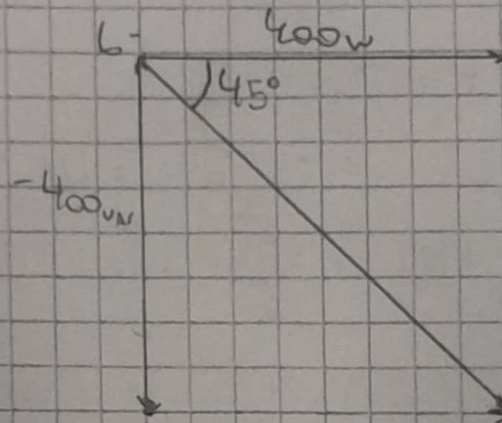
3-

$$A- \quad 100 + 300 \text{ W} = 400 \text{ W}$$

$$200 \text{ var} - 600 \text{ var} = -400 \text{ var}$$

$$\sqrt{400^2 + 400^2} = 565.7 \text{ VA}$$

$$F_p = \cos\left(\tan^{-1} \frac{400}{400}\right) = 0.707$$



c-

$$\frac{565.7 \text{ VA} \cdot e^{j-45}}{100 \text{ V} \cdot e^{j90}} = 5.66 \text{ A} \cdot e^{j-135}$$

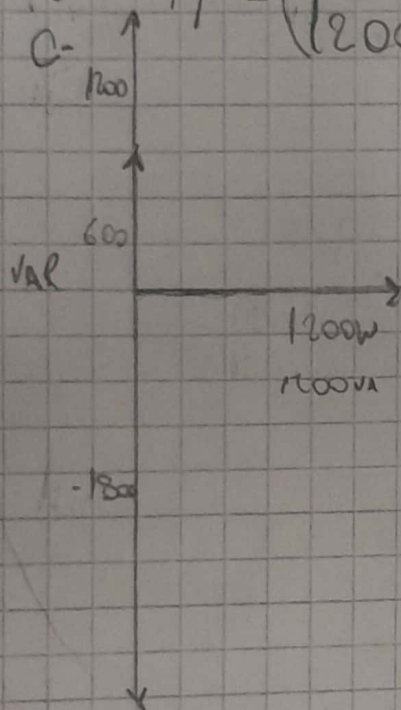
$$4. 1200 \text{ var} - 1800 \text{ var} = 600 \text{ var (c)}$$

$$600 \text{ var} - 600 \text{ var} = \underline{0 \text{ var}}$$

$$600 \text{ w} + 500 \text{ w} + 100 \text{ w} = \underline{1200 \text{ w}}$$

$$\sqrt{1200^2 + 0^2} = \underline{1200 \text{ VA}}$$

$$b. \quad c. \quad F_p = \left(\frac{1200 \text{ w}}{1200 \text{ VA}} \right) = \underline{1}$$



$$d. 1200 \text{ w} \div 200 \text{ v} = 6 \text{ A}$$

$$I_f = 6 \text{ A} e^{j0^\circ}$$

$$58 e^{j90^\circ}$$

5-

$$1. 100 \text{ var} + 50 \text{ var} = 150 \text{ var}$$

$$150 \text{ var} - 200 \text{ var} - 400 \text{ var} = -450 \text{ var}$$

$$200 \text{ w} + 100 \text{ w} + 50 \text{ w} = 350 \text{ w}$$

$$\sqrt{350^2 + 450^2} = 570 \text{ VA (c)}$$

$$58 e^{j90^\circ}$$

$$P_+ = 350 \text{ w}$$

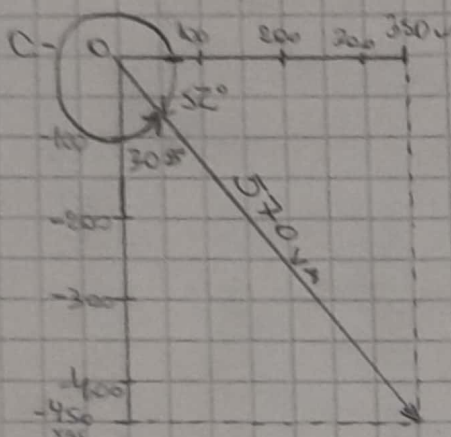
$$Q_+ = -450 \text{ var}$$

$$S_+ = 570 \text{ VA}$$

$$b- \frac{350W}{570VA} = 0.614$$

$$F_p = 0.614$$

Capacitor
corriente
adelanta
voltage



$$\tan^{-1}(W/VA) = 37.875$$

$$270 + 37.875 = 307.875$$

$$d- \frac{570 \angle -52^\circ}{50 \angle 60^\circ} = 11.4 \angle 112^\circ$$

$$6- 60V_{RMS} \div 20\Omega = 3A$$

$$3A \cdot 60V = 180W$$

$$P_r = S_r = 180W/VA$$

$$Q_r = 0VAR$$

$$b- 60V_{RMS} \div 10\Omega = 6A$$

$$6A \cdot 60V = 360VAR$$

$$Q_L = S_L = 360VAR/VA$$

$$P_L = 0W$$

$$c- 400W + 180W = P_t = 580W$$

$$600VAR + 360VAR = Q_t = 960VAR$$

$$\sqrt{580W^2 + 960VAR^2} = S_t = 1121.6VA$$

Éxito

$$\frac{580}{1122} = 0,517 \quad F_p = 0,517$$

d- $\tan^{-1}(V_{ar}/W) = 58,9^\circ$

$$\frac{1122 \text{ VA } e^{j58,9^\circ}}{60 \text{ V } e^{j30^\circ}} = 18,7 \text{ A } e^{j28,9^\circ}$$

