HOJA Nº 1

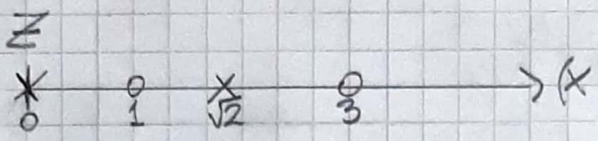
FECHA

TS 9

1)

a) Foster serie

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



$$Z(s) = \frac{s^4+4s^2+3}{s^3+2s} = \frac{k_0}{s} + k_\infty s + \frac{2k_1 s}{s^2+\omega_1^2}$$

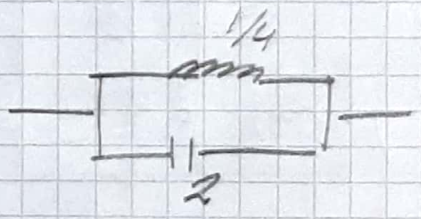
$$2k_1 = \lim_{s^2\to -2} Z(s)\frac{(s^2+2)}{s} = \frac{(-2+3)(-2+1)}{-2} = \frac{1}{2}$$

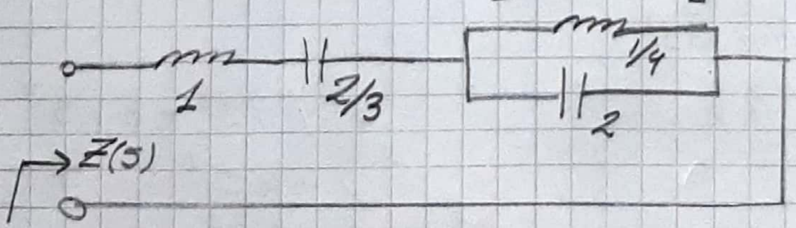
$$k_0 = \lim_{s\to 0} Z(s)\, s = \frac{(0+3)(0+1)}{(0+2)} = \frac{3}{2}$$

$$k_\infty = \lim_{s\to\infty} \frac{Z(s)}{s} = \frac{s^4+4s^2+3}{s^4+2s^2} = 1$$

$$Z = \frac{2k_1 s}{s^2+\omega_1^2} = \frac{1}{\underbrace{\frac{s}{2k_1}}_{C} + \underbrace{\frac{1}{\frac{2k_1}{\omega_1^2}\, s}}_{L}}$$

Y

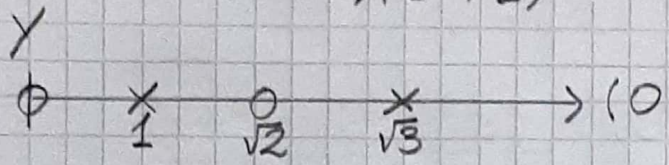




NOTA

b) Foster paralelo

$$Y(s) = \frac{s(s^2+2)}{(s^2+3)(s^2+1)}$$



$$Y(s) = \frac{2k_1 s}{s^2+\omega_1^2} + \frac{2k_2 s}{s^2+\omega_2^2}$$

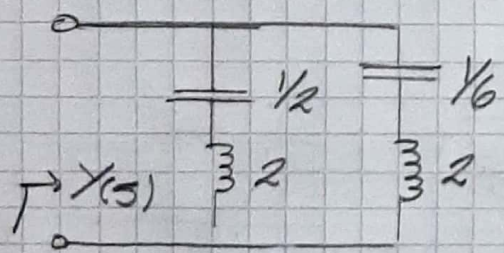
$$2k_1 = \lim_{s^2\to -1} \frac{(s^2+1)}{s} Z(s) = \frac{(-1+2)}{(-1+3)} = \frac{1}{2}$$

$$2k_2 = \lim_{s^2\to -3} \frac{(s^2+3)}{s} Z(s) = \frac{(-3+2)}{(-3+1)} = \frac{1}{2}$$

$$Y_1(s) = \frac{2ks}{s^2+\omega^2} = \frac{1}{Z\left(\underbrace{\frac{s}{2k}}_{L} + \frac{1}{\underbrace{\frac{2ks}{\omega_1^2}}_{C}}\right)}$$

