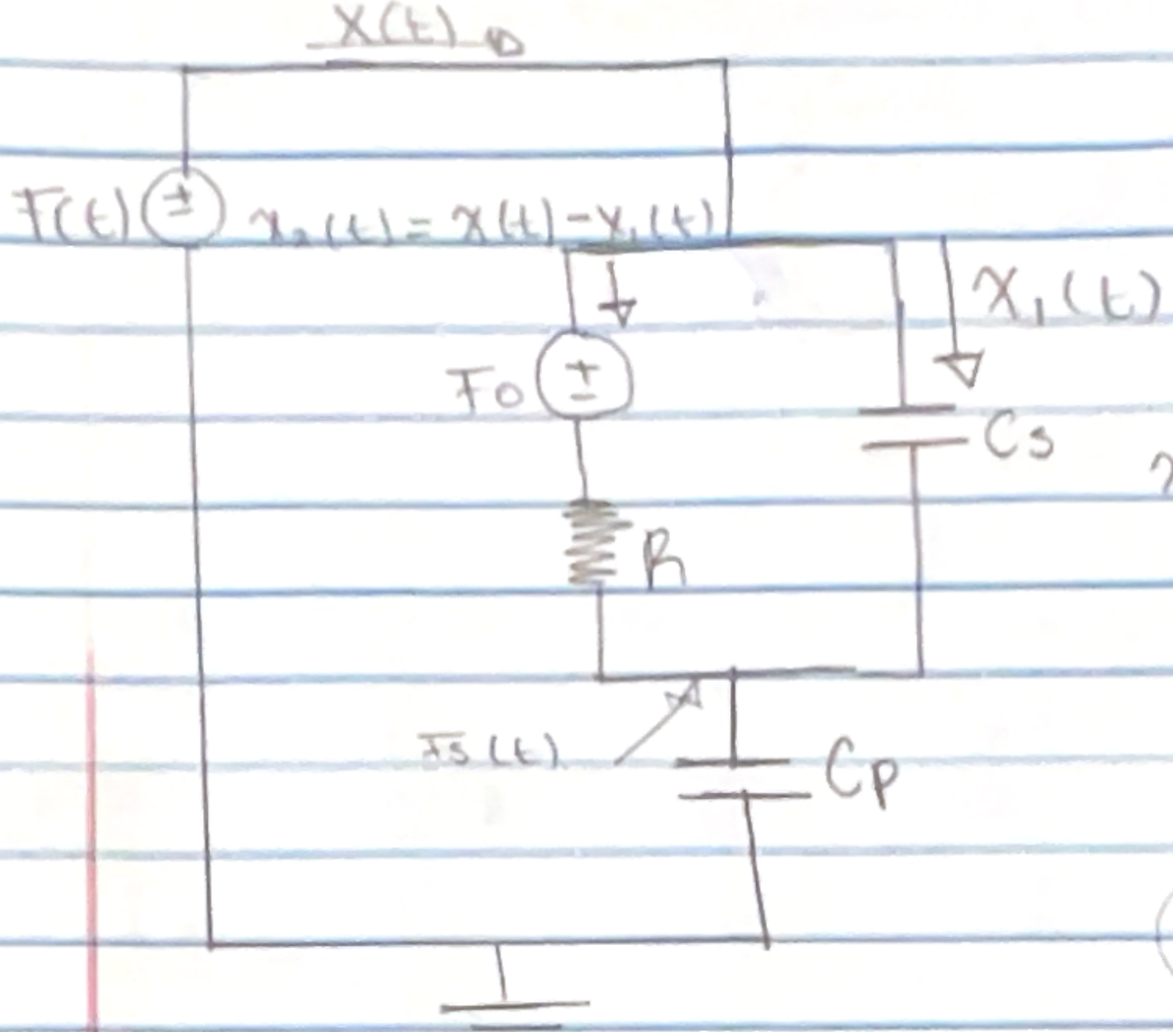
Circuito eléctrico



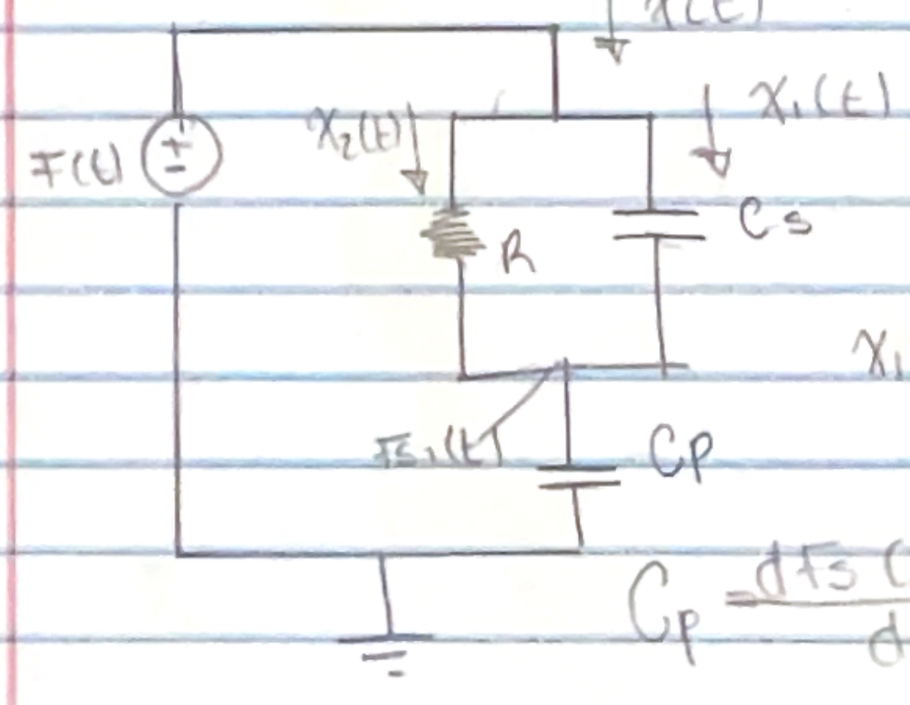
$x(t) = x_1(t) + x_2(t)$

M(0) > M(B)

Función de transferencia

Analisis apagando Fo

$x(t) = x_1(t) + x_2(t)$



$$x(t) = \frac{d[F_s(t)]}{dt} C_p$$

$$x_2(t) = \frac{F(t) - F_s(t)}{R}$$

$$x_1(t) = C_s \frac{d[F(t) - F_s(t)]}{dt}$$

