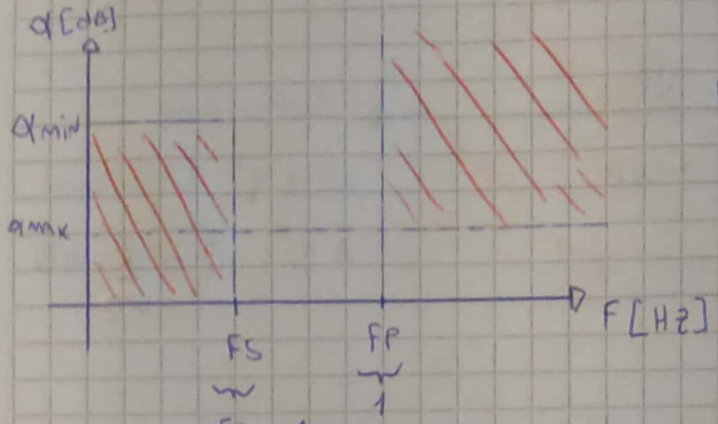
TAREA SEMANAL 4

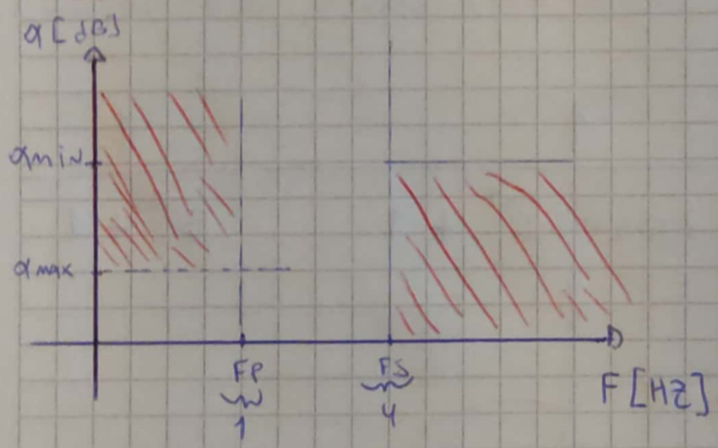
$F_P = 40\,KHZ$, $F_S = 10\,KHZ$, $\alpha_{max} = 1\,dB$, $\alpha_{min} = 30\,dB$

$F_P > F_S \rightarrow$ PASA - ALTOS



$$\frac{F_S}{F_P} = \frac{1}{4}$$

PLANTILLA PASA BAJOS PROTOTIPO



$$\xi^2 = 10^{1/10} - 1 = 0,2589$$

$$\xi = 0,5088$$

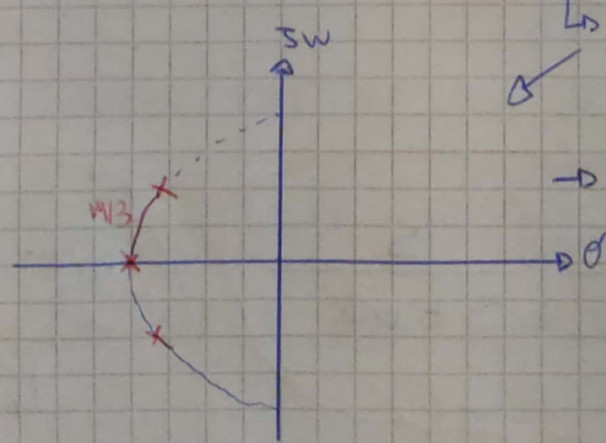
$$\alpha_{min}(n) = 10 \log\left(1 + \xi^2 \Omega_S^{2n}\right)$$

$$\alpha_{min}(\underbrace{n}_{2}) = 10 \log\left(1 + 0,2589 \cdot 4^4\right)$$

$$\alpha_{min\,2} = 7,11\,dB$$

$$\alpha_{min\,3} = 10 \log\left(1 + 0,2589\ 4^6\right) \Rightarrow \alpha_{min\,3} = 30,25\,dB$$

↳ $n = 3 \rightarrow$ ORDEN 3



$$\rightarrow \boxed{T(s) = \frac{1}{s^2 + 2\cos\frac{\pi}{3} s + 1} \cdot \frac{1}{s + 1}}$$

↳ BUTTER ORDEN 3

$\omega_{BUTTER} = 2\pi \cdot 10KHz \cdot \varepsilon^{-1/n}$ → DESNORMALIZO CON WB PARA PB

$$T(\$) = \frac{WB^2}{\$'^2 + 2\cos\pi/3 \, WB\$' + WB^2} \quad \frac{WB}{\$' + WB}$$

