810199492

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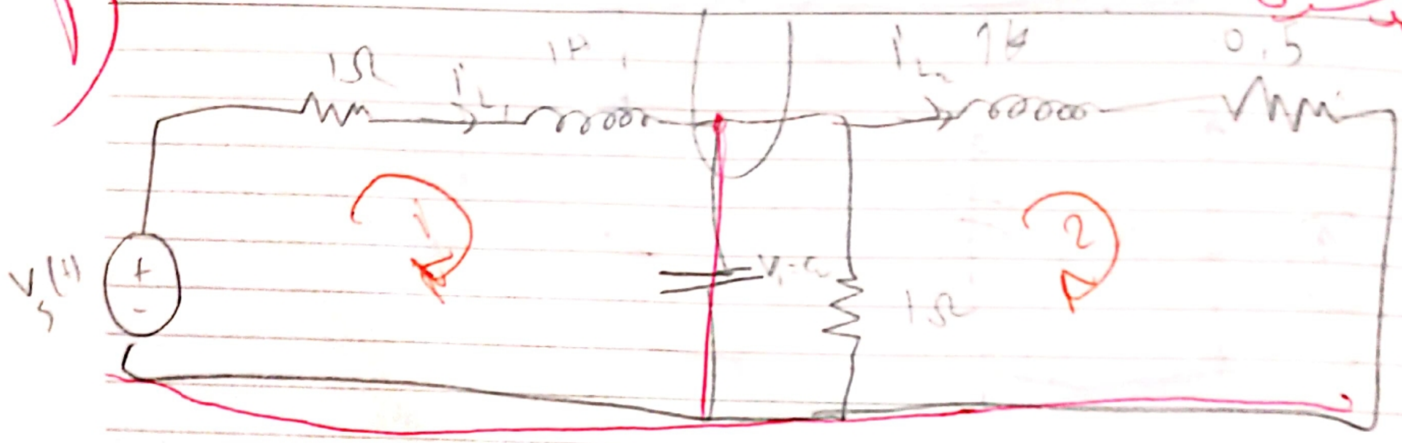


$i_{1\Omega} = V_C = V_1 \Rightarrow V_{1\Omega} = i_{1\Omega} \times 1 = V_C$

Cut Set : $\Rightarrow i_1 = C_1 \frac{dV_1}{dt} + i_{1\Omega} + i_{L_2} \xrightarrow[C=1]{i_{1\Omega}=V_1} i_1 = \frac{dV_1}{dt} + V_1 + i_{L_2}$

KVL ① $\Rightarrow i_1 + \frac{di_1}{dt} + V_1 = V_s$

KVL ② $\Rightarrow \frac{i_2}{2} + \frac{di_2}{dt} = V_1$

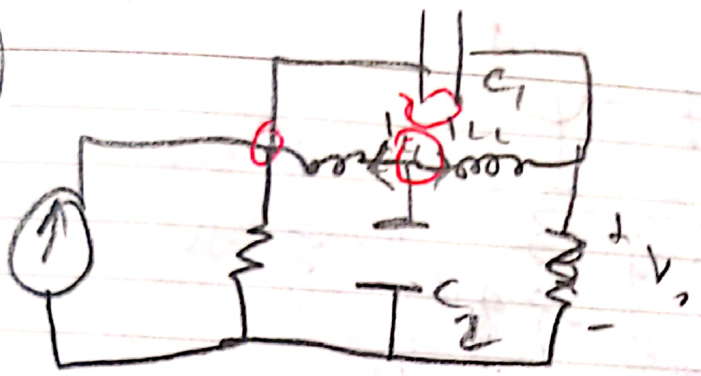
$\frac{dV_1}{dt} = i_1 - V_1 - i_2$

$\frac{di_1}{dt} = -V_1 - i_1 + V_s$

$\frac{di_2}{dt} = V_1 - \frac{i_2}{2}$

$$\begin{bmatrix} \frac{dV_1}{dt} \\ \frac{di_1}{dt} \\ \frac{di_2}{dt} \end{bmatrix} = \begin{bmatrix} -1 & 1 & -1 \\ -1 & -1 & 0 \\ 1 & 0 & -\frac{1}{2} \end{bmatrix} \begin{bmatrix} V_1 \\ i_1 \\ i_2 \end{bmatrix} + \begin{bmatrix} 0 \\ V_s \\ 0 \end{bmatrix}$$

