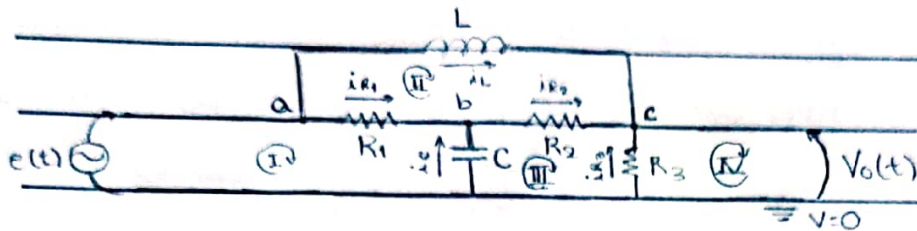


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PME 3380 - Exercício - Aula 01/09



Método dos nós:

$$\text{Nó b: } i_{R2} = i_{R1} + i_C$$

$$\hookrightarrow i_{R2} = \frac{V_c - V_b}{R_2}, \quad i_{R1} = \frac{V_b - V_a}{R_1}, \quad i_C = V_b \cdot CD \quad \text{onde: } V_a = e(t) \text{ e } V_c = V_0(t)$$

$$\therefore \frac{V_0(t) - V_b}{R_2} = \frac{V_b - e(t)}{R_1} + V_b \cdot CD \Rightarrow \left| V_b \left( \frac{1}{R_1} + \frac{1}{R_2} + CD \right) - \frac{e(t)}{R_1} - \frac{V_0}{R_2} = 0 \right|$$

$$\text{Nó c: } i_L + i_{R2} + i_{R3} = 0$$

$$\hookrightarrow i_L = \frac{V_c - V_a}{LD}, \quad i_{R3} = \frac{V_c}{R_3}$$

$$\therefore \frac{V_c - e(t)}{LD} + \frac{V_0(t) - V_b}{R_2} + \frac{V_0(t)}{R_3} = 0 \Rightarrow \left| V_0 \left( \frac{1}{R_3} + \frac{1}{R_2} + \frac{1}{LD} \right) - \frac{V_b}{R_2} - \frac{e(t)}{LD} = 0 \right|$$

Método das malhas:

$$\text{Malha I: } e(t) - (V_b - V_a) + V_b = 0 \Rightarrow e(t) - R_1 i_{R1} + \frac{i_C}{CD} = 0$$

$$\text{Malha II: } V_b - V_a + V_c - V_b - (V_c - V_a) = 0 \Rightarrow R_1 i_{R1} + R_2 i_{R2} - LD i_L = 0$$

$$\text{Malha III: } V_c - (V_c - V_b) - V_b = 0 \Rightarrow R_3 i_{R3} - R_2 i_{R2} - \frac{i_C}{CD} = 0$$

$$\text{Malha IV: } V_c = V_0 \Rightarrow R_3 i_{R3} = V_0$$

Considerando os nós:

$$a: i_c + i_{R_3} + i_L + i_{R_1} = 0 \quad ; \quad b: i_{R_2} = i_{R_1} + i_c \quad , \quad c: i_{R_2} + i_{R_3} + i_L = 0$$

Chega-se nas equações diferenciais:

$$R_3 i_{R_3} - i_c \left( \frac{1}{CD} + R_2 + \frac{R_2}{R_1 CD} \right) = 0$$

$$LD i_{R_3} + i_c \left( \frac{1}{CD} + R_2 + \frac{R_2}{R_1 CD} + LD + \frac{L}{R_1 C} \right) = 0$$