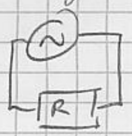
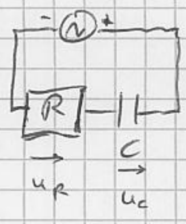
13.45. U_{eff} et $\hat{u}$ sont identiques dans tous les montages !

1).



seul R est branché $\Rightarrow \overline{P}_1 = R\, I_{eff}^2 = 1 = \frac{U_{eff}^2}{R} \Rightarrow U_{eff} = \sqrt{R}$

2).

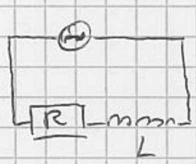


$$\overline{P}_2 = I_{eff} \cdot U_{eff} \cdot \cos\varphi = I_{eff} \cdot U_{eff} \cdot \frac{R}{Z} = \frac{U_{eff}}{Z} \cdot U_{eff} \cdot \frac{R}{Z} = \frac{U_{eff}^2 \cdot R}{Z^2} = \frac{R^2}{Z^2} = \frac{1}{2}$$

$$Z_2 = \sqrt{R^2 + \left(\frac{1}{2\pi f C}\right)^2} = R\sqrt{2} \quad (1)$$

$$\Rightarrow Z = R\sqrt{2}$$

3).



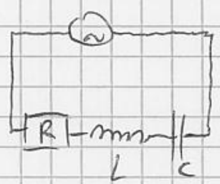
$$\overline{P}_3 = I_{eff} \cdot U_{eff} \cdot \cos\varphi = \frac{1}{4} = \frac{R^2}{Z^2} \Rightarrow Z = 2R$$

$$Z_3 = \sqrt{R^2 + (2\pi f L)^2} = 2R \quad (2)$$

• De (1) $\Rightarrow (1)^2$: $2R^2 = R^2 + \left(\frac{1}{2\pi f C}\right)^2$; $R^2 = \left(\frac{1}{2\pi f C}\right)^2$; $R = \frac{1}{2\pi f C} \Rightarrow C = \frac{1}{2\pi f R}$

• De (2) $\Rightarrow (2)^2$: $4R^2 = R^2 + (2\pi f L)^2$; $3R^2 = (2\pi f L)^2$; $R = \frac{2\pi f L}{\sqrt{3}} \Rightarrow L = \frac{R\sqrt{3}}{2\pi f}$

4).



$$\overline{P} = \frac{R^2}{Z^2}$$

$$Z = \sqrt{R^2 + \left(2\pi f L - \frac{1}{2\pi f C}\right)^2} \Rightarrow Z^2 = R^2 + \left(2\pi f L - \frac{1}{2\pi f C}\right)^2$$

$$Z^2 = R^2 + \left(R\sqrt{3} - R\right)^2 = R^2 + R^2\left(\sqrt{3} - 1\right)^2 = R^2\left[1 + \left(\sqrt{3} - 1\right)^2\right]$$

$$\Rightarrow \overline{P} = \frac{R^2}{Z^2} = \frac{\cancel{R^2}}{\cancel{R^2}\left[1 + (\sqrt{3} - 1)^2\right]} = \frac{1}{1 + (\sqrt{3} - 1)^2} \cong \underline{\underline{0{,}65\ W}}$$