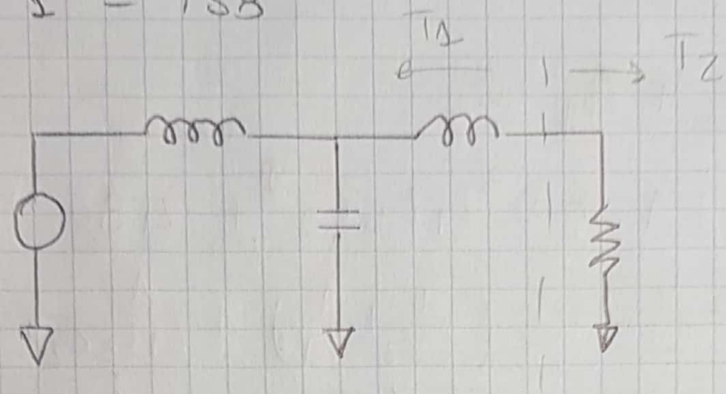
HOJA N°

FECHA

Parte 1 - TS8



Cascada de cuadripolos

$$\frac{V_0}{V_i} = T_1 \cdot T_2 \qquad T_1 = \begin{pmatrix} \frac{z_{11}}{z_{21}} & \frac{\Delta z}{z_{21}} \\ \frac{1}{z_{21}} & \frac{z_{22}}{z_{21}} \end{pmatrix}$$

$$z_2 = \begin{pmatrix} R & R \\ R & R \end{pmatrix} \qquad T_2 = \begin{pmatrix} 1 & 0 \\ \frac{1}{R} & 1 \end{pmatrix}$$

$$z_1 = \begin{pmatrix} sL_1 + \frac{1}{sC_2} & \frac{1}{sC_2} \\ \frac{1}{sC_2} & \frac{1}{sC_2} + sL_3 \end{pmatrix} \qquad A_1 = \frac{\frac{s^2 L_1 C_2 + 1}{\cancel{sC_2}}}{\frac{1}{\cancel{sC_2}}}$$

$$\Delta z_1 = \frac{(s^2 L_1 C_2 + 1)}{sC_2}\frac{(s^2 L_3 C_2 + 1)}{sC_2} - \frac{1}{s^2 C_2^2}$$

$$\Delta z_1 = \frac{s^4 L_1 L_3 C_2^2 + s^2 L_1 C_2 + s^2 L_3 C_2 + 1 - 1}{s^2 C_2^2}$$

$$\Delta z_1 = \frac{\cancel{s^4}^{2} L_1 L_3 \cancel{C_2^2} + \cancel{s^2} L_1 \cancel{C_2} + \cancel{s^2} L_3 \cancel{C_2}}{\cancel{s^2}\cancel{C_2^2}}$$

$$b_1 = \frac{s^2 L_1 L_3 \cancel{C_2} + \frac{L_1}{C_2} + \frac{L_3}{C_2}}{\frac{1}{sC_2}} = s^3 L_1 L_3 C_2^2 + L_1 s\cancel{C_2} + L_3 s\cancel{C_2}$$

NOTA

$$A_T = A_1 \cdot A_2 + B_1 \cdot C_2$$

$$A_T = s^2 L_1 C_2 + 1 + s^3 L_1 L_3 C_2 + L_1 s + L_3 s$$

$$A_T = s^3 + s^2 \underbrace{\frac{1}{L_3}}_{2} + s \underbrace{\left(\frac{1}{L_3 C_2} + \frac{1}{L_1 C_2} \right)}_{2} + \underbrace{\frac{1}{L_1 L_3 C_2}}_{1}$$