2)



KCL: $i_{L_1} + i_{L_2} - 2\frac{dV_{c_2}}{dt} = 0 \Rightarrow \frac{dV_{c_2}}{dt} = 2(i_{L_1} + i_{L_2})$

KCL: $i_{L_1} + 2\frac{dV_{c_1}}{dt} + i_s - \frac{V_{c_2} - 2\frac{di_{L_1}}{dt}}{2} = 0$

KVL: $-V_{c_2} + 3\frac{di_{L_2}}{dt} + i_{L_2} - 2\frac{dV_{c_1}}{dt} = 0$

KVL: $2\frac{di_1}{dt} - 3\frac{di_2}{dt} + V_{c_1} = 0 \Rightarrow V_{1c} - V_{2c} + 2\frac{di_{L_1}}{dt} + i_{L_2} - 2\frac{dV_2}{dt} = 0$

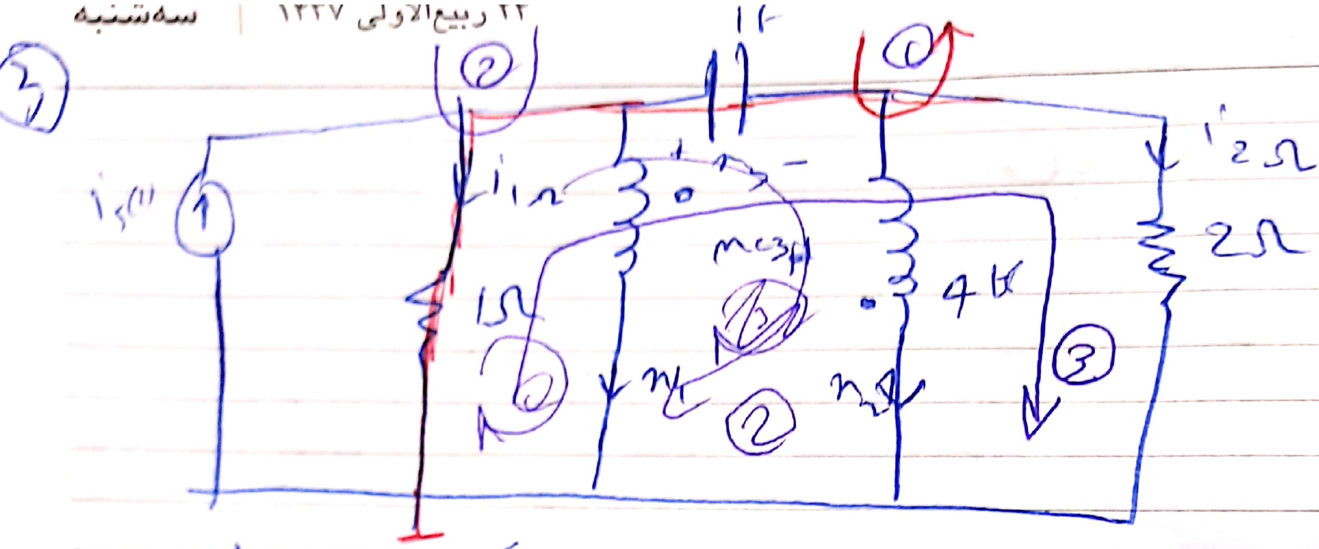
$\Rightarrow i_{L_1} + i_{L_2} + i_s - \frac{3}{2}V_{c_2} + 3\frac{di_{L_1}}{dt} + V_{c_1} = 0$

$\frac{V_{c_1}}{3} + V_{c_2} - \frac{2(i_{L_1} + i_{L_2} + i_s(t))}{3} = \frac{3di_2}{dt}$,

$\frac{dV_{c_1}}{dt} = \frac{V_{c_2}}{3} - \frac{2(i_1 + i_s)}{3} + \frac{i_2}{3}$

$$\begin{bmatrix} V_1' \\ V_2' \\ i_1' \\ i_2' \end{bmatrix} = \begin{bmatrix} 0 & 0 & 2 & 2 \\ 0 & \frac{2}{3} & -\frac{2}{3} & \frac{1}{6} \\ \frac{1}{2} & -\frac{1}{3} & -\frac{1}{3} & -\frac{1}{3} \\ \frac{1}{3} & -\frac{1}{9} & -\frac{2}{9} & -\frac{2}{9} \end{bmatrix} + \begin{bmatrix} 0 \\ -\frac{1}{3}i_s \\ -\frac{1}{3}i_s \\ -\frac{2}{9}i_s \end{bmatrix}$$

