correction :

1. $P = U.I.\sqrt{3}\cos\varphi = 400 \times 10 \times \sqrt{3} \times 0{,}8$

$$\boxed{P = 5{,}542 \text{ kW}}$$

Puissance réactive :

$$Q = U.I.\sqrt{3}.\sin\varphi = P \times \tan\varphi$$

$\varphi = \cos^{-1}(0{,}8) = 36{,}86° = 0{,}646$ rad

donc $Q = 5{,}542 \times \tan 36{,}86 = 4{,}155$ kVar

$$\boxed{Q = 4{,}155 \text{ kVar}}$$

2.

charge capacitive $\Rightarrow \varphi < 0$

$\cos\varphi = 0{,}8 \Rightarrow \varphi = -\cos(0{,}8) = -36{,}86°$

Puissance active : $P = U.I.\sqrt{3}\cos\varphi = 400 \times 3 \times \sqrt{3} \times 0{,}8$

$$\boxed{P = 1663 \text{ W}}$$

Puissance réactive : $Q = U.I.\sqrt{3}.\sin\varphi = P \times \tan\varphi$

avec $\varphi = -36{,}86°$

donc $Q = 1663 \times \tan(-36{,}86) = -1247$ Var

$$\boxed{Q = -1247 \text{ Var}}$$

3. $P = P_1 + P_2 = 115 + (-30) = \underline{\underline{85 \text{ W}}}$

4. $Q = (P_1 - P_2) \times \sqrt{3} = (85 - 60) \times \sqrt{3}$

$$\boxed{Q = 44 \text{ Var}}$$

5. $P = 3 \times 50 = 150$ W

6.

$P = 3P_1 = 3 \times 50 = 150$ W

$Q = 3Q_1 = 3 \times (-15) = -45$ Var

7. $Q = P \times \tan\varphi \Rightarrow P = \dfrac{Q}{\tan\varphi}$; $\varphi = \cos^{-1}(0{,}8)$

$P = 500 / \tan(\cos^{-1}(0{,}8)) = \underline{\underline{667 \text{ W}}}$

8] $I_n = \frac{S_n}{U_n\sqrt{3}} = \frac{1000}{400\times\sqrt{3}} = 1{,}45\,A$

9] $S = \sqrt{P^2 + Q^2} = \sqrt{8^2 + 6^2} = 10\,kVA$

10] $P_J = \frac{3}{2} R_m I^2 = \frac{3}{2} \times 1{,}5 \times 10^2 = 225\,W$

11] 1) $\underline{Z} = \underline{Z_R} + \underline{Z_L} = R + jL\omega$

2°) $Z = \sqrt{R^2 + (L\omega)^2} = \sqrt{100^2 + (0{,}1\times 314)^2}$

$\boxed{Z = 104{,}8\,\Omega}$ ($Z_L = 0{,}1\times 314 = 31{,}4\,\Omega$)

3°) $\varphi = \tan^{-1}\left(\frac{Z_L}{Z_R}\right) = \tan^{-1}\left(\frac{31{,}4}{100}\right) = 0{,}304\,rd$

$\boxed{\varphi = 17{,}34°}$

l'angle φ représente le déphasage entre le courant de phase $\vec{J}$ et la tension composée $\vec{U}$.

$\varphi = (\vec{J_{12}}, \vec{U_{12}}) = (\vec{J_{23}}, \vec{U_{23}}) = (\vec{J_{31}}, \vec{U_{31}})$

4°) $J = \frac{U}{Z} = \frac{230}{104{,}8} \simeq 2{,}2\,A$

5°) $I = J\times\sqrt{3} = 2{,}2\times\sqrt{3} = 3{,}80\,A$

6°) $\cos\varphi = \cos(17{,}34°) = 0{,}954$

7°) $P = U.I.\sqrt{3}\times\cos\varphi$ et $Q = U.I.\sqrt{3}\times\sin\varphi$

8°) $P = 230\times 3{,}8\times\sqrt{3}\times 0{,}954 = 1444\,W$

$Q = P\times\tan\varphi = 1444\times\tan(17{,}34) = 453\,Var$

9°) $\varphi > 0$ aussi $Q > 0 \Rightarrow$ le récepteur est de nature inductif

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1°) $P_1 = U \times J \times \cos\varphi$

2°) $Q_1 = U \times J \times \sin\varphi$

3°) $P = 3 \times P_1$

4°) $Q = 4 \times Q_1$

5°) a) $J = \frac{U}{Z} = \frac{400}{10+18} = 3{,}82\,A$

b) $P_1 = 400 \times 3{,}82 \times \cos(17°14) = 1458\,W$

$Q_1 = 400 \times 3{,}82 \times \sin(17°14) = 458\,Var$

c) $P = 3 \times P_1 = 3 \times 1458 = 4{,}374\,kW$

$Q = 3 \times Q_1 = 3 \times 458 = 1{,}374\,kVar$

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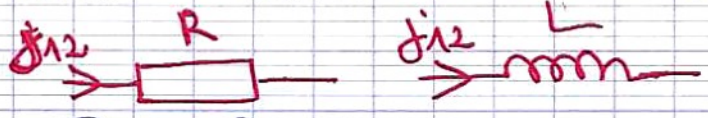

1°) $P_1 = R J^2$

2°) $P_L = 0\,W$! Non elle ne consomme pas

$P_L = U_L \times J \cos\varphi_L = 0$ car $\cos 90° = 0$

3°) $Q_L = Z_L \times J^2 = L\omega J^2$

4°) $Q_R = 0$ car $Q_L = U J \sin\varphi = 0\,Var$

5°) a) $P_R = 100 \times 3{,}8^2 = 1444\,W$

$Q_L = Z_L J^2 = 314 \times 3{,}8^2 = 454\,Var$

b) $Q = 3 P_R = 3 \times 1444 = 4332\,W$

$Q = 3 Q_L = 3 \times 454 = 1362\,Var$