$$C_p \frac{dF_s(t)}{dt} = C_s \frac{d(F(t) - F_s(t)}{dt} + \frac{F(t) - F_s(t)}{R}$$

$$C_p \frac{dF_s(t)}{dt} = C_s \frac{d(F(t) - F_s(t)}{dt} + \frac{F(t) - F_s(t)}{R}$$

$$C_p S F_s(s) = C_s S [F(s) - F_s(s)] + \frac{F(s) - F_s(s)}{R}$$

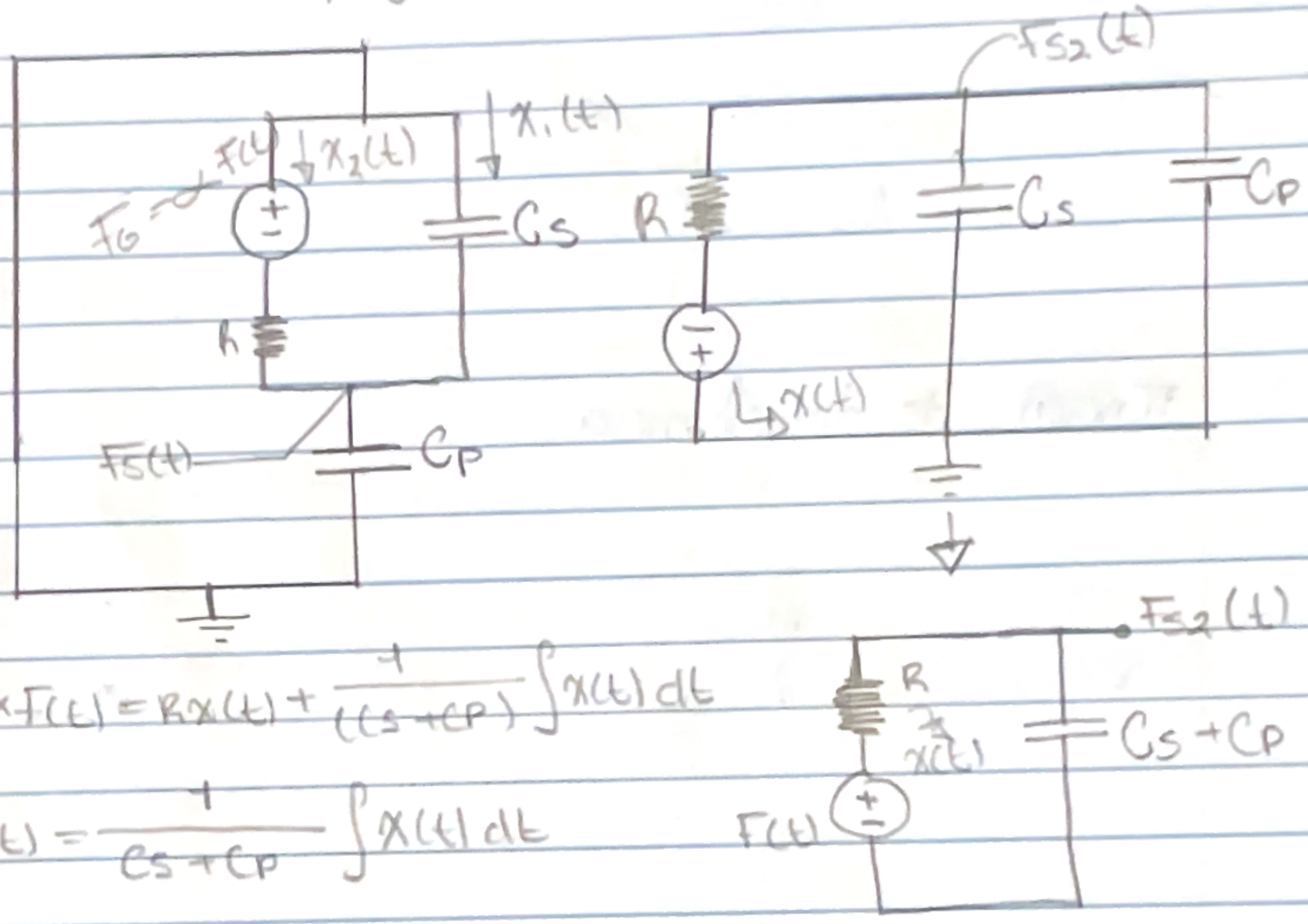
$$\left(C_p S + C_s S + \frac{1}{R}\right) F_s(s) = \left(C_s S + \frac{1}{R}\right) F(s)$$