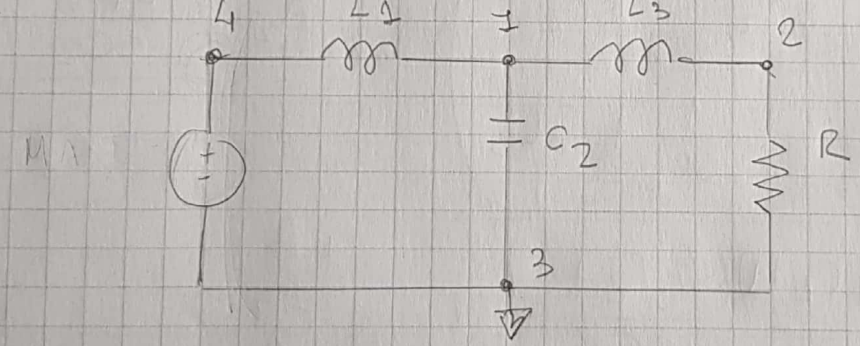
$$A_T = s^3 + 2s^2 + 2s + 1$$

$$A = \frac{V_i}{V_o} \longrightarrow \frac{V_o}{V_i} \longrightarrow \frac{1}{s^3 + 2s^2 + 2s + 1}$$

• EL EJERCICIO NOS DICE QUE HABRA POLOS EN LA CIRC. UNITARIA:

$$P_1 = -1 \; ; \; P_2 = \frac{-1 + \sqrt{3}\,i}{2} \; ; \; P_3 = \frac{-1 - \sqrt{3}\,i}{2}$$

Parte II - MAI



$$MAI = \begin{array}{c} \begin{pmatrix} \frac{1}{sL_1} + sC_2 + \frac{1}{sL_3} & -\frac{1}{sL_3} & -sC_2 & -\frac{1}{sL_1} \\ -\frac{1}{sL_3} & \frac{1}{R} + \frac{1}{sL_3} & -\frac{1}{R} & 0 \\ -sC_2 & -\frac{1}{R} & sC_2 + \frac{1}{R} & 0 \\ -\frac{1}{sL_1} & 0 & 0 & \frac{1}{sL_1} \end{pmatrix} \begin{matrix} 0 ✓ \\ 0 ✓ \\ 0 ✓ \\ 0 ✓ \end{matrix} \\ \begin{matrix} 0 ✓ & \quad 0 ✓ & \quad 0 ✓ & \quad 0 ✓ \end{matrix} \end{array}$$

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FECHA

$$A^{ij}_{mn} = \frac{V_{ij}}{V_{mn}} = sgn(m-n)\, sgn(i-j)\, \frac{Y^{mn}_{ij}}{Y^{m}_{mn}}$$

$$\frac{V_{23}}{V_{43}} = sgn(-1)\, sgn(4-3)\, \frac{Y^{43}_{23}}{Y^{43}_{43}}$$

y de aca pasamos al calculo computacional

$$Y_a = \frac{1}{sL_1} \qquad Y_b = sC_2$$

$$Y_c = \frac{1}{sL_3} \qquad G = \frac{1}{R}$$

$$\frac{\frac{1}{sL_1}\,\frac{1}{sL_3}}{\frac{\frac{1}{sL_1}}{R} + \frac{sC_2}{R} + \frac{\frac{1}{sL_3}}{R} + \frac{1}{sL_3}\,\frac{1}{sL_1} + sC_2\,\frac{1}{sL_3}} = \frac{V_o}{V_i}$$

$$\frac{\frac{1}{\cancel{s^2L_1L_3}}}{\underbrace{\frac{1}{sL_1} + \frac{1}{sL_3} + sC_2 + \frac{1}{s^2L_3L_1} + \frac{\cancel{s}C_2}{\cancel{s}L_3}}_{\frac{sL_3 + sL_1 + s^3C_2L_3L_1 + C_2L_1s^2}{\cancel{s^2L_1L_3}}}} = \frac{V_o}{V_i}$$

$$\frac{V_o}{V_i} = \frac{1}{s^3C_2L_3L_1 + C_2L_1s^2 + s(L_3+L_1) + 1}$$

$$\frac{V_o}{V_i} = \frac{1}{s^3 + 2s^2 + 2s + 1}$$

Igual que por cuadripolos

NOTA