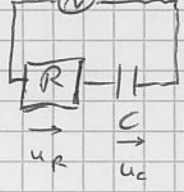
(13.45). U_{eff} et $\hat{u}$ sont identiques dans tous les montages !

1). 

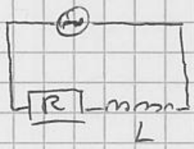
Seul R est branché. $\Rightarrow \bar{P}_1 = R I_{eff}^2 = 1 = \dfrac{U_{eff}^2}{R} \Rightarrow U_{eff} = \sqrt{R}$

2). 

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

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

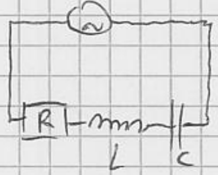
$$Z_2 = \sqrt{R^2 + \left(\frac{1}{2\pi f C}\right)^2} = R\sqrt{2} \qquad (1)$$

3). 

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

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

- De (1) $\Rightarrow (1)^2$: $2R^2 = R^2 + \left(\dfrac{1}{2\pi f C}\right)^2$; $R^2 = \left(\dfrac{1}{2\pi f C}\right)^2$; $R = \dfrac{1}{2\pi f C} \Rightarrow C = \dfrac{1}{2\pi f R}$
- De (2) $\Rightarrow (2)^2$: $4R^2 = R^2 + (2\pi f L)^2$; $3R^2 = (2\pi f L)^2$; $R = \dfrac{2\pi f L}{\sqrt{3}} \Rightarrow L = \dfrac{R\sqrt{3}}{2\pi f}$

4). 

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

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

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

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

(13.51) $\dfrac{Z_L}{Z_C} = 5{,}36$; $f_0 = 225\ Hz$; $Z_L = 2\pi f L$; $Z_C = \dfrac{1}{2\pi f C}$

$$\omega_0 = 2\pi f_0 = \frac{1}{\sqrt{LC}} \quad ; \quad \frac{Z_L}{Z_C} = \frac{2\pi f L}{\frac{1}{2\pi f C}} = 4\pi^2 f^2 LC = 5{,}36$$

$$\Rightarrow \sqrt{LC} = \frac{1}{2\pi f_0} \Rightarrow LC = \frac{1}{4\pi^2 f_0^2}$$

$$\Rightarrow 5{,}36 = 4\pi^2 f^2 \frac{1}{4\pi^2 f_0^2} = \left(\frac{f}{f_0}\right)^2 \Rightarrow f^2 = 5{,}36 f_0^2 \Rightarrow f = f_0\sqrt{5{,}36} \cong \underline{\underline{521\ Hz}}$$