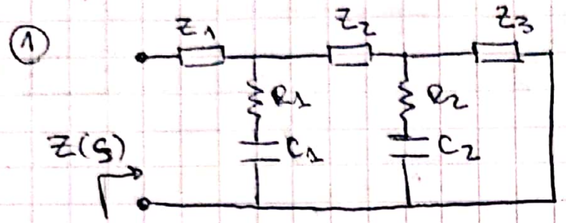
TS10 - FUNCIONES de EXCITACIÓN DISIPATIVAS

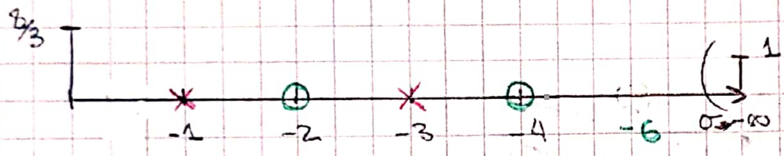
(1)



$R_1 C_1 = \frac{1}{6}$ → $\omega_1 = 6$

$R_2 C_2 = \frac{2}{7}$ → $\omega_2 = \frac{7}{2}$

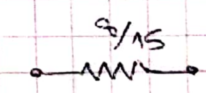
$$Z(s) = \frac{(s^2+6s+8)}{s^2+4s+3} = \frac{(s+2)(s+4)}{(s+1)(s+3)}$$

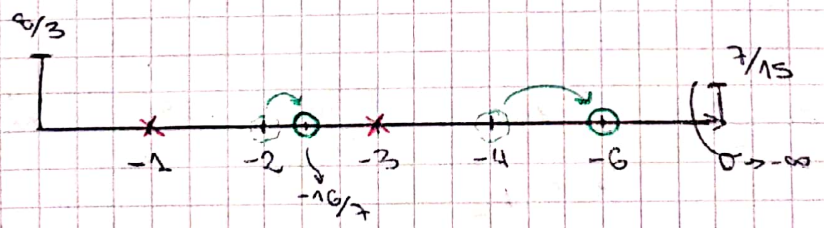


• Remoción parcial para lograr el cero en -1/6 :

$$Z_2(s) = Z(s)\Big|_{s=-6} - R_0' = 0$$

$$Z(-6) = \frac{(-6+2)(-6+4)}{(-6+1)(-6+3)} = \frac{(-4)(-2)}{(-5)(-3)} = \left[\frac{8}{15} = k_0'\right]$$



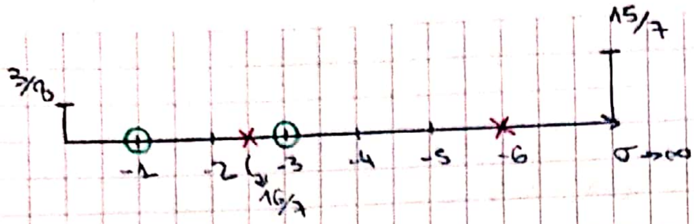


$$Z_2(s) = \frac{s^2+6s+8}{s^2+4s+3} - 8/15\, s^2 - 32/15\, s - 8/5 = \frac{\left(7/15\, s^2 + \frac{58}{15}s + \frac{32}{5}\right)}{(s+1)(s+3)}$$

$$Z_2(s) = \frac{(s+16/7)(s+6)}{(s+1)(s+3)}$$

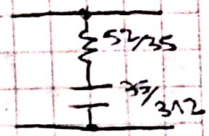
• Ahora invierto p/ remover en (-6)

Escaneado con CamScanner



$$Y_2(s) = \frac{(s+1)(s+3)}{(s+16/7)(s+6)}$$

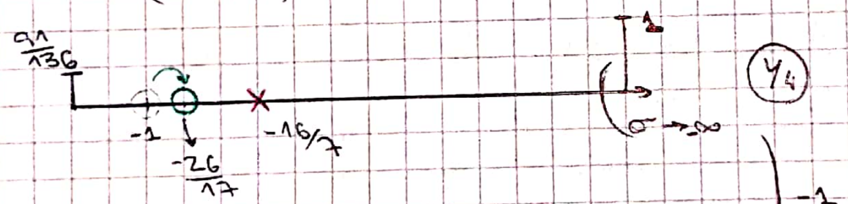
$$Y_4 = Y_2\Big| - \frac{s k_1}{(s+6)} \quad \Big\} \quad Y_3 = \frac{1}{\frac{1}{k_1}+\frac{1}{s\frac{k_1}{6}}} = \frac{1}{\frac{52}{35}+\frac{1}{s\cdot\frac{35}{312}}}$$

