

Solution

$$1. A_v = \frac{j\omega L}{R+j\omega L} \quad \boxed{A_v = \frac{j\omega L/R}{1+j\omega L/R}}$$

A_v est une fonction de transfert d'un filtre RL passe-haut 1^{er} ordre

$$2. A_v = \frac{j\omega L/R}{1+j\omega L/R} = \frac{j\omega/\omega_0}{1+j\omega/\omega_0} \quad G_m = 1 \text{ (gain maximal)}$$

$$\omega_0 = R/L = 2\pi f_c \quad \Rightarrow \quad L = R/2\pi f_c = 10^4/2\pi \times 3,5 \cdot 10^3 \quad \boxed{L = 455 \text{mH}}$$

$$3. |A_v| = \frac{U_s}{U_e} = \frac{\frac{\omega}{\omega_0}}{\sqrt{1+\left(\frac{\omega}{\omega_0}\right)^2}}$$

$$\omega / \omega_0 = 2\pi f / 2\pi f_c = f / f_c \quad |A_v| = \frac{U_s}{U_e} = \frac{\frac{f}{f_c}}{\sqrt{1+\left(\frac{f}{f_c}\right)^2}}$$

$$f = 7 \text{Khz} \text{ donc } f / f_c = 7 \text{khz} / 3,5 \text{khz} = 2$$

$$A_v = \frac{U_s}{U_e} = \frac{2}{\sqrt{1+(2)^2}} = \frac{2}{\sqrt{5}}$$

$$\Rightarrow U_e = U_s \times \sqrt{5}/2 = 1,6 \text{V} \times \sqrt{5}/2 \quad \boxed{U_e = 1,79 \text{V}}$$

4.