→ SUPONIENDO QUE $\$'$ ES DISTINTA A $\$$; $\$' = \$ \cdot WB$

AHORA ENCONTRAMOS EL PASAALTOS. PARA LOGRAR ESTO, PARTIMOS DEL PASA BAJOS NORMALIZADO CON UN NUCLEO DE TRANSFORMACIÓN DE $KPA(s) = 1/s$.

$$T_{PA}(s) = T(\$) \Big|_{\$ = KPA(s)} = \frac{1}{\left(\frac{1}{s}\right)^2 + 2\cos\pi/3 \, s^{-1} + 1} \quad \frac{1}{s^{-1} + 1}$$

$$TPA(s') = \frac{s'^2}{s'^2 + 2\cos\frac{\pi}{3} s + 1} \quad \frac{s'}{s' + 1}$$

DESNORMALIZADO → $s' = s/WB$

$$T_{PA}(s) = \frac{s^2}{s^2 + 2\cos\frac{\pi}{3} WB\, s + WB^2} \quad \frac{s}{s + WB}$$; $WB = 2\pi \cdot 10KHz \cdot \varepsilon^{+1/3}$

↳ PA

b) DIAGRAMA POLOS Y CEROS (PASA ALTOS)

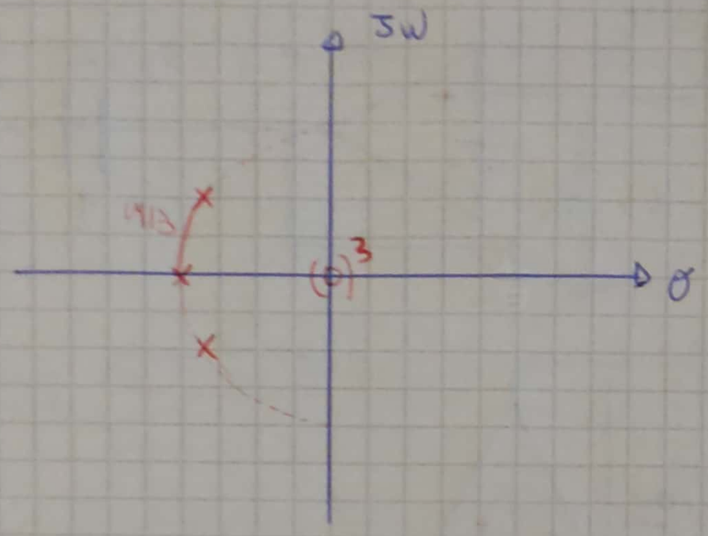
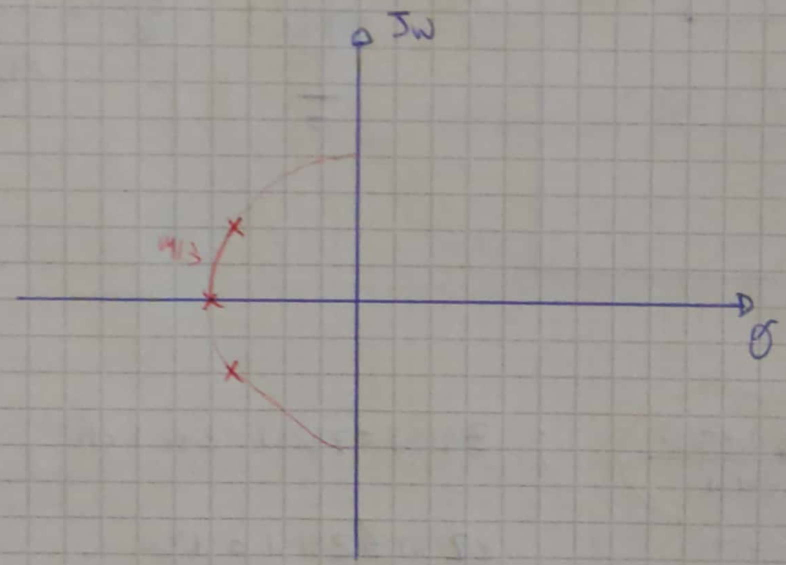


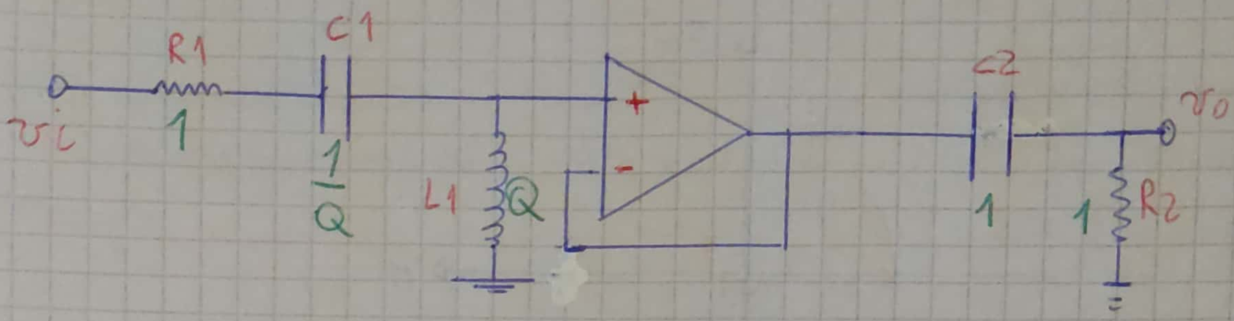
DIAGRAMA POLOS Y CEROS (PASA BAJOS)



