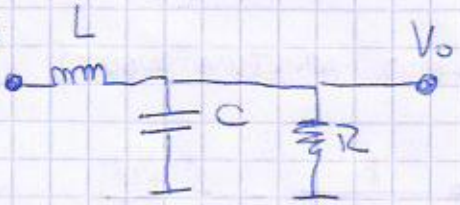
HOJA Nº

FECHA

TAREA: EJ TP2



- $\alpha_{MAX} = 1\,dB \qquad f_p = 1kHz$

* Aplico una norma de filtro → $\Omega w = 2\pi \cdot 1kHz \rightarrow w_p = 1$

  " " " " z → $\Omega z = 1k\Omega \rightarrow z = 1$

* Según la topología del circuito → $m = 2$

* Obtengo ξ → $\alpha_{máx} = 20 \log\left(\sqrt{1 + \xi^2 \, w_p^{2m}}\right)$

$$\frac{\alpha_{máx}}{10} = \log\left(1 + \xi^2 \, w_p^{2m}\right)$$

$$10^{\frac{\alpha_{máx}}{10}} = 1 + \xi^2 \, w_p^{2m} \qquad \text{con } m=2 \text{ y } w_p = 1$$

$$10^{\frac{\alpha_{máx}}{10}} = 1 + \xi^2$$

$$\xi^2 = 10^{\frac{\alpha_{máx}}{10}} - 1 \rightarrow \boxed{\xi = 0{,}51}$$

* Renormalización → $\left(\frac{w_p}{\xi^{1/m}}\right)^{2m} = w_B^{2m}$

$$w_p \cdot \xi^{-1/m} = w_B \rightarrow w_B = 2\pi \cdot 1kHz \cdot (0{,}51)^{-1/2}$$

$$\boxed{w_B = 8{,}8 \cdot 10^3 \ \frac{rad}{s}}$$

* Transferencia → $T(s) = \dfrac{1/LC}{s^2 + s\,1/cR + 1/LC}$

1 → $w_o^2 = \dfrac{1}{LC} \rightarrow \{L = \dfrac{1}{C}\}$

NOTA

K1

$$\frac{\omega_0}{q} = \frac{1}{CR} \quad (CR \to 1) \rightarrow \{q = C\} \qquad \{R = 1\}$$

* USANDO APERTURA ANGULAR $\psi = \pi/4$ PARA $n = 2$

$$q = \frac{1}{2\cos\psi} = \frac{\sqrt{2}}{2} \rightarrow \boxed{C = \frac{\sqrt{2}}{2}} \qquad \boxed{L = \sqrt{2}}$$

* DESNORMALIZO

$$R = 1 \cdot R_Z = 1k\Omega$$

$$C = \frac{\sqrt{2}}{2} \cdot \frac{1}{R_Z \cdot \omega_B} = \frac{\sqrt{2}}{2} \cdot \frac{1}{1k\Omega \cdot 8{,}8 \cdot 10^3 \frac{r}{s}} = 80{,}35\ mF$$

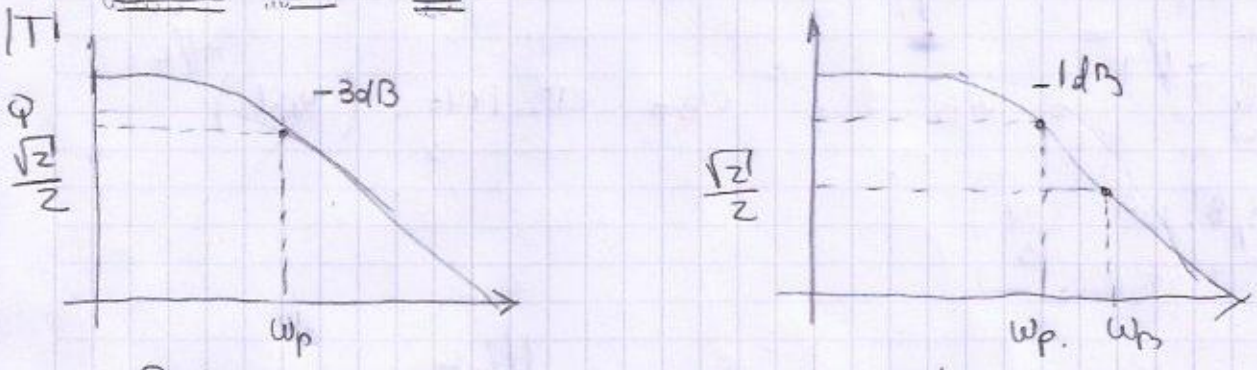
$$L = \sqrt{2} \cdot \frac{R_Z}{\omega_B} = \sqrt{2} \cdot \frac{1k\Omega}{8{,}8 \cdot 10^3 \frac{r}{s}} = 160{,}71\ mH$$

