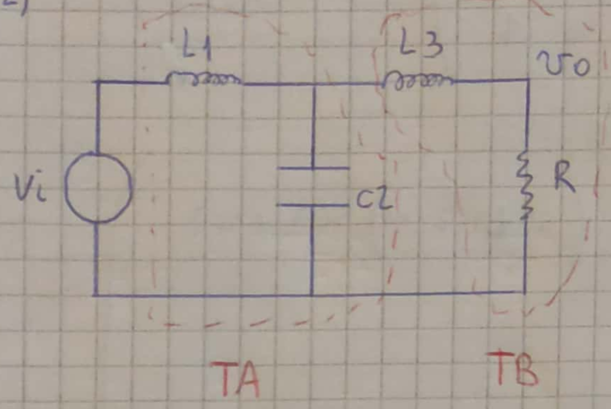
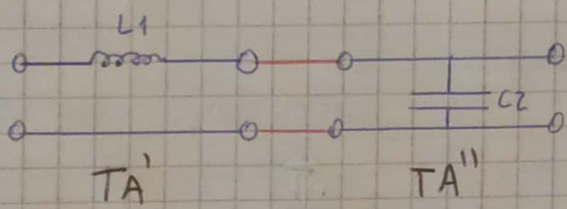
2)



$R = 1\,\Omega$; $L_3 = 0{,}5\,Hy$; $L_1 = 1{,}5\,Hy$

$C_2 = 4/3\ F$

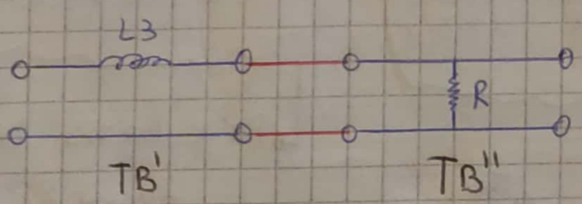
a) TA :



CASCADA

$$TA = TA' \cdot TA'' = \begin{pmatrix} 1 & sL_1 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 \\ sC_2 & 1 \end{pmatrix} = \begin{pmatrix} s^2 L_1 C_2 + 1 & sL_1 \\ sC_2 & 1 \end{pmatrix}$$

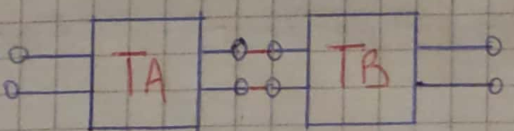
TB :



CASCADA

$$TB = TB' \cdot TB'' = \begin{pmatrix} 1 & sL_3 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 \\ 1/R & 1 \end{pmatrix} = \begin{pmatrix} \frac{sL_3}{R} + 1 & sL_3 \\ 1/R & 1 \end{pmatrix}$$

T = TA . TB :



CASCADA

$$T = \begin{pmatrix} s^2 L_1 C_2 + 1 & sL_1 \\ sC_2 & 1 \end{pmatrix} \begin{pmatrix} \frac{sL_3 + R}{R} & sL_3 \\ 1/R & 1 \end{pmatrix}$$

A

$$T = \begin{pmatrix} (s^2 L_1 C_2 + 1)\left(\frac{sL_3 + R}{R}\right) + \frac{sL_1}{R} & (s^2 L_1 C_2 + 1) sL_3 + sL_1 \\ sC_2\left(\frac{sL_3 + R}{R}\right) + \frac{1}{R} & sC_2 L_3 + 1 \end{pmatrix}$$

$$A = T(s)^{-1} = \left.\frac{V_i}{V_o}\right]_{I_2 = 0} \rightarrow T(s)^{-1} = \frac{s^3 L_1 C_2 L_3 + s^2 L_1 C_2 R + sL_3 + R + sL_1}{R}$$

$$T(s) = \frac{R / L_1 C_2 L_3}{s^3 + \frac{R}{L} s^2 + \frac{(L_1 + L_3)}{L_1 C_2 L_3} s + \frac{R}{L_1 C_2 L_3}} \quad ; \quad T(s) = \frac{1}{s^3 + 2s^2 + 2s + 1}$$

