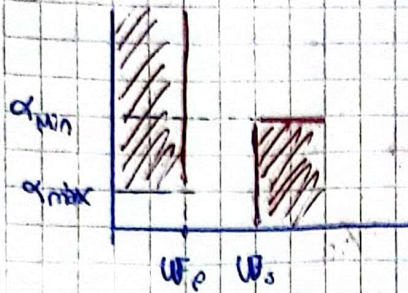


TP Semanal 3



$$\alpha_{min} = 12 \text{ dB}$$

$$\omega_s = 2\pi \cdot 3000 \text{ Hz}$$

$$\alpha_{max} = 1 \text{ dB}$$

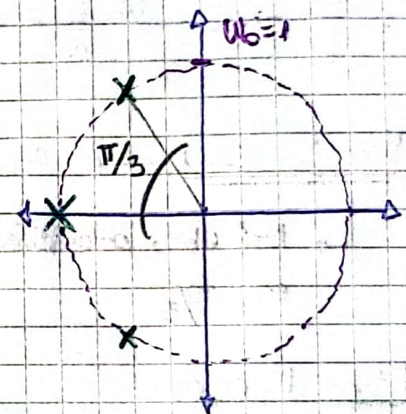
$$\omega_p = 2\pi \cdot 1500 \text{ Hz}$$

* Normalizado $\omega_p = 1$ $\omega_s = 2$ $\omega_c = 2\pi \cdot 1500 \text{ Hz}$

* Armo Pz map

↳ n: impar \rightarrow polo sobre el eje real

↳ polos separados π/n



$$\frac{1}{2 \cos(\pi/3)} = Q = 1$$

* Cálculo n

$$\alpha_{min} < 10 \log(1 + \epsilon^2 \omega_s^{2n})$$

Iteración:

n	α_{min}
1	3,087 < 10
2	7,11 < 10
3	12,45 > 10 $\rightarrow n=3$

* Armo Transferencia

$$|T(\omega)|^2 = \frac{1}{1 + \epsilon^2 \omega^{2n}}$$

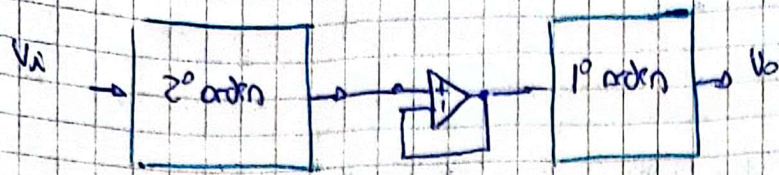
* Renormalizo

$$\omega_c = \frac{2\pi \cdot 1500 \text{ Hz}}{\sqrt{\epsilon}} = 11805 \frac{\text{rad}}{\text{s}}$$

$$|T(\omega)|^2 = \frac{1}{1 + \omega^{2n}}$$

NOTA

* Diseño Crawlto



* Etapa 2º orden

$$\frac{V_o}{V_i} = \frac{\frac{1}{sC}}{\frac{1}{sC} + sL + R} = \frac{\frac{1}{sC}}{\frac{1}{sC} + \frac{s^2 LC}{sC} + \frac{sR}{sC}} = \frac{\frac{1}{sC}}{\frac{s^2 + \frac{R}{L}s + \frac{1}{LC}}{sC}} = \frac{1}{s^2 + \frac{R}{L}s + \frac{1}{LC}}$$

$$\omega_0 = \frac{1}{\sqrt{LC}}$$

$$\frac{\omega_0}{Q} = \frac{R}{L} \Rightarrow Q = \omega_0 \frac{L}{R} = \frac{1}{R} \sqrt{\frac{L}{C}}$$

Normalizado

$$\omega_0 = 1 \rightarrow L = 1/C$$

$$Q = 1 \rightarrow R = L$$

Necesito $Q=1 \rightarrow R=1 ; C=1 ; L=1$

Así ubicar polos en $\pi/3$

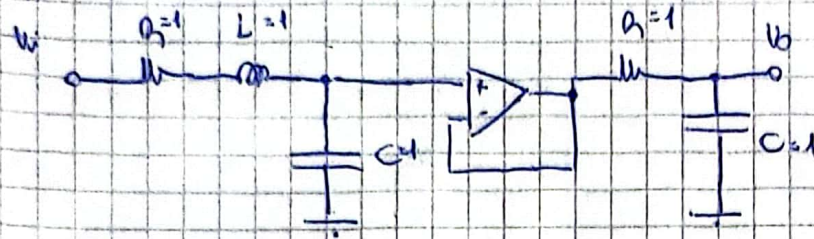
* Etapa 1º orden

$$\frac{V_o}{V_i} = \frac{\frac{1}{sC}}{\frac{1}{sC} + R} = \frac{1}{sCR + 1} = \frac{1/sC}{s + 1/C}$$

Necesito polo en $-1 \rightarrow \frac{1}{s + 1} \rightarrow \frac{1}{C} = 1$

Normalizado $R = \frac{1}{C} \rightarrow R=1$
 $C=1$

* Respeto Cero



* Respeto Valores Deseado

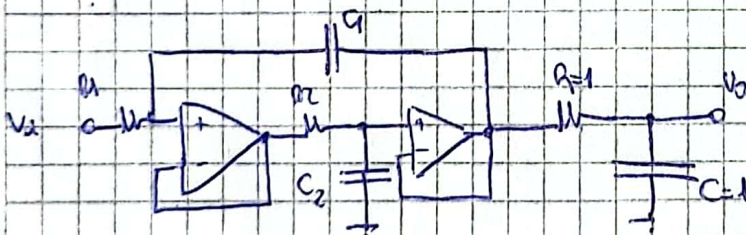
$$R_1 = 1 \cdot \Omega \rightarrow R_1 = 847 \Omega$$

$$L = 1 \cdot \frac{\Omega}{s} \rightarrow L = \frac{847 \Omega}{11805 \frac{rad}{seg}} = 71,75 \text{ mH}$$

$$C = 100 \text{ nF} = \frac{1 \cdot \frac{1}{s}}{\Omega \cdot s} \rightarrow \Omega \cdot s = \frac{1}{100 \text{ nF} \cdot s} = \frac{1}{100 \text{ nF} \cdot 11805 \frac{rad}{seg}} = 847 \Omega$$

* Modifico Circuito para no usar inductores

↳ Implemento pasabajas bicuadrado



$$\omega_0 = \frac{1}{\sqrt{R_1 R_2 C_1 C_2}} \rightarrow R_1 R_2 C_1 C_2 = 1$$

$$Q = \sqrt{\frac{R_1 C_1}{R_2 C_2}} = 1 \rightarrow R_1 C_1 = R_2 C_2$$

$$\left. \begin{array}{l} R_1 = 1 \quad R_2 = 1 \\ C_1 = 1 \quad C_2 = 1 \end{array} \right\}$$

→ Mismos valores que antes