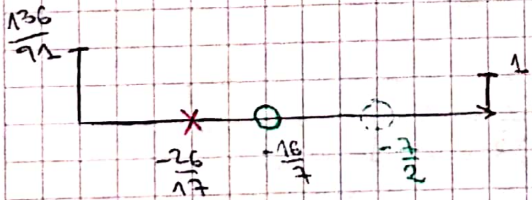


$$k_1 = \lim_{s\to -6} \frac{\cancel{(s+6)}}{s}\cdot\frac{(s+1)(s+3)}{\cancel{(s+6)}(s+16/7)} \Rightarrow k_1 = \frac{15}{156/7} = \frac{35}{52}$$

$$Y_4 = \frac{s^2+4s+3}{\frac{7}{15}s^2+\frac{58}{15}s+\frac{32}{5}} - \frac{s\frac{35}{52}}{(s+6)} = \frac{s^2+4s+3 - s^2\frac{35}{52} - \frac{20}{13}s}{(s+16/7)(s+6)}$$

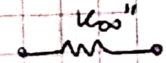
$$Y_4 = \frac{\frac{17}{52}s^2+\frac{32}{13}s+3}{(s+16/7)(s+6)} = \frac{(s+26/17)\cancel{(s+6)}}{(s+16/7)\cancel{(s+6)}}$$



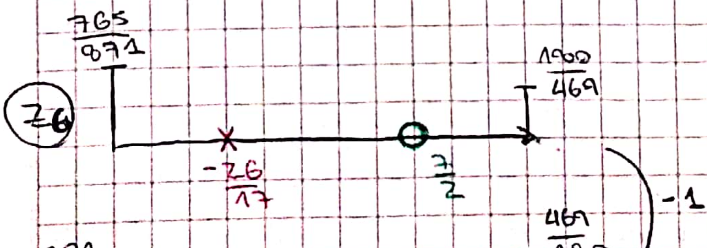


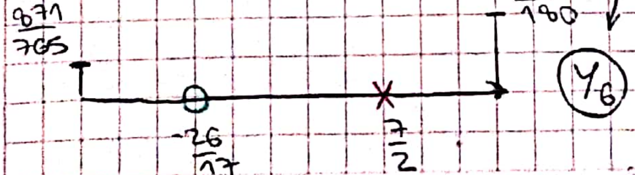
$|\omega_z| = \frac{7}{2}$ Z4 } Remuevo parcialmente k_∞ p/ lograr el cero en ω_z

$$Z_6 = Z_4\Big|_{s=-\frac{7}{2}} - k_\infty'' = 0 \to \frac{s+16/7}{s+26/17}\Big|_{s=-7/2} = k_\infty'' = \frac{-17/14}{-67/34} = \frac{289}{469}$$



$$Z_6 = \frac{s+\frac{16}{7}-\frac{289}{469}s-\frac{442}{469}}{(s+26/17)} = \frac{\frac{180}{469}s+\frac{90}{67}}{(s+26/17)} = \frac{(s+7/2)}{(s+26/17)}\cdot\overbrace{\frac{180}{469}}^{K}$$

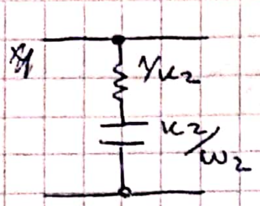




$$Y_8 = Y_6 - \frac{s k_2}{s+\frac{7}{2}}$$

$$k_2 = \lim_{s\to -\frac{7}{2}} \frac{\cancel{(s+7/2)}}{s}\cdot\frac{(s+26/17)}{\cancel{(s+7/2)}}\cdot\frac{469}{180}$$

$$k_2 = \frac{67}{119}\cdot\frac{469}{180} = \frac{31423}{21420}$$



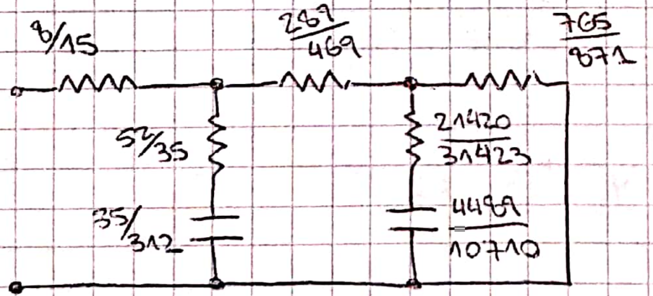
$$Y_a = \frac{(s+26/17)}{(s+7/2)}\cdot\frac{469}{190} - \frac{s\,k_2}{(s+7/2)}$$