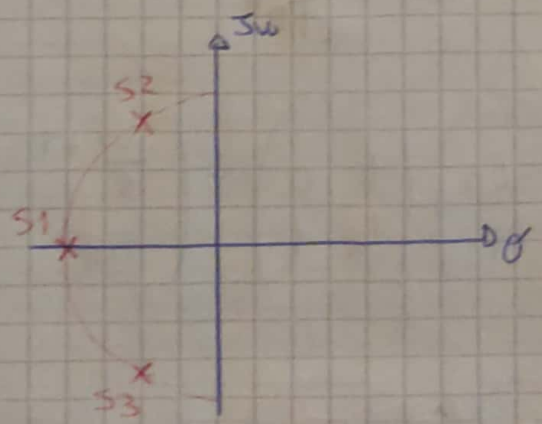
$\rightarrow$ PASA BAJOS DE ORDEN 3

Polos

$s_1 = -1$

$s_2 = -\frac{1}{2} + j\frac{\sqrt{3}}{2}$

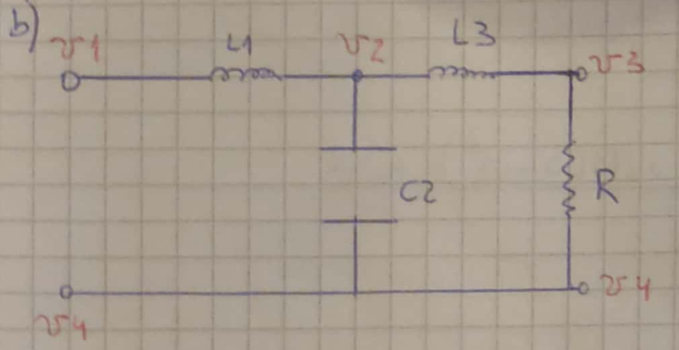
$s_3 = -\frac{1}{2} - j\frac{\sqrt{3}}{2}$



HOJA Nº

FECHA

b)



$$\underset{\sim}{Y} = \begin{pmatrix} \frac{1}{sL1} & -\frac{1}{sL1} & 0 & 0 \\ -\frac{1}{sL1} & \frac{1}{sL1} + sC2 + \frac{1}{sL3} & -\frac{1}{sL3} & -sC2 \\ 0 & -1/sL3 & \frac{1}{sL3} + \frac{1}{R} & -1/R \\ 0 & -sC2 & -1/R & 1/R + sC2 \end{pmatrix} \rightarrow \underset{\sim}{MAI}$$

c) $T(s) = \frac{V34}{V14}$; $m=1$; $n=4$; $i=3$; $j=4$

$$\underline{Y}_{34}^{14} = \underbrace{(-1)^{\overset{n+m+3+i}{\widetilde{12}}}}_{1} y_{34}^{14} = \begin{vmatrix} -1/sL1 & 1/sL1 + sC2 + 1/sL3 \\ 0 & -1/sL3 \end{vmatrix} = \underline{1/s^2 L1L3}$$

$$\underline{Y}_{14}^{14} = \underbrace{(-1)^{12}}_{1} y_{14}^{14} = \begin{vmatrix} 1/sL1 + sC2 + 1/sL3 & -1/sL3 \\ -1/sL3 & 1/sL3 + 1/R \end{vmatrix} =$$

$$= \frac{(L1 + L3 + s^2C2L1L3)}{sL1L3} \cdot \frac{(R + sL3)}{sL3R} - \frac{1}{s^2L3^2} = \frac{(L1+L3+s^2C2L1L3)(R+sL3) - L1R}{s^2 L1 L3^2 R} =$$

NOTA

$$= \frac{s^2 L_1C_2L_3R + s^3 L_1C_2L_3^2 + \cancel{L_1R} + L_3R + sL_1L_3 + sL_3^2 - \cancel{L_1R}}{s^2 L_3^2 L_1 R} =$$

$$= \frac{s^3 L_1C_2L_3^2 + s^2 L_1C_2L_3R + s(L_1L_3 + L_3^2) + L_3R}{s^2 L_3^2 L_1 R}$$

$$T(s) = Y_{-34}^{14} \Big/ Y_{-14}^{14} \rightarrow T(s) = \frac{\dfrac{1}{\cancel{s^2}\cancel{L_1}\cancel{L_3}}}{\dfrac{s^3 L_1C_2L_3^2 + s^2 L_1C_2L_3R + s(L_1L_3 + L_3^2) + L_3R}{\cancel{s^2} L_3^{\cancel{2}} \cancel{L_1}R}}$$

$$T(s) = \frac{RL_3}{s^3 L_1C_2L_3^2 + s^2 L_1C_2L_3R + s(L_1L_3 + L_3^2) + L_3R}$$

$$T(s) = \frac{\dfrac{R}{L_1C_2L_3}}{s^3 + s^2 \cdot \dfrac{R}{L_3} + \dfrac{L_1 + L_3}{L_1C_2L_3} s + \dfrac{R}{L_1C_2L_3}}$$

Escaneado con CamScanner