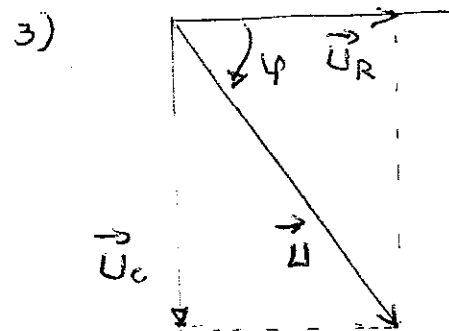


Exercice 1

7 points

- 1) $U = 0,5 \text{ V}$
 2) $U_R = R I = 7,5 \times 40 \cdot 10^{-3} = 0,3 \text{ V}$



- 4) $U \cos \varphi = U_R$ soit $\cos \varphi = \frac{0,3}{0,5}$ et $\varphi = -53^\circ = -0,93 \text{ rad}$
 ($\varphi = +53^\circ$ est accepté)
 5) $Z = \frac{U}{I} = \frac{0,5}{40 \cdot 10^{-3}} = 12,5 \Omega$
 6) $156,25 - R^2 = \left(\frac{1}{2\pi f C} \right)^2 = 100$ soit $f = 72343 \text{ Hz} \approx 72 \text{ kHz}$

Exercice 2

7 points

- 1) Couplage étoile (Neutre - phase)
 2) $V_1 = 230 \text{ V}$
 3a) $T = 4 \times 5 = 20 \text{ ms}$ $f = \frac{1}{T} = 50 \text{ Hz}$
 3b) $V_{2H} = 3,4 \times 10 = 34 \text{ V}$ $V_2 = \frac{34}{\sqrt{2}} = 24 \text{ V}$
 3c) $m = \frac{V_2}{V_1} = \frac{24}{230} = 0,105$ on accepte $m = 0,1$
 3d) $N_1 = \frac{N_2}{m} = \frac{60}{0,105} = 574 \text{ spires} \approx 600 \text{ spires}$
 4) $P = 40 \text{ W} \Rightarrow S = 40 \text{ V.A}$ car $\cos \varphi = 1$ nombre de lampes = $\frac{1000}{40} = 25$

Exercice 3

6 points

- 1) $130 = 10 \log \left(\frac{I_H}{10^{-12}} \right)$ soit $I_H = 10 \text{ W/m}^2$
 2) $L_S = 10 \log \left(\frac{1}{10^{-12}} \right) = 120 \text{ dB}$
 3a) $I_T = I_H + I_S = 10 + 1 = 11 \text{ W/m}^2$
 3b) $L_T = 10 \log \left(\frac{11}{10^{-12}} \right) = 130,41 \text{ dB}$
 4) $L = 60 = 10 \log \left(\frac{I}{10^{-12}} \right)$ soit $I = 10^{-6} \text{ W/m}^2$
 $I = 10^{-6} = \frac{0,5}{4\pi d^2}$ soit $d = 199,5 \text{ m} \approx 200 \text{ m}$