7-
a- $20 \text{ V}^2 \div 2 \Omega = P_r = S_r = 200$

b- $20 \text{ V}^2 \div 5 \Omega = Q_c = S_c = 80 \text{ (C)}$

$20 \text{ V}^2 \div 4 \Omega = Q_L = S_L = 100 \text{ (L)}$

c- $S_r = 200 \text{ VA}$

$S_c = 80 \text{ VA}$

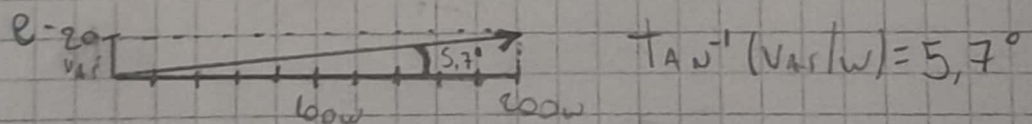
$S_L = 100 \text{ VA}$

d- $P_r = 200 \text{ W}$

$Q_r = 100 \text{ VAR} - 80 \text{ VAR} = 20 \text{ VAR}$

$S_r = \sqrt{200^2 + 20^2} = 201 \text{ VA}$

$$\frac{200 \text{ W}}{201 \text{ VA}} = 0,995 \quad F_p = 0,995$$



f- $\frac{201 \text{ VA } e^{j5,7^\circ}}{20 \text{ V } e^{j30^\circ}} = 10,05 \text{ A } e^{j35,7^\circ}$

8.

1- $P_r = 21.43^2 / 3 \Omega = 153.1 \text{ W}$

$50 \text{ V} \div 7.3 \Omega = 21.43 \text{ A}$

$R = 0 \Omega$ (no es resistivo)

$\sqrt{9+16} = 5 \Omega$

$P_r = 0 \text{ W}$ (no es resistivo)

$50 \text{ V} \div 5 \Omega$

6- $Q_r = 0$ (no es reactivo)

$Q_L = 28.57^2 / 4 \Omega = 204.06 \text{ var}$ $50 \text{ V} \div 7 \Omega \cdot 4 \Omega = 28.57 \text{ A}$

$Q_C = 50 \text{ V}^2 / 10 \Omega = -250 \text{ var}$

c- $S_r = 153.1 \text{ VA}$

$S_L = 204.06 \text{ VA}$

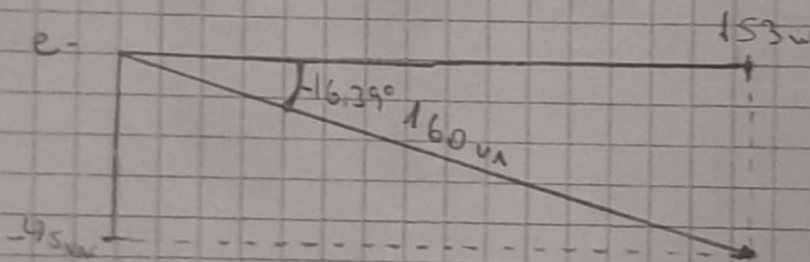
$S_C = -250 \text{ VA}$

d- $P_r = 153.1 \text{ W}$

$Q_r = 204.06 - 250 = -45.94 \text{ var}$

$S_r = \sqrt{153.1^2 + 45.94^2} = 160 \text{ VA}$

$F_p = \frac{153.1 \text{ W}}{160 \text{ VA}} = 0.958$



$\tan^{-1}(45.94 / 153) = 16.39^\circ$

$\frac{160 \text{ VA} e^{j-16.39}}{50 \text{ V} e^{j60}} = 3.2 \text{ A} e^{j-76.39^\circ}$

Éxito

$$\sqrt{3^2 + 4^2} = 5 \Omega$$

$$\tan^{-1}\left(\frac{4}{3}\right) = 53.13^\circ$$

$$5 \Omega e^{j53.13^\circ}$$

$$\frac{50V e^{j60^\circ}}{5 \Omega e^{j53.13^\circ}} = 10A e^{j6.87^\circ}$$

$$10A e^{j6.87^\circ} \cdot 3 \Omega e^{j0^\circ} = 30V e^{j6.87^\circ}$$

$$10A e^{j6.87^\circ} \cdot 4 \Omega e^{j-90^\circ} = 40V e^{j-83.13^\circ}$$

$$P_r = 30V e^{j6.87^\circ} \cdot 10A e^{j6.87^\circ}$$

$$P_c =$$

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