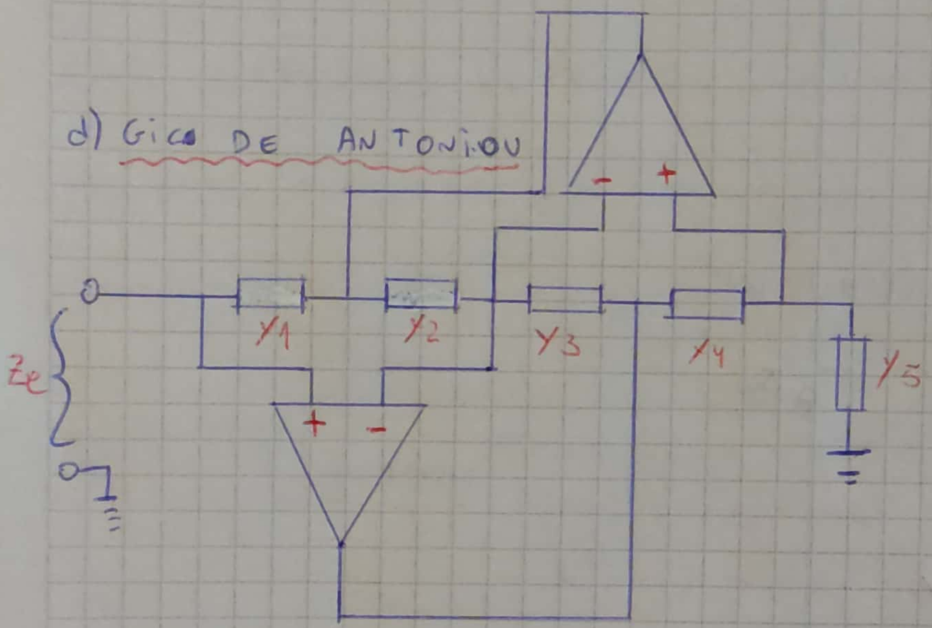
LA DIFERENCIA ESTA EN QUE EL PASA ALTOS TIENE UN CERO TRIPLE EN 0 Y EL PASA BAJOS NO. ESTO HACE QUE UNO NO DEJE PASAR LA CONTINUA, OTRO SI.

c)

PASA ALTOS:



d) GIC DE ANTONIOU



$$Z_e(s) = \frac{Y_2 Y_4}{Y_1 Y_3 . Y_5}$$

$$\boxed{Z_e(s) = \frac{Z_1(s) . Z_3(s) . Z_5(s)}{Z_2(s) . Z_4(s)}}$$; $Z_1(s) = Z_3(s) = Z_5(s) = R$

$Z_2(s)$ ó $Z_4(s) = 1/sC$

POR EJEMPLO ; $Z_1 = Z_2 = Z_3 = Z_5 = R$; $Z_4 = 1/sC$

$$Z_e(s) = \frac{R^{\cancel{3}2}}{\cancel{R} \cdot 1/sC} \Rightarrow \boxed{Z_e = sCR^2} \rightarrow L_{eq} = R^2 C$$

$[\Omega^2 . F] = [s . \Omega]$

$[Hy]$

LA ENTRADA DE GIC VA EN VEZ DE L1.

NOTA

HOJA Nº

FECHA

VALORES (DESNORMALIZACIÓN) ; $Q = 1/2\cos \pi/3 = 1$

$\Omega z = 1K\Omega$; $\Omega w = wB = 2 \cdot \pi \cdot 40KHz \cdot \left[(0{,}2589)^{+1/2}\right]^{+1/3} = 200{,}64 K s^{-1}$

$R = \Omega z = 1K\Omega$

$C1 = \underbrace{\frac{1}{Q}}_{1} \frac{1}{\Omega w \cdot \Omega z} \Rightarrow C1 = 4{,}98 nF$; $L1 = \underbrace{Q}_{1} \cdot \Omega z / \Omega w$

$L1 = 4{,}98 mH$ y

$C2 = \frac{1}{\Omega z \cdot \Omega w} = C1 \Rightarrow C2 = 4{,}98 nF$; $L1 = C R^2$

SUPONIENDO $R = 1K\Omega$; $C = 4{,}98 nF$