



1. Ancho de banda del Filtro “a”

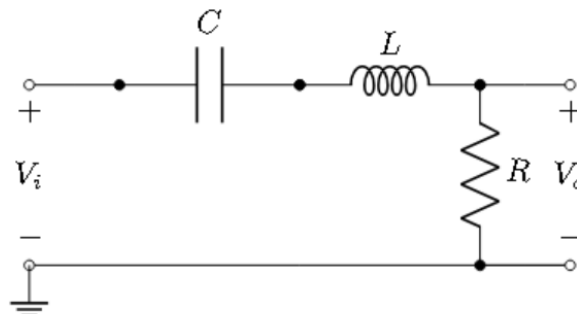
$$|H(jw)| = \frac{w \frac{w_0}{Q}}{\sqrt{(w_0^2 - w^2)^2 + (w \frac{w_0}{Q})^2}}$$

$$\frac{w \frac{w_0}{Q}}{\sqrt{(w_0^2 - w^2)^2 + (w \frac{w_0}{Q})^2}} = \frac{\sqrt{2}}{2}$$

$$\left(\frac{w \frac{w_0}{Q}}{\sqrt{(w_0^2 - w^2)^2 + (w \frac{w_0}{Q})^2}} \right)^2 = \frac{1}{2}$$

$$\frac{(w \frac{w_0}{Q})^2}{(w_0^2 - w^2)^2 + (w \frac{w_0}{Q})^2} = \frac{1}{2}$$

$$w_0^4 - (2w_0^2 + (\frac{w_0}{Q})^2)w^2 + w^4 = 0$$



Hago un cambio de variable $x = w^2$

$$w_{1,2} = \frac{w_0(\sqrt{1+Q^2} \pm 1)}{2Q} \text{ y con } w_0 = 2\pi * 1\text{Hz y } \frac{w_0}{Q} = \frac{R}{L} \rightarrow Q = L$$

$$\text{Ancho de banda} = w_2 - w_1 = \left(\frac{\sqrt{1+L^2} - 1}{2L} \right) - \left(-\frac{\sqrt{1+L^2} + 1}{2L} \right)$$

2. Ancho de banda del filtro “b”

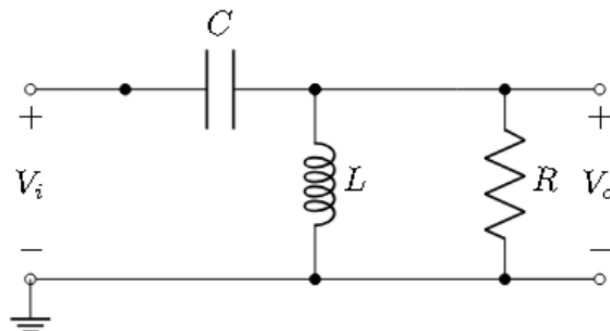
$$|H(jw)| = \frac{w^2}{\sqrt{(w_0^2 - w^2)^2 + (w \frac{w_0}{Q})^2}}$$

$$\frac{w^2}{\sqrt{(w_0^2 - w^2)^2 + (w \frac{w_0}{Q})^2}} = \frac{\sqrt{2}}{2}$$

$$\left(\frac{w^2}{\sqrt{(w_0^2 - w^2)^2 + (w \frac{w_0}{Q})^2}} \right)^2 = \frac{1}{2}$$

$$\frac{(w^2)^2}{(w_0^2 - w^2)^2 + (w \frac{w_0}{Q})^2} = \frac{1}{2}$$

$$w_0^4 - (2w_0^2 + (\frac{w_0}{Q})^2)w^2 + w^4 = 0$$





Hago un cambio de variable $x = w^2$

$$w_{1,2} = \frac{w_0(\sqrt{1+Q^2} \pm 1)}{2Q} \text{ y con } w_0 = 2\pi * 1Hz \text{ y } \frac{w_0}{Q} = \frac{1}{RC} \rightarrow Q = RC$$

$$\text{Ancho de banda del filtro } b = w_2 - w_1 = \left(\frac{(\sqrt{1+(RC)^2} - 1)}{2(RC)} \right) - \left(-\frac{(\sqrt{1+(RC)^2} + 1)}{2(RC)} \right)$$