$$Y_a = \frac{\frac{469}{190}\cdot s + 3{,}98497 - s\,1{,}4669}{s+7/2}$$

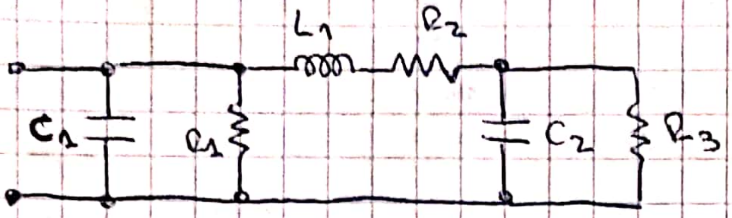
$$Y_a = \frac{\frac{871}{765}\,s + \frac{12194}{3060}}{s+\frac{7}{2}} = \frac{871}{765}\cdot\frac{\cancel{s+7/2}}{\cancel{s+7/2}}$$

$$Y_a = \frac{871}{765}$$

Red Sintetizada



Ejercicio (2)



$$Z(s) = \frac{(s^2+s+1)}{(s^2+2s+5)(s+1)} =$$

- Las singularidades poseen parte real e imaginaria por lo que no puedo usar el método gráfico.

remuevo en derivación

$$C_1 = \lim_{s\to\infty} \frac{Y(s)}{s} = \frac{s^3+3s^2+7s+5}{s^3+s^2+s} = 1$$

 1

$Y(0) > Y(\infty)$

$$Y_2 = \frac{\cancel{s^3} + \overset{2}{\cancel{3}}s^2 + \overset{6}{\cancel{7}}s + 5 - \cancel{s^3} - \cancel{s^2} - \cancel{s}}{s^2+s+1} = \frac{2s^2+6s+5}{s^2+s+1} = Y_2$$

- Analizo extremos: $Y(0) = 5 > Y(\infty) = 2$

↳ remuevo R en derivación (K_∞)

$$Y_4 = Y_2 - K_\infty \quad \text{con} \quad K_\infty = \lim_{s\to\infty} Y_2 = \boxed{2}$$

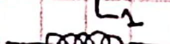
 2

$$Y_4 = \frac{2\cancel{s^2} + \overset{4}{\cancel{6}}s + \overset{3}{\cancel{5}} - \cancel{2s^2} - \cancel{2s} - \cancel{2}}{s^2+s+1} = \frac{4s+3}{s^2+s+1} = Y_4$$

- Ahora debo remover en serie: $Z_4 = \frac{1}{Y_4} = \frac{s^2+s+1}{4s+3}$

Remuevo un inductor (K_∞)

$$Z_6 = Z_4 - sL_1 \longrightarrow L_1 = \lim_{s\to\infty} \frac{s^2+s+1}{4s^2+3s} = \frac{1}{4} = L_1$$

L_1


$$Z_6 = \frac{s^2+s+1}{4s+3} - s\cdot\frac{1}{4} = \frac{\cancel{s^2}+s+1-\cancel{s^2}-s\,3/4}{4s+3} = \frac{s\,1/4+1}{4s+3}$$

- Analizo extremos: $Z(0) = 1/3 > Z(\infty) = 1/16$

  ↳ remuevo K_∞

$$Z_8 = Z_6 - K_\infty \quad \text{con} \quad K_\infty = \lim_{s\to\infty} \frac{s\,1/4+1}{4s+3} = \boxed{\frac{1}{16}}$$

- Ahora vuelvo a las admitancias para remover

$$\cancel{Y_{8}}\; Z_8 = \frac{s\,1/4+1}{4s+3} - \frac{1}{16} = \frac{\cancel{s\,1/4}+1-\cancel{s\,1/4}-3/16}{4s+3} = \frac{13/16}{4s+3}$$

$$Y_8 = \frac{4s+3}{13}\cdot 16 \;\Big\}\; \text{remuevo } s\cdot K_\infty$$

$$C_\infty = \lim_{s\to\infty} \frac{4s+3}{13s}\cdot 16 = \frac{4}{13}\cdot 16 = \frac{64}{13}$$

$$Y_{10} = \frac{4s+3}{13/16} - s\cdot\frac{64}{13} = \frac{\cancel{4s}+3-\cancel{4s}}{13/16} = \frac{48}{13}$$

Red Sintetizada: