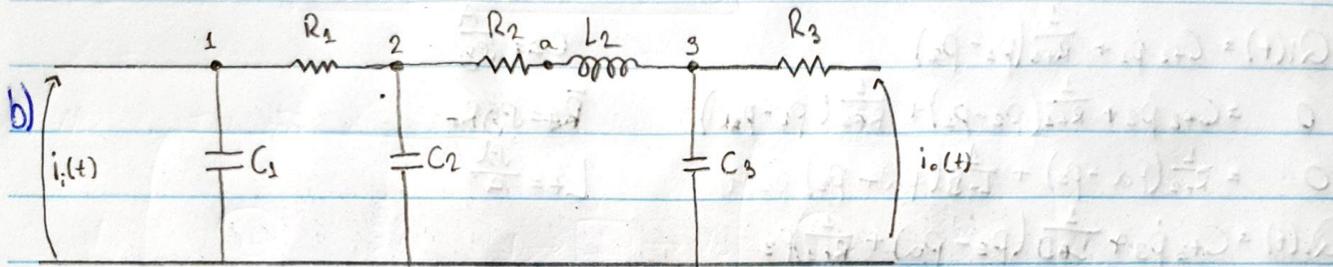
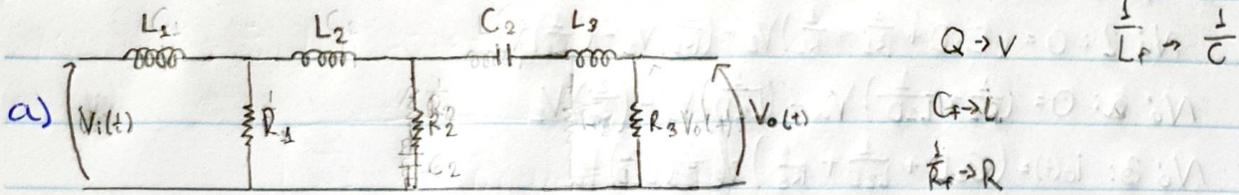


Ex 1:



c)

Tipo 1: Malha 1:  $V_i(t) = (L_1 D + R_1) i_1 - R_1 i_2$

Malha 2:  $0 = (R_1 + L_2 D + R_2) i_2 - R_2 (i_3) - (R_1) i_1$

Malha 3:  $V_o(t) = (L_3 D + R_3 + R_2 + \frac{1}{C_2 D}) i_3 - (R_2) i_2$

$Q_1(t) = C_{f1} \dot{p}_1 + \bar{R}_{f1} p_1 - \bar{R}_{f1} p_2$        $\bar{R}_f = \frac{1}{\rho_g R_f}$

$0 = \bar{R}_{f1} p_2 + C_{f2} \dot{p}_2 + \bar{R}_2 p_2 - \bar{R}_2 p_3 - \bar{R}_{f1} p_1$        $C_f = \frac{A}{\rho_g}$

$Q_o(t) = C_{f3} \dot{p}_3 + \bar{R}_{f3} p_3 + \bar{R}_{f2} p_3 + \frac{1}{L_{f2}} \int p_3 dt - \bar{R}_{f2} p_2$        $L_f = \frac{\rho l}{A}$

$Q_1(t) = \frac{A_1}{\rho_g} \dot{p}_1 + \frac{1}{\rho_g R_{f1}} p_1 - \frac{1}{\rho_g R_{f1}} p_2 = h_1 A_1 + h_1 \frac{1}{R_{f1}} - h_2 \frac{1}{R_{f1}}$

$0 = \frac{1}{\rho_g R_{f1}} p_2 + \frac{A_2}{\rho_g} \dot{p}_2 + \frac{1}{\rho_g R_{f2}} p_2 - \frac{1}{\rho_g R_{f2}} p_3 - \frac{1}{\rho_g R_{f1}} p_1 = h_2 (\frac{1}{R_{f1}} + \frac{1}{R_{f2}}) + h_2 A_2 - h_3 (\frac{1}{R_{f2}}) - h_1 (\frac{1}{R_{f1}})$

$Q_o(t) = \frac{A_3}{\rho_g} \dot{p}_3 + \frac{1}{\rho_g R_{f3}} p_3 + \frac{1}{\rho_g R_{f2}} p_3 + \frac{A}{\rho_g} p_3 dt - \frac{1}{\rho_g R_{f2}} p_2 = h_3 A_3 + \frac{1}{R_{f3}} h_3 + \frac{1}{R_{f2}} (h_3 - h_2) + \dot{Q}_2(t)$

$Q_1(t) = h_1 A_1 + \frac{1}{R_{f1}} (h_1 - h_2)$   
 $0 = h_2 A_2 + \frac{1}{R_{f1}} (h_2 - h_1) + \frac{1}{R_{f2}} (h_2 - h_3)$   
 $Q_o(t) = h_3 A_3 + \frac{1}{R_{f2}} (h_3 - h_2) + \frac{1}{R_{f2}} (h_3) + \dot{Q}_2(t)$

Tipo 2: Nó 1:  $i(t) = (C_1 D + \frac{1}{R_1}) V_1 - (\frac{1}{R_1}) V_2$

Nó 2:  $0 = (C_2 D + \frac{1}{R_1} + \frac{1}{R_2}) V_2 - (\frac{1}{R_1}) V_1 - (\frac{1}{R_2}) V_a$

Nó a:  $0 = (\frac{1}{R_2} + \frac{1}{L_2 D}) V_a - (\frac{1}{L_2 D}) V_3 - (\frac{1}{R_2}) V_2$

Nó b:  $i_o(t) = (C_3 D + \frac{1}{L_2 D} + \frac{1}{R_3}) V_3 - (\frac{1}{L_2 D}) V_a$

$Q_i(t) = C_{f1} \dot{p}_1 + \frac{1}{R_{f1}} (p_1 - p_2)$

$C_f = \frac{A}{\rho g}$

$0 = C_{f2} \dot{p}_2 + \frac{1}{R_{f1}} (p_2 - p_1) + \frac{1}{R_{f2}} (p_2 - p_a)$

$\bar{R}_f = \rho g R_f$

$0 = \frac{1}{R_{f2}} (p_a - p_2) + \frac{1}{L_f D} (p_a - p_2)$

$L_f = \frac{\rho l}{A}$

$Q_o(t) = C_{f3} \dot{p}_3 + \frac{1}{L_f D} (p_3 - p_a) + \frac{1}{R_{f3}} p_3$

$Q_1(t) = A_1 \dot{h}_1 + \frac{1}{R_{f1}} (h_1 - h_2)$

$0 = A_2 \dot{h}_2 + \frac{1}{R_{f1}} (h_2 - h_1) + \frac{1}{R_{f2}} (h_2 - h_a)$

$0 = \frac{1}{R_{f2}} (h_a - h_2) + \dot{Q}_a - \dot{Q}_2$

$Q_o(t) = A_3 \dot{h}_3 + \dot{Q}_3 - \dot{Q}_a + \frac{1}{R_{f3}} h_3$