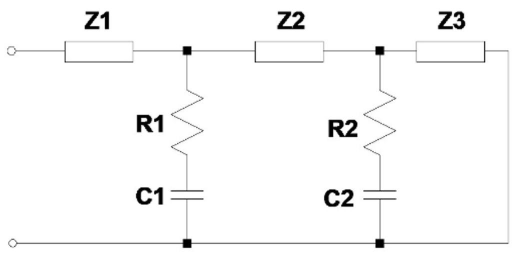
ES11

domingo, 25 de septiembre de 2022 17:01

1) Encuentre el valor de los componentes del siguiente circuito:



Sabiendo que está caracterizado por la siguiente función de excitación y constantes de tiempo:

$$R1.C1 = \frac{1}{6}$$

$$Y_3 = \frac{sK_3}{s+\sigma_3} = \frac{1}{\frac{\cancel{s}}{\cancel{s}K_3} + \frac{\sigma_3}{sK_3}} \Big] Z$$

$$R_1 = \frac{1}{K_3} \qquad C_1 = K_3/\sigma_3$$

$$R_1 . C_1 = \frac{1}{\cancel{K_3}} \cdot \frac{\cancel{K_3}}{\sigma_3} = \frac{1}{6}$$

$$\boxed{\sigma_3 = 6}$$

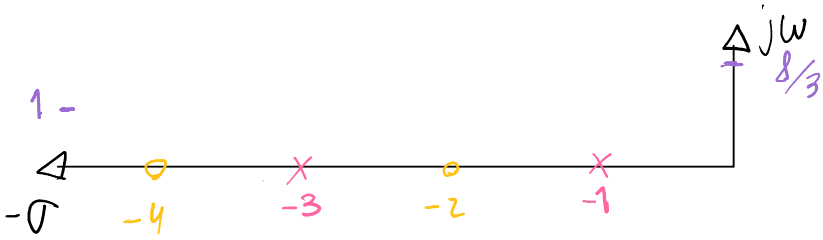
$$R2.C2 = \frac{2}{7} \rightarrow \sigma_7 = \frac{7}{2}$$

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

$$Z_{(s)} = \frac{(s+2)(s+4)}{(s+1)(s+3)}$$

$$\rightarrow \lim_{s \to \infty} Z_{(s)} = 1$$

$$\rightarrow \lim_{s \to 0} Z_{(s)} = \frac{8}{3}$$



$Z(s)$

La rama en derivación me obliga a remover parcialmente. $\rightarrow \sigma_3 = -6$

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

$$K'_\infty = Z(-6) = \frac{(-6+2)(-6+4)}{(-6+1)(-6+3)} = \frac{8}{15} = Z1$$

$$K_\infty' = Z(-6) = \frac{(-6+2)(-6+4)}{(-6+1)(-6+3)} = \frac{8}{15} = Z1$$

$$Z_2(s) = \frac{(s+2)(s+4)}{(s+1)(s+3)} - \frac{8}{15} = \frac{(s+2)(s+4).15 - 8.(s+1)(s+3)}{(s+1)(s+3)15}$$

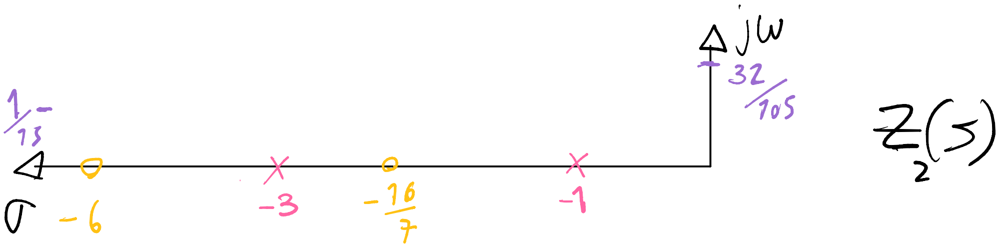
$$Z_2(s) = \frac{15s^2 + 90s + 120 - 8s^2 - 32s - 24}{(s+1)(s+3)15}$$

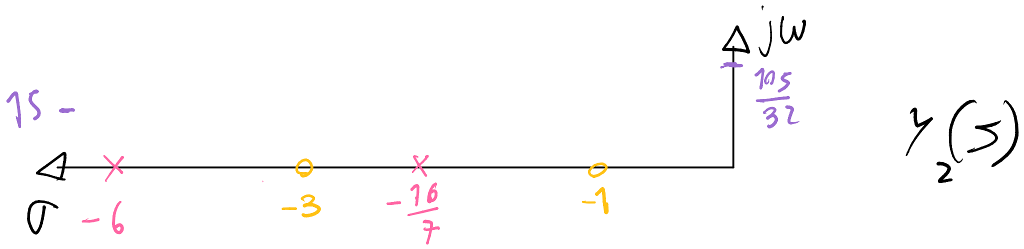
$$Z_2(s) = \frac{7s^2 + 58s + 96}{(s+1)(s+3)15} = \frac{(s+\frac{16}{7})(s+6)}{(s+1)(s+3).15}$$

Removí Bien

$\rightarrow \infty \rightarrow \frac{1}{15}$

$\rightarrow 0 \rightarrow 32/105$

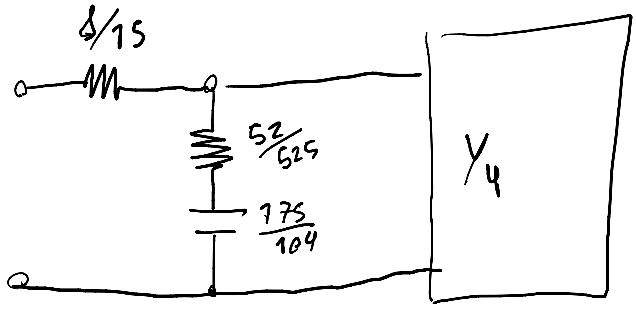




→ Remoción Total Polo $\sigma = -6$

$$\rightarrow K_3 = \lim_{s \to -6} \frac{(s-6)}{s} \cdot Y_2(s) = \frac{(s+1)(s+3).15}{s(s+\frac{16}{7})} = \frac{525}{52}$$

→



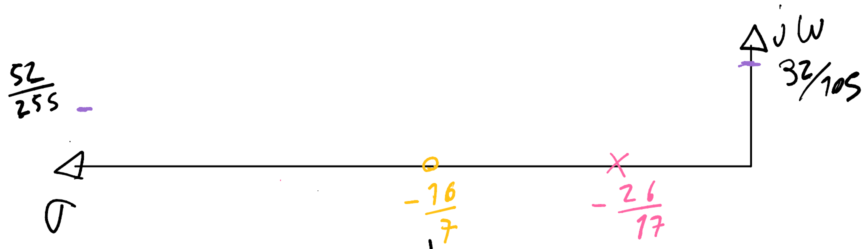
$$Y_4 = Y_2 - Y_3 = \frac{(s+1)(s+3)15}{(s+6)\left(s+\frac{16}{7}\right)} - \frac{s.\frac{525}{52}}{(s+6)}$$

$$Y_4 = \frac{(s+1)(s+3)15 - s.\frac{525}{52}.\left(s+\frac{16}{7}\right)}{(s+6)\left(s+\frac{16}{7}\right)}$$

$$Y_4 = \frac{15s^2 + 60s + 45 - s^2\frac{525}{52} - s\,\frac{300}{13}}{(s+6)\left(s+\frac{16}{7}\right)}$$

$$Y_4 = \frac{s^2\,255/52 + s\,\frac{480}{13} + 45}{(s+6)\left(s+\frac{16}{7}\right)} = \frac{\left(s+\frac{26}{17}\right)\cancel{(s+6)}.\frac{255}{52}}{\cancel{(s+6)}\left(s+16/7\right)}$$

$$Z_4 = \frac{\left(s+16/7\right)}{\left(s+\frac{26}{17}\right).\frac{255}{52}} \quad \begin{cases} \infty \to \frac{52}{255} \\ 0 \to \frac{32}{105} \end{cases}$$



$Z_4(s)$

La tengo que mover A $\frac{7}{2} = \cancel{0}7$

$$Z_4(s) - K'_{\infty_2} = Z_6(s) = 0 \Big|_{s=\frac{7}{2}}$$

$$K'_{\infty_2} = Z_4(s)\Big|_{s=7/2} = \frac{884}{7035}$$

Si Remuevo K_{∞_2}:

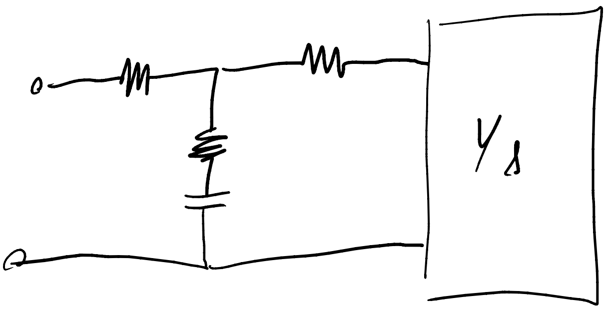
$$Z_4 - \frac{884}{7035} = Z_6$$

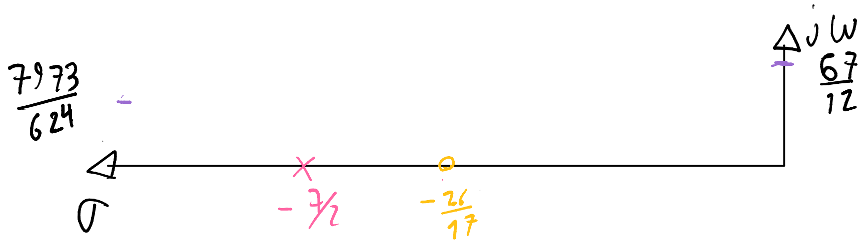
$(s+16/7)$ $\quad$ 884 $\quad$ $7035\,s + 16080 - 4335\,s - 6630$