(*) $[C] = \left[\frac{s}{\Omega}\right]$ Y $[L] = [s \cdot \Omega]$

* TABLA DE RESULTADOS

	-3dB	-1dB
R	1kΩ	1kΩ
L	225 mHy	160,71 mHy
C	116 mF	80,35 mF

* RELACIÓN DE ω_p



BUTTER

$$T(1) = \frac{1}{\sqrt{1 + \xi^{2n}}}$$

$$\rightarrow 3dB \rightarrow \sqrt{2}/2$$

$$\rightarrow 1dB \rightarrow \frac{1}{\sqrt{1 + 0{,}2584}} = 0{,}89$$

(*) PARA EL 2DO CASO EL PUNTO DE -3dB SE ENCUENTRA EN $\omega_B \cong 2\pi \cdot 1400\ Hz \rightarrow 2\pi \cdot 1447 \cdot \xi = 1/2$

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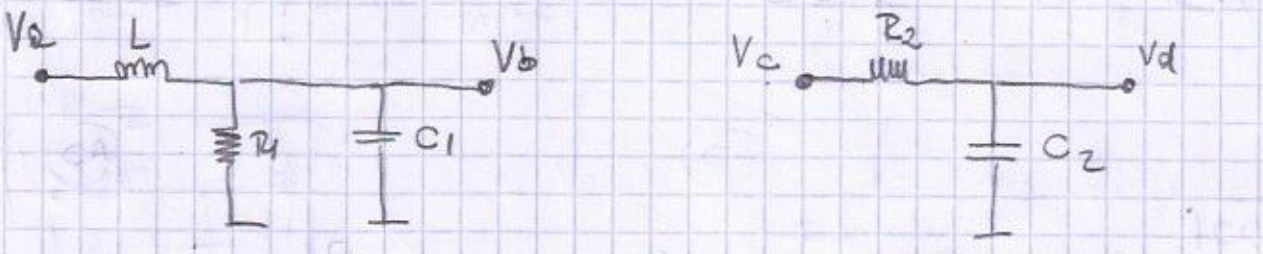
GENERALIZACIÓN PARA TODO n

- $\varepsilon = \sqrt{10^{\frac{1}{10}\alpha_{máx}} - 1} = 0{,}51$

- $\omega_B = \frac{\Omega_\omega}{\sqrt[n]{\varepsilon}} = \frac{2\pi \cdot 1\,kHz}{\sqrt[n]{0{,}51}}$

- UTILIZO EN CASCADA SEGÚN n



$$T_{1_N}(\$) = \frac{1}{\$^2 + \$ + 1} \qquad T_{2_N}(\$) = \frac{1}{\$ + 1}$$

- Normo $\Omega_z = 1k\Omega$ $\Omega_\omega = \omega_B$

$$C_1 = \frac{1}{\Omega_z \cdot \omega_B} \qquad C_2 = \frac{1}{\Omega_z \omega_B}$$

$$L = \frac{\Omega_z}{\omega_B} \qquad R_1 = R_2 = 1k\Omega$$

NOTA