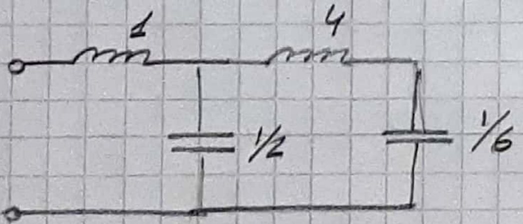
$L = 1/2k_1$

$C = \frac{2k}{\omega}$



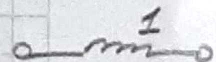
b) Saco polos en infinitos

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



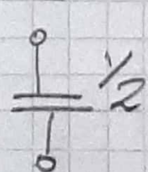
$s^4+4s^2+3 \;\lfloor\; s^3+2s$

$-\;0+2s^2 \qquad s$



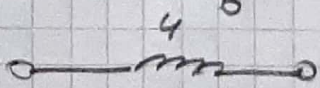
$s^3+2s \;\lfloor\; 2s^2+3$

$-\;0+\frac{3}{2}s \qquad \frac{1}{2}s$



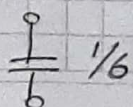
$2s^2+3 \;\lfloor\; \frac{3}{2}s$

$-\;0 \qquad 4s$

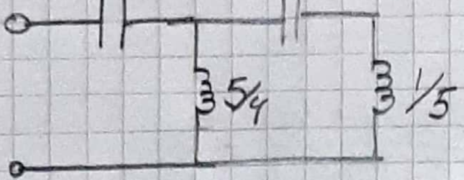


$\frac{3}{2}s \;\lfloor\; 3$

$0 \qquad \frac{1}{6}s$

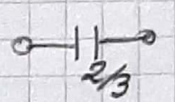


Saco polos en cero



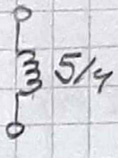
$3+4s^2+s^4 \,|\, 2s+s^3$

$-\ \frac{3}{2}s^2 \qquad \frac{3}{2}\frac{1}{s}$



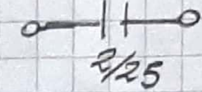
$2s+s^3 \,|\, \frac{5}{2}s^2+s^4$

$-\ \frac{4}{5}s^3 \qquad \frac{4}{5}\frac{1}{s}$



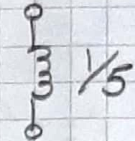
$\frac{5}{2}s^2+s^4 \,|\, \frac{1}{5}s^3$

$\frac{25}{2}\frac{1}{s}$

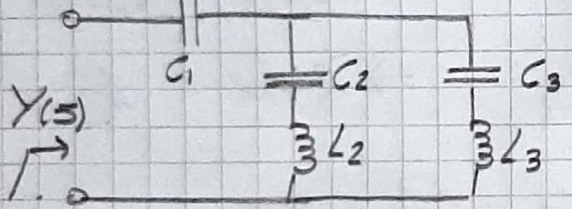


$\frac{1}{5}s^3 \,|\, s^4$

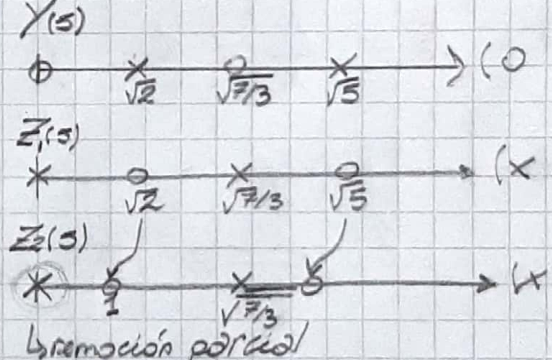
$0 \qquad \frac{1}{5}\frac{1}{s}$



2) L_2 y C_2 resuenan @ $w = 1\ r/s$



$$Y(s) = \frac{3s(s^2+7/3)}{(s^2+2)(s^2+5)}$$



$$\frac{1}{Y} - Z_1 = Z_2$$

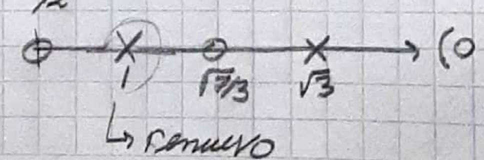
$$Z - Z_1 \Big|_{s=j1} = 0$$

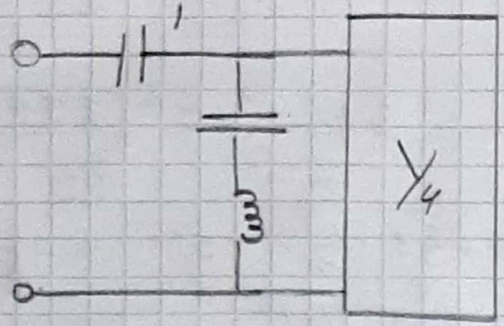
$$k_0 = Z\,s \Big|_{s=j1} = \frac{(s^2+2)(s^2+5)}{3\cancel{s}(s^2+7/3)}\cancel{s} = \frac{(-1+2)(-1+5)}{3(-1+7/3)} = 1$$

$$Z_2 = Z - 1/s = \frac{s^4+7s^2+10}{3s(s^2+7/3)} - 1/s$$

$$Z_2 = \frac{s^4+7s^2+10-3s^2-7}{3s(s^2+7/3)} = \frac{s^4+4s^2+3}{3s(s^2+7/3)}$$

$$Z_2 = \frac{(s^2+1)(s^2+3)}{3s(s^2+7/3)}$$





$$Y_4 = \frac{1}{Z_2} - \frac{2K_1 s}{s^2+1}$$

$$2K_1 = \lim_{s^2 \to -1} \frac{1}{Z_2} \frac{s}{(s^2+1)} = \frac{3(-1+7/3)}{(-1+3)} = 2$$

$$Y_2 = \frac{2K_1 s}{s^2+1} = \frac{1}{Z\left(\underbrace{\frac{s}{2K_1}}_{L} + \underbrace{\frac{1}{2K_1 s}}_{\frac{1}{C}}\right)}$$

$$L_2 = \frac{1}{2K_1} = \frac{1}{2}$$

$$C_2 = \frac{2K_1}{1} = 2$$

$$Y_4 = \frac{3s(s^2+7/3)}{(s^2+1)(s^2+3)} - \frac{2s}{(s^2+1)} = \frac{3s(s^2+7/3) - 2s(s^2+3)}{(s^2+1)(s^2+3)}$$

$$Y_4 = \frac{s\,\cancel{(s^2+1)}}{\cancel{(s^2+1)}(s^2+3)} = \frac{s}{s^2+3} \Rightarrow 2K_2 = 1$$

$$\Rightarrow \quad L_3 = \frac{1}{2K_2} = 1 \quad y \quad C_3 = \frac{2K_2}{3} = \frac{1}{3}$$