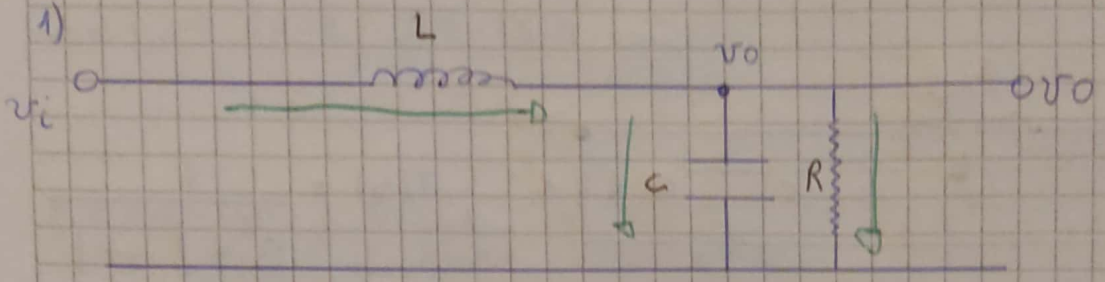
HOJA N°

FECHA

GUIA 2 "APROXIMACIONES DE FUNCIONES TRANSFERENCIAS"

1)



$$(V_i - V_o)\cdot\frac{1}{SL} = SC\cdot V_o(S) + \frac{1}{R}V_o(S)$$

$$\frac{1}{SL}\cdot V_i(S) = \left(SC + \frac{1}{R} + \frac{1}{SL}\right)V_o(S) \Rightarrow T(S) = \frac{V_o(S)}{V_i(S)} = \left(\frac{S^2LCR + SL + R}{SLR}\right)^{-1}\frac{1}{SL}$$

$$T(S) = \frac{\frac{1}{LC}}{S^2 + \frac{1}{RC}S + \frac{1}{LC}}$$

; $W_o^2 = 1/LC \Rightarrow W_o = \frac{1}{\sqrt{LC}}$

$$\left(\frac{Q}{W_o}\right)^{-1} = \frac{1}{RC}\ ;\ Q = W_o\left(\frac{1}{RC}\right)^{-1}$$

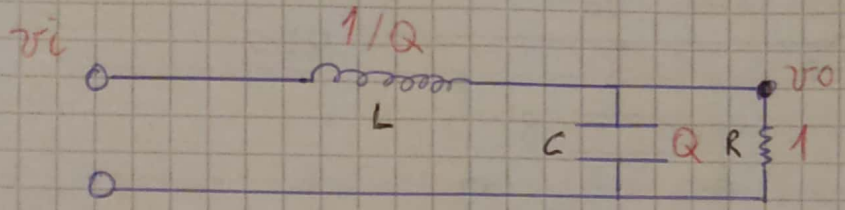
$$Q = \frac{1}{\sqrt{LC}}\left(\frac{1}{RC}\right)^{-1} \Rightarrow Q = \frac{RC}{\sqrt{LC}} \Rightarrow Q = \frac{R}{1}\sqrt{\frac{C}{L}} \Rightarrow Q = R\sqrt{\frac{C}{L}}$$

$$W_o\left(1 = \frac{1}{LC}\right) \Rightarrow LC = 1\ .\ \text{Si } R = 1 \rightarrow Q = \sqrt{\frac{C}{L}}\ ;\ Q = \sqrt{\frac{1}{L^2}} \Rightarrow L = 1/Q$$

NOTA

$C = Q$; $L = 1/Q$; $R = 1$

CIRCUITO NORMALIZADO EN FRECUENCIA E IMPEDANCIA



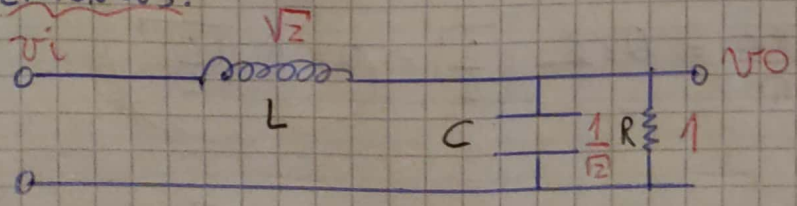
$$T(S) = \frac{1}{S^2 + \frac{1}{Q}S + 1}$$

$$|T(w)|^2 = \frac{1}{1 + w^{2n}} \quad ; \text{ BUTTER. ORDEN 2}$$

$$|T(w)|^2 = \frac{1}{1 + w^4} \rightarrow |T(S)|^2 \Big|_{S=jw} = \left[T(S) \cdot T(-S) \right] \Big|_{S=jw} = |T(w)|^2 \Big|_{w=S/j}$$

$$|T(S)|^2 = \frac{1}{1 + S^4} \Rightarrow T(S)_{b2} = \frac{1}{S^2 + \underbrace{\sqrt{2}}_{\frac{1}{Q}} S + 1}$$

ENTONCES:



NOTA

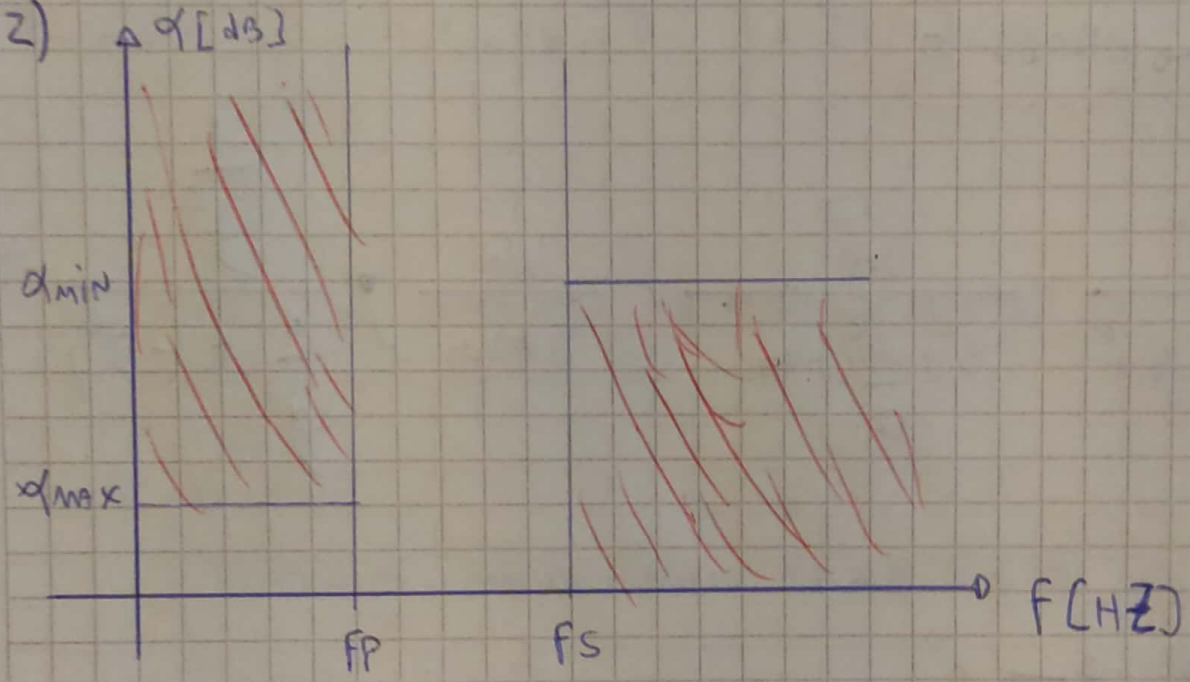
DESNORMALIZAMOS:

$\Omega W = 2M \cdot 1KHz$; $\Omega Z = 1K\Omega$

$R = \Omega Z = 1K\Omega$; $C = \frac{C_N}{\Omega W \cdot \Omega Z} = \frac{(\sqrt{2}/2)}{1K\Omega \cdot 2M \cdot 1KHz} \rightarrow C = 112,54nF$

$L = \frac{L_N}{\Omega W}\sqrt{2}\ \Omega Z \rightarrow L = 225,08\ mHy$

2)



$\alpha_{max} = 0,5\ dB$; $\alpha_{min} = 20\ dB$; $FP = 1000$; $FS = 2000$

$$\xi^2 = 10^{\alpha_{max}/10} - 1 \Rightarrow \xi^2 = 10^{0,5/10} - 1 \Rightarrow \xi^2 = 0,122$$

$$\xi = 0,350$$

NOTA

2)

$$a_{min\,n} = 10\log\left(1+\xi^{2}\,\Omega_{WS}^{2n}\right)$$

$$\Omega_{WS} = \frac{2\pi F_S}{2\pi F_P} = 2$$

$$a_{min\,1} = 10\log\left(1+0{,}122\cdot 2^{2}\right) \Rightarrow a_{min\,1} = 1{,}73\,dB$$

$a_{min\,2} = 4{,}70\,dB$; $a_{min\,3} = 9{,}45\,dB$; $a_{min\,4} = 15{,}08\,dB$

$a_{min\,5} = 21\,dB \rightarrow$ ORDEN 5

$$T(S) = \frac{w_0^{2}}{S^{2}+\frac{w_0}{Q}S+w_0^{2}}\;\frac{w_0^{2}}{S^{2}+\frac{w_0^{2}}{Q}S+w_0}\;\frac{w_0}{S+w_0}\;/\;\frac{\frac{1}{\xi^{2}}}{\frac{1}{\xi^{2}}+(-S^{10})} = |T(S)|^{2}$$

SABEMOS QUE $\varphi \rightarrow 0^{0}$

$\rightarrow$ M/S $\}$ $Q_1 = 1/2\cos(M/S) \tilde{=} 0{,}618$

$\rightarrow$ 2M/S $\}$ $Q_2 = 1/2\cos(2M/S) = 1{,}62$

$w_0^{10} = 1/\xi^{2} \Rightarrow w_0 = 1{,}23$

$$T(S) = \frac{1{,}23^{2}}{S^{2}+\frac{1{,}23}{1{,}62}S+1{,}23^{2}}\;\frac{1{,}23^{2}}{S^{2}+\frac{1{,}23}{0{,}618}S+1{,}23^{2}}\;\frac{1{,}23}{S+1{,}23}$$