$Z_4 - 7035 = Z_6$

$$Z_6 = \frac{(s+16/7)}{\frac{255}{52}\left(s+\frac{26}{17}\right)} - \frac{884}{7035} = \frac{7035\,s + 16080 - 4335\,s - 6630}{7035\left(s+\frac{26}{17}\right)\cdot\frac{255}{52}}$$

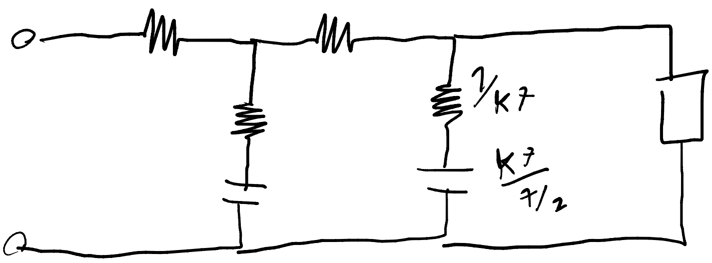
$$Z_6 = \frac{2700\,s + 9450}{7035\left(s+\frac{26}{17}\right)\frac{255}{52}} = \frac{624\cdot\left(s+7/2\right)}{7973\cdot\left(s+\frac{26}{17}\right)}$$





$Y_6(s)$

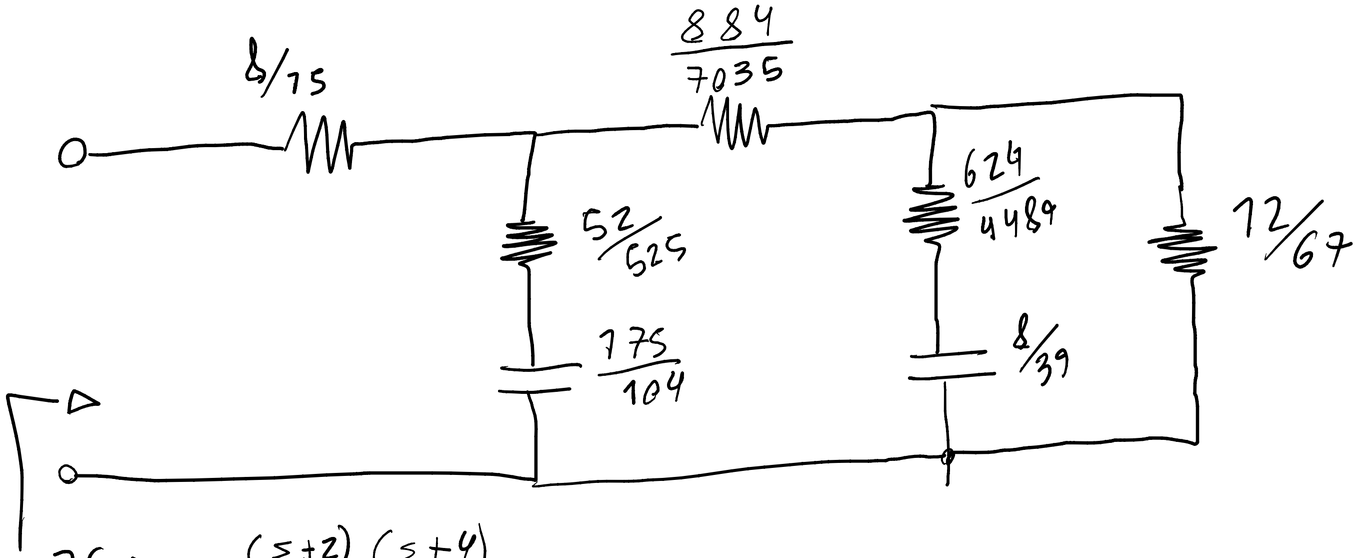
$$K_7 = \lim_{s\to -\frac{7}{2}} \frac{(s+7/2)}{s}\cdot Y_6(s) = \frac{7973\left(s+26/17\right)}{624\cdot s} = \boxed{\frac{4489}{624}}$$



$$\frac{7973\cdot\left(s+\frac{26}{17}\right)}{624\cdot\left(s+7/2\right)} = Y_6(s)$$

$$Y_8 = Y_6 - \frac{s K_7}{(s+7/2)} = \frac{7973\,s + 12194 - s\,4489}{624\,(s+7/2)}$$

$$Y_8 = \frac{3484\,s + 12194}{624\,(s+7/2)} = \frac{3484\,\cancel{(s+7/2)}}{624\,\cancel{(s+7/2)}} = \frac{67}{12}$$



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