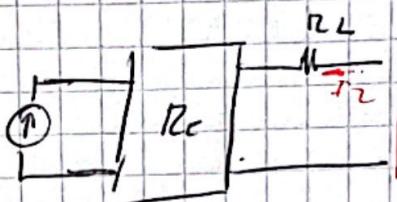


1)

$$\frac{-T_2}{I_1} = H \cdot \frac{s^2 + 5s + 4}{s^2 + 8s + 12}$$

$$Z_{21} = 64$$

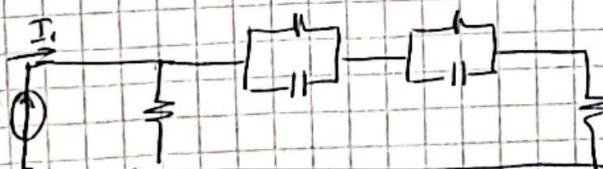
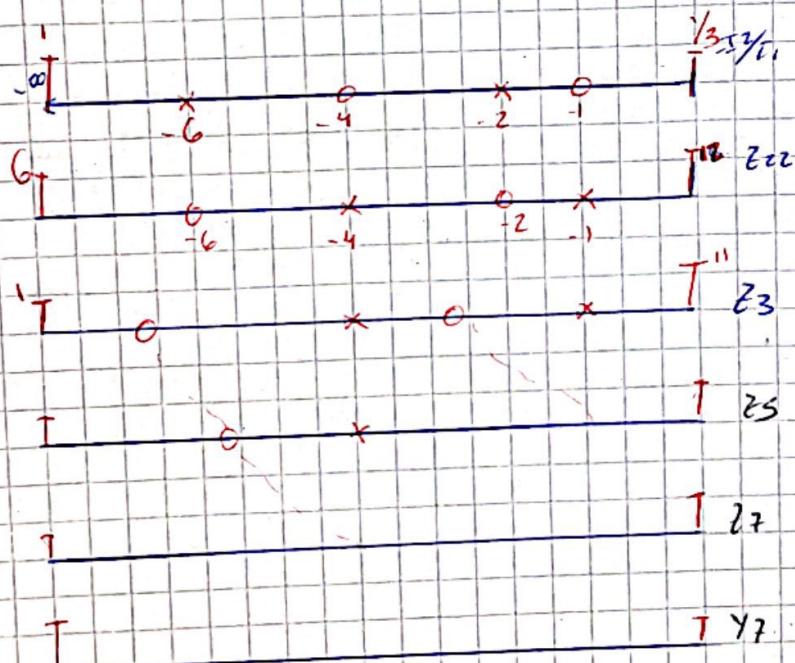
$$\frac{-T_2}{I_1} = \frac{Z_{21}}{Z_{22}}$$



$$\frac{-T_2}{I_1} = \frac{GH}{Z_{22}} = H \cdot \frac{s^2 + 5s + 4}{s^2 + 8s + 12}$$

$$Z_{22} = 6 \cdot \frac{(s+2) \cdot (s+6)}{(s+4) \cdot (s+1)}$$

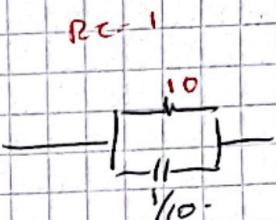
Síntesis Grafica



$$Z_{22} = \frac{6 \cdot (s^2 + 8s + 12)}{s^2 + 5s + 4}$$

$$Z_3 = Z_{22} - 1 = \frac{6s^2 + 48s + 72 - s^2 - 5s - 4}{s^2 + 5s + 4}$$

$$Z_3 = \frac{5s^2 + 43s + 68}{s^2 + 5s + 4} = \frac{5s^2 + 43s + 68}{(s+4)(s+1)}$$



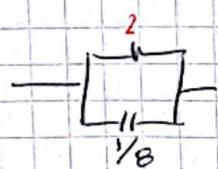
$$Z_S = Z_3 - \frac{k}{(s+1)}$$

$$k = \lim_{s \rightarrow -1} Z_3 \cdot (s+1) = \lim_{s \rightarrow -1} \frac{5s^2 + 43s + 68}{(s+4)(s+1)} \cdot (s+1) = \frac{30}{3} = 10.$$

$$Z_S = \frac{5s^2 + 43s + 68}{s^2 + 5s + 4} - \frac{10}{(s+1)} = \frac{5s^2 + 43s + 68 - 10s - 40}{(s+4)(s+1)}$$

$$Z_S = \frac{5s^2 + 33s + 28}{(s+4)(s+1)} - 5 \cancel{(s+1)} \cdot \cancel{(s+5,6)} = \frac{5s^2 + 33s + 28}{(s+4)(s+1)} \quad RC = \frac{1}{4} \quad R = 2$$

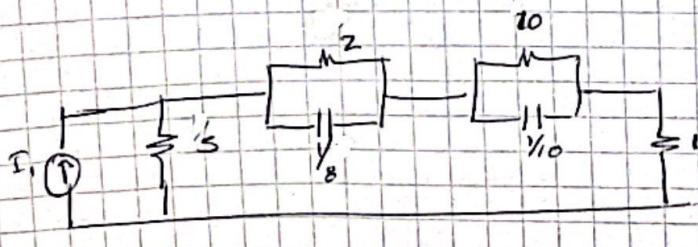
$$Z_7 = Z_S - \frac{k_1}{(s+4)}$$

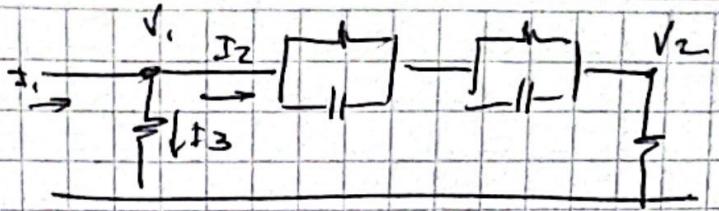


$$k_1 = \lim_{s \rightarrow -4} \frac{5(s + \frac{56}{10}) \cdot (s+1)}{s+4} = 8$$

$$Z_7 = \frac{5(s + \frac{56}{10})}{(s+4)} - \frac{8}{(s+4)} = \frac{5s + 28 - 8}{(s+4)} = \frac{5s + 20}{s+4} - \frac{5 \cdot \cancel{(s+4)}}{\cancel{(s+4)}} =$$

$$Y_7 = \frac{1}{5}$$



Verificación

$$I_1 = I_3 + I_2$$

$$I_3 = \frac{V_1}{5}$$

$$I_2 = \frac{V_1 - V_2}{\frac{10}{(S+1)} + \frac{8}{S+4}}$$

$$\frac{V_2}{I} = I_2$$

$$I_2 \left(\frac{10 \cdot S + 40 + 8S + 8}{(S+1) \cdot (S+4)} + I_2 \right) = +V_1$$

$$I_1 = I_2 + \frac{I_2}{5} + \frac{I_2}{5} \left(\frac{18S + 48}{S^2 + 5S + 4} \right)$$

$$I_1 = I_2 \cdot \left(1 + \frac{1}{5} + \frac{18S + 48}{5(S^2 + 5S + 4)} \right)$$

$$\frac{I_1}{I_2} = \frac{5(S^2 + 5S + 4) + S^2 + 5S + 4 + 18S + 48}{5(S^2 + 5S + 4)}$$

$$\frac{I_1}{I_2} = \frac{6S^2 + 48S + 72}{5(S^2 + 5S + 4)} = \frac{6 \cdot (S^2 + 8S + 12)}{5 \cdot (S^2 + 5S + 4)}$$

$$\frac{I_2}{I_1} = \frac{5(S^2 + 5S + 4)}{6 \cdot (S^2 + 8S + 12)}$$

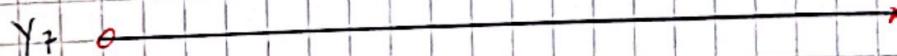
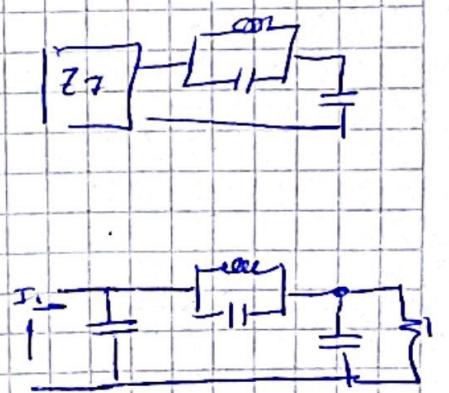
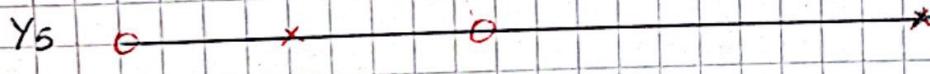
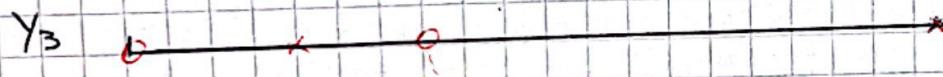
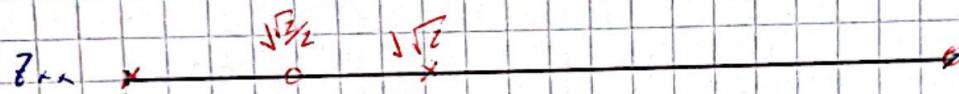
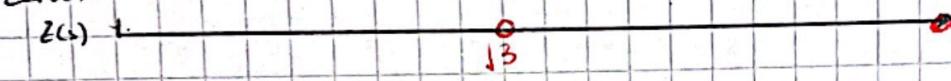
$$\boxed{\frac{5}{6} = 4}$$

$$Z(s) = \frac{V_2}{I_s} = \frac{s^2 + 9}{s^3 + 2s^2 + 2s + 1}$$

$$E(s) = \frac{V_2}{I_s} = \frac{\frac{s^2 + 9}{s^3 + 2s}}{1 + \frac{2s^2 + 1}{s^3 + 2s}} \rightarrow Z_{eq}$$

Síntesis Gráfica

Ceros:



$$Y_3 = \frac{1}{Z_{nn}} = \frac{s \cdot (s^2 + 2)}{2 \cdot (s^2 + \frac{1}{2})}$$

$$Y_S = Y_3 - K \cdot S \Big|_{s^2 = -9}$$

$$K = \frac{1}{s^2 + 9} \cdot \frac{Y_3}{S} = \frac{1}{s^2 + 9} \cdot \frac{s \cdot (s^2 + 2)}{2 \cdot (s^2 + \frac{1}{2})} = \frac{1}{s^2 + 9} \cdot \frac{1}{2} = \frac{1}{17}$$

COP de v1/or $\frac{1}{17}$

$$Y_S = \frac{s^3 + 2s}{2 \cdot (s^2 + \frac{1}{2})} = \frac{1}{17} \cdot s = \frac{17s^3 + 34s - 14s^3 - 7s}{34 \cdot (s^2 + \frac{1}{2})} = \frac{3s^3 + 27s}{34 \cdot (s^2 + \frac{1}{2})}$$

$$Y_S = \frac{3s \cdot (s^2 + 9)}{34 \cdot (s^2 + \frac{1}{2})} =$$

$$Z_S = \frac{34 \cdot (s^2 + \frac{1}{2})}{3s \cdot (s^2 + 9)} =$$

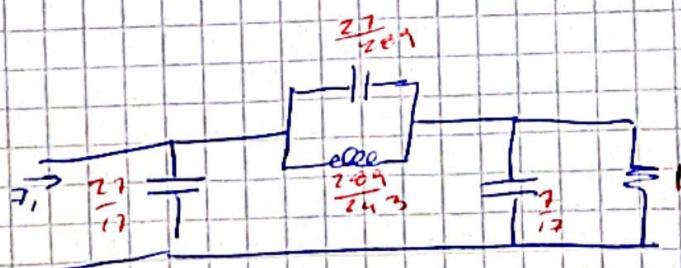
$$Z_7 = Z_S - \frac{K_2 S}{s^2 + 9}$$

$$K_2 = \frac{1}{s^2 + 9} \cdot Z_S \frac{(s^2 + 9)}{S} = \frac{34 \cdot (s^2 + \frac{1}{2})}{3s \cdot (s^2 + 9)} \cdot \frac{(s^2 + 9)}{S} = \frac{-289}{-127}$$

$$Z_7 = \frac{34 \cdot (s^2 + \frac{1}{2})}{3s \cdot (s^2 + 9)} - \frac{289}{-127} \cdot \frac{S}{(s^2 + 9)} = \frac{306s^2 + 153 - 289s^2}{27s \cdot (s^2 + 9)} = \frac{17s^2 + 153}{27s \cdot (s^2 + 9)}$$

$$Z_7 = \frac{17 \cdot (s^2 + 9)}{27s \cdot (s^2 + 9)} = \frac{-17}{27s}$$

$$Y_7 = \frac{27}{17} S$$



NOTA

En la expresión si, $s \rightarrow 0$

$$Z = \frac{1}{q} \quad K = \frac{1}{q}$$

$$Z(s) = \frac{V_2}{I_1} = \frac{s^2 + 9}{87(s+1)(s^2 + s + 1)}$$

Resol

Si, $s \rightarrow 0$.



Si, $s \rightarrow \infty$

$$\frac{V_2}{I_1} = \frac{1}{s} = 0.$$



verificación:

$$T_{Euler} = \frac{27s}{17} \quad \left[\begin{array}{|c|c|c|} \hline 1 & 0 & 1 \\ \hline 1 & 0 & 0 \\ \hline \end{array} \right] \quad \frac{289s}{27(s^2+9)} \quad \left[\begin{array}{|c|c|c|} \hline 1 & 0 & 1 \\ \hline 1 & 0 & 0 \\ \hline \end{array} \right] \quad \frac{75+1}{17} \quad \left[\begin{array}{|c|c|} \hline 1 & 0 \\ \hline \end{array} \right]$$

$$Z = \frac{V_2}{I_1} = \frac{1}{C}$$

$$T_{exacto} = \frac{27s}{17} \quad \left[\begin{array}{|c|c|c|} \hline 1 & \frac{289s}{27(s^2+9)} & 1 \\ \hline 1 & \frac{17s^2+1}{(s^2+9)} & 0 \\ \hline \end{array} \right] \quad \left[\begin{array}{|c|c|} \hline 1 & 0 \\ \hline \end{array} \right]$$

$$C = \frac{27s}{17} + \left(\frac{17s^2+1}{s^2+9} \right) \left(\frac{75+17}{17} \right)$$

$$C = \frac{27s}{17} + \left(\frac{17s^2+s^2+9}{s^2+9} \right) \left(\frac{75+17}{17} \right)$$

$$C = \frac{1}{17} \left(27s + \left(\frac{18s^2+9}{s^2+9} + \left(\frac{75+17}{17} \right) \right) \right)$$

$$C = \frac{1}{17} \left(27s + \frac{126s^3 + 306s^2 + 63s + 153}{s^2 + 9} \right)$$

