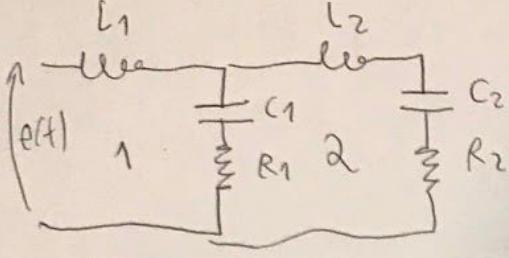
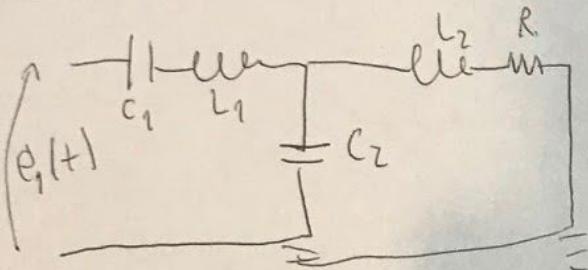


NATHAN DALEFFI RODRIGUES RAYES 10772585

1) 

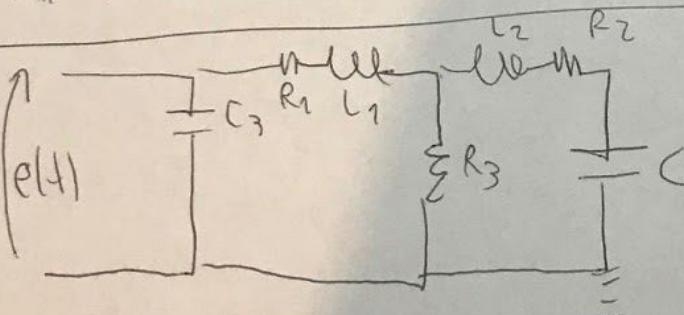
$$\Rightarrow \begin{cases} L_1 \dot{i}_{11} + \frac{1}{C_1 D} (i_1 - i_2) + R_1 (i_1 - i_2) = e(t) \\ L_2 \dot{i}_{12} + \frac{1}{C_2 D} i_2 + R_2 i_{12} + \frac{1}{C_1 D} (i_2 - i_1) + R_1 (i_2 - i_1) = 0 \end{cases}$$

$$\Rightarrow \begin{cases} m_2 \ddot{x}_2 + K_2 (x_2 - x_1) + b_2 (\dot{x}_2 - \dot{x}_1) = f(t) \\ m_1 \ddot{x}_1 + K_1 x_1 + b_1 \dot{x}_1 + K_2 (x_1 - x_2) + b_2 (\dot{x}_1 - \dot{x}_2) = 0 \end{cases}$$

2) 

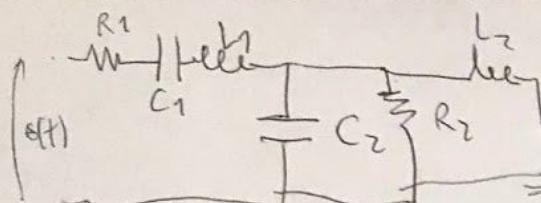
$$\Rightarrow \begin{cases} L_2 \dot{i}_{12} + R_{12} + \frac{1}{C_2 D} (i_2 - i_1) = 0 \\ L_1 \dot{i}_{11} + \frac{1}{C_1 D} i_1 + \frac{1}{C_2 D} (i_2 - i_1) = e_1(t) \end{cases}$$

$$\Rightarrow \begin{cases} m_2 \ddot{x}_2 + b \dot{x}_2 + K_2 (x_2 - x_1) = 0 \\ m_1 \ddot{x}_1 + K_1 x_1 + K_2 (x_1 - x_2) = f_1(t) \end{cases}$$

3) 

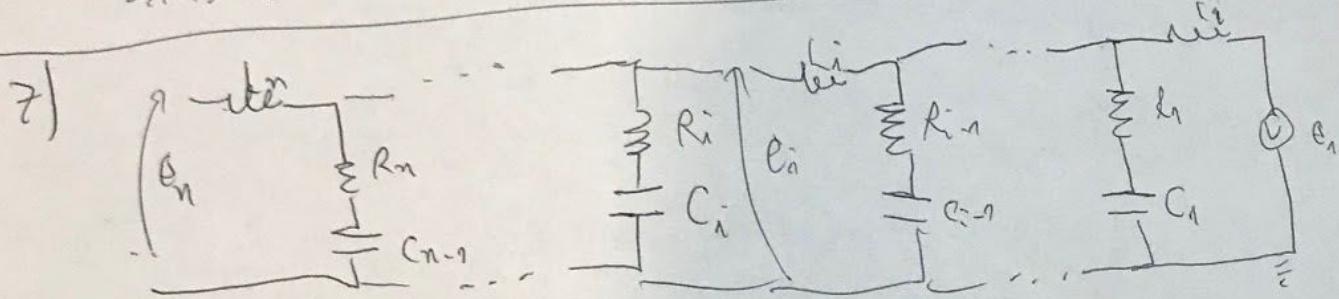
$$\Rightarrow \begin{cases} \frac{1}{C_1 D} i_1 = e(t) \\ L_1 \dot{i}_{12} + R_{12} i_{12} + R_3 i_{13} + \left( \frac{1}{C_1 D} i_1 - \frac{1}{C_2 D} i_2 \right) = 0 \\ L_2 \dot{i}_{13} + R_{23} i_{13} + R_2 i_{23} + \left( \frac{1}{C_1 D} i_1 - \frac{1}{C_2 D} i_2 \right) = 0 \end{cases}$$

$$\Rightarrow \begin{cases} T = K_1 \theta_1 \\ J_1 \ddot{\theta}_1 + B_1 \dot{\theta}_2 + B_3 (\theta_2 - \theta_3) + K_1 (\theta_2 - \theta_1) = 0 \\ J_2 \ddot{\theta}_2 + B_2 \dot{\theta}_3 + B_3 (\theta_3 - \theta_2) + K_2 \theta_3 = 0 \end{cases}$$

6) 

$$\Rightarrow \begin{cases} L_1 \ddot{i}_1 + \frac{1}{C_1} i_1 + b_1 \dot{i}_1 + K_1 (x_1 - x_3) = f(t) \\ L_2 \ddot{i}_2 + R_2 (i_2 - i_3) = 0 \\ R_2 (i_3 - i_1) + \frac{1}{C_2} (i_3 - i_1) = 0 \end{cases}$$

$$\Rightarrow \begin{cases} m_1 \ddot{x}_1 + k_1 x_1 + b_1 \dot{x}_1 + K_1 (x_1 - x_3) = f(t) \\ m_2 \ddot{x}_2 + b_2 (\dot{x}_2 - \dot{x}_3) = 0 \\ b_2 (\dot{x}_3 - \dot{x}_2) + K_1 (x_3 - x_1) = 0 \end{cases}$$

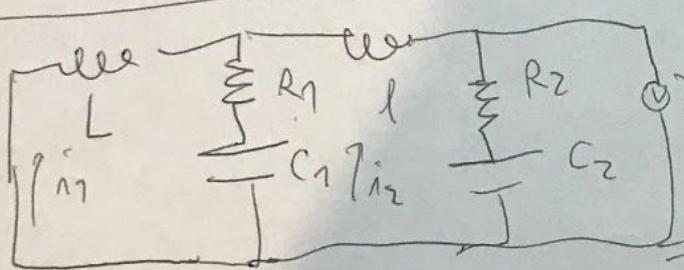


VAG&O 1:

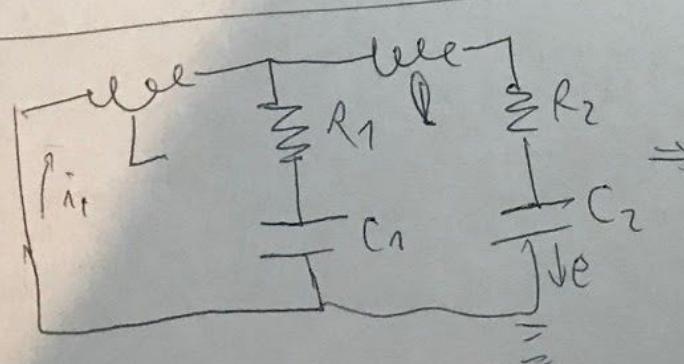
$$m_1 \ddot{x}_1 + b_1 \dot{x}_1 + K_1 x_1 - b_1 \dot{x}_2 - K_1 x_2 = f(t)$$

VAG&O n:  $m_n \ddot{x}_n + b_{n-1} \dot{x}_{n-1} + K_{n-1} x_{n-1} - b_{n-1} \dot{x}_{n-1} - K_{n-1} x_{n-1} = f_n(t)$

VAG&O i:  $m_i \ddot{x}_i + (b_i + b_{i-1}) \dot{x}_i + (K_{i-1} + K_i) x_i - b_{i-1} \dot{x}_{i-1} - b_{i-1} x_{i-1} - K_{i-1} x_{i-1} = f_i(t)$

8) a) 

$$\Rightarrow \begin{cases} M \ddot{x}_1 + b_1 \dot{x}_1 + K_1 x_1 - b_1 \dot{x}_2 - K_2 x_2 = 0 \\ m \ddot{x}_2 + (b_1 + b_2) \dot{x}_2 + (K_1 + K_2) x_2 - b_1 \dot{x}_1 - K_2 x_1 = -b_2 w(t) + K_2 w(t) \end{cases}$$

b) 

$$\Rightarrow \begin{cases} M \ddot{x}_1 + b_1 \dot{x}_1 + K_1 x_1 - b_1 \dot{x}_2 - K_2 x_2 = 0 \\ m \ddot{x}_2 + (b_1 + b_2) \dot{x}_2 + (K_1 + K_2) x_2 - b_1 \dot{x}_1 - K_2 x_1 = w(t) \end{cases}$$