$$\frac{F_s(s)}{F(s)} = \frac{\left(C_s S + \frac{1}{R}\right)}{\left(C_p S + C_s S + \frac{1}{R}\right)} = \frac{C_s S + \frac{1}{R}}{(C_p + C_s) S + \frac{1}{R}} \quad (R)$$

$$\frac{F_S(S)}{F(S)} = \frac{C_S R S + 1}{C_P R S + C_S R S + 1} = \boxed{\frac{C_S R S + 1}{(C_P R + C_S R) S + 1}}$$

$$F_{S_1}(S) = \frac{((C_S R S + 1) F(S)}{R((C_S + C_P) S + 1}$$

✳ Analisis apagando $F(t)$



$$-\alpha F(t) = R x(t) + \frac{1}{(C_S + C_P)} \int x(t)\, dt$$

$$F_S(t) = \frac{1}{C_S + C_P} \int x(t)\, dt$$

Error de estado estacionario y lazo abierto

$$-\alpha F(S) = R x(S) + \frac{x(S)}{(C_S + C_P) S} = \frac{R x(S)}{-\alpha} - \frac{x(S)}{\alpha (C_S + C_P) S}$$

$$F_S(S) = \frac{x(S)}{(C_S + C_P) S}$$

$$F_S = \frac{R x(S) (\alpha (C_S + C_P) S) + \alpha x(S)}{-\alpha^2 (C_S + C_P) S}$$

$$= \frac{x(S) [R (C_S + C_P) S + 1]}{-\alpha (C_S + C_P) S}$$

$$\frac{F_S(S)}{F_S} = \frac{\frac{x(S)}{(C_S + C_P) S}}{-x(S) \frac{R (C_S + C_P) S + 1}{\alpha (C_S + C_P) S}} = \boxed{\frac{\alpha}{R (C_S + C_P) S + 1}}$$

$$Fs_2(s) = \frac{-\alpha F_3}{R((_S + (_D)S + 1}$$

$$Fs(s) = Fs_1(s) + Fs_2(s)$$

$$Fs(s) = \frac{((_S RS + 1)F(s) - \alpha F(s)}{R((_D + (_S)S + 1}$$

$$\frac{Fs(s)}{F(s)} = \frac{(_S RS + 1 - \alpha}{R((_D + (_S)S + 1}$$

Error de estado estacionario.

$$e(s) = \lim_{s \to 0} S \cdot F(s)\left[1 - \frac{Fs(s)}{F(s)}\right]$$

$$= \lim_{s \to 0}\left(S \cdot \frac{1}{S} \cdot \left(1 - \frac{(_S RS + 1 - \alpha}{R((_D + (_S)S + 1}\right)\right) = 1 - 1 + \alpha$$

$$e(s) = +\alpha$$

Estabilidad en lazo abierto

$$R((_D + (_S)S + 1 = 0 \qquad S = -\frac{1}{R((_D + (_S)}$$

$$R((_D + (_S)S = -1$$