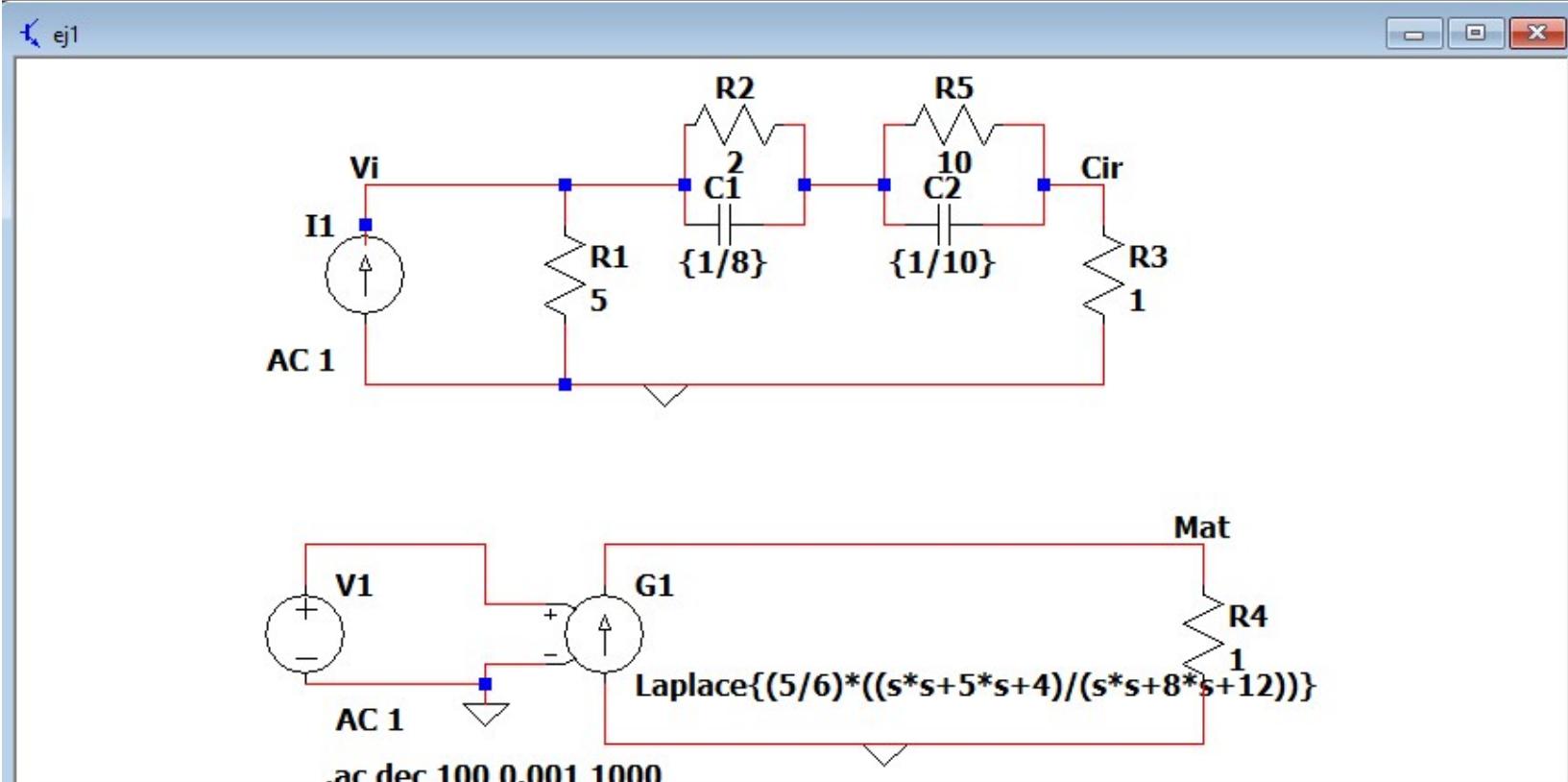
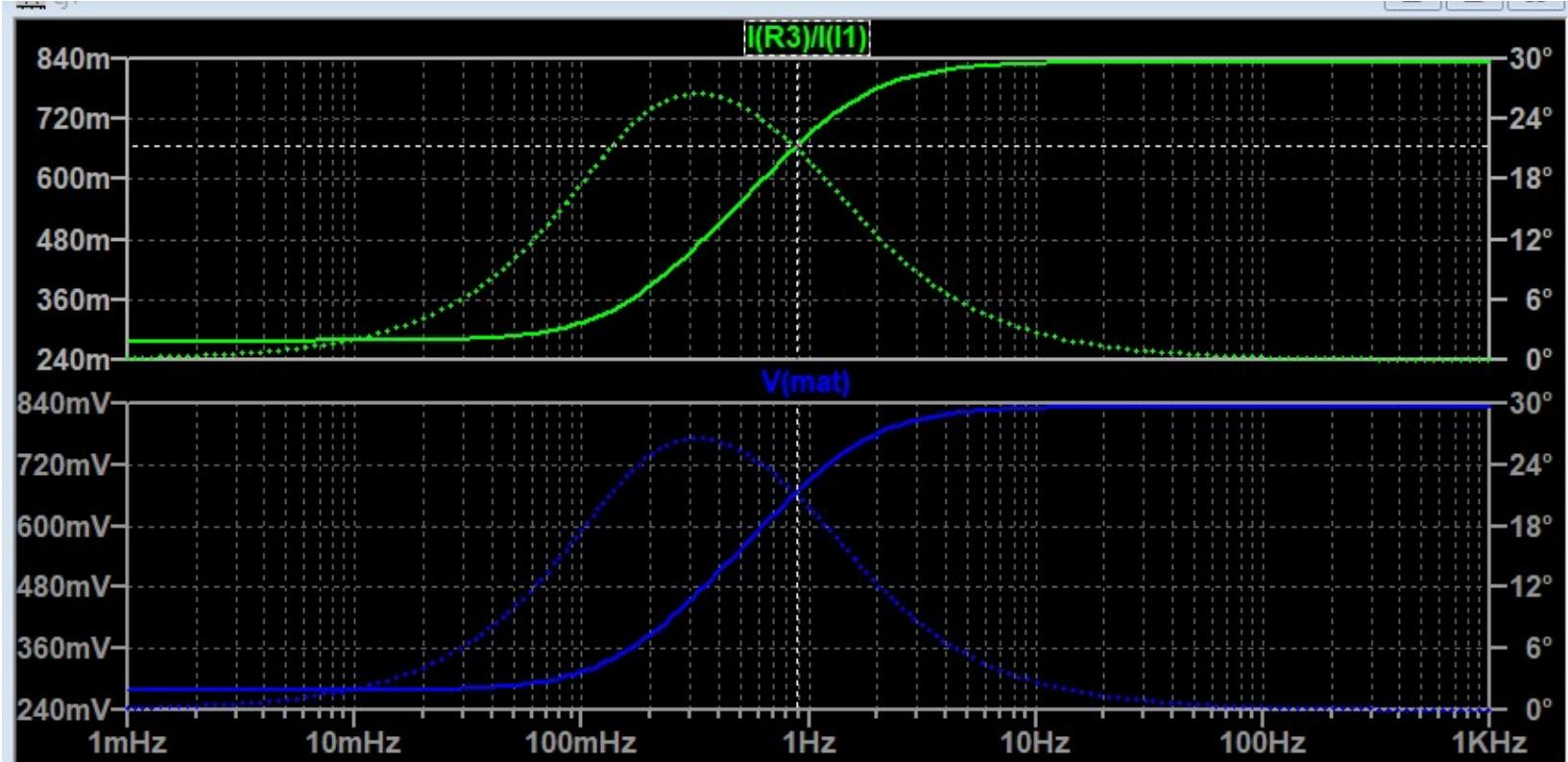
$$C = \frac{1}{17} \left(\frac{27s^3 + 243s + 126s^3 + 306s^2 + 63s + 153}{s^2 + 9} \right)$$

$$C = \frac{1}{17} \left(\frac{153s^3 + 306s^2 + 306s + 153}{s^2 + 9} \right)$$

$$C = \frac{9s^3 + 18s^2 + 18s + 9}{s^2 + 9}$$

$$C = 9 \cdot \frac{(s^3 + 2s^2 + 2s + 1)}{s^2 + 9}$$

$$\frac{V_2}{I_1} = \frac{1}{C} = \frac{s^2 + 9}{9 \cdot (s^3 + 2s^2 + 2s + 1)}$$
verifica





ej2