③



KCL ①: $\frac{dx_3}{dt} = x_2 + i_{2\Omega}$ ①

KVL ①: $3\frac{dx_1}{dt} - 3\underbrace{\frac{dx_2}{dt}}_{x_3 + 2\Omega} = V_{1\Omega}$

KVL ②: $x_3 + 4\frac{dx_2}{dt} - 3\underbrace{\frac{dx_1}{dt}}_{x_{2t}} =$

KVL ③: $i_{1\Omega} = x_3 + 2$ $\Rightarrow 2 i_{2\Omega} = i_{1\Omega} - x_3$

KCL ②: $i_{1\Omega} = i_s - x_1 - x_2 - i_{2\Omega}$

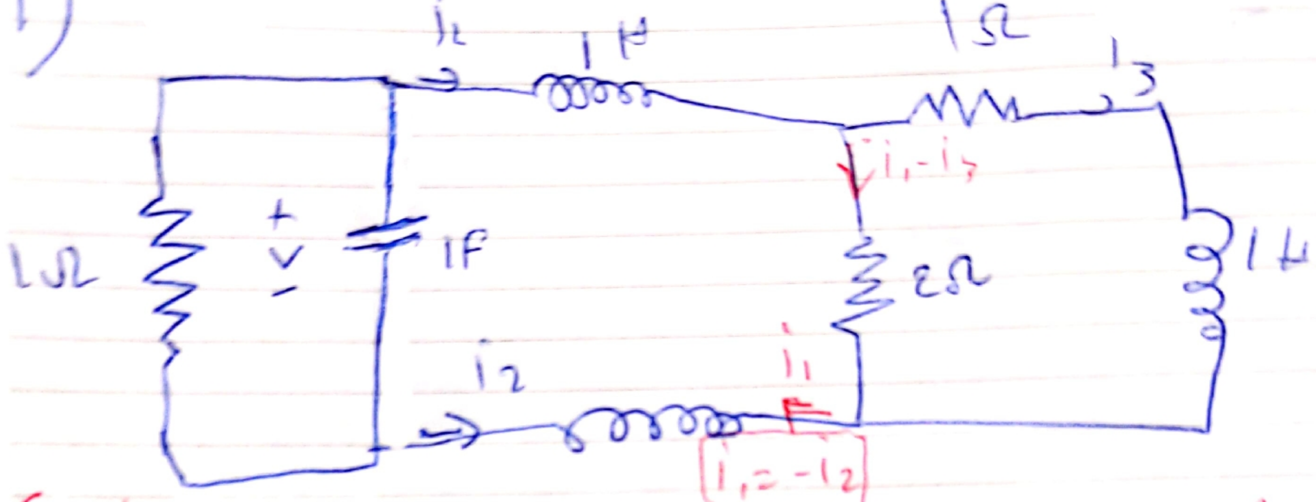
$\Rightarrow$

$$i_{2\Omega} = \frac{i_s - x_1 - x_2 - x_3}{3}$$

① $\Rightarrow$ $$\frac{dx_3}{dt} = \frac{2}{3}x_2 + \frac{i_s}{3} - \frac{x_1}{3} - \frac{x_3}{3}$$

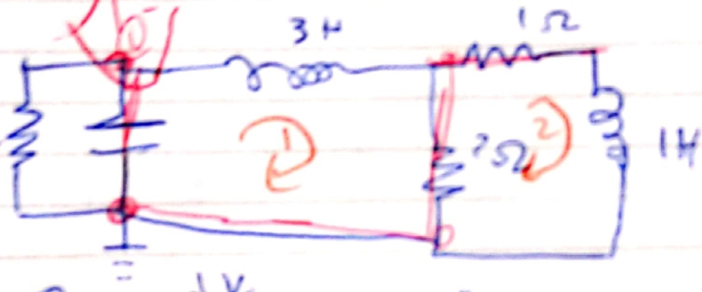
$\frac{di_1}{dt}(0)=?$

4)



سلف شماره 2 را حذف، مقدار آن را به سلف شماره 1 می دهیم (ساده می کنیم)

⇒



KCL①: $\frac{dV_c}{dt} = -\frac{V_c}{1} - i_1$

KVL①: $3\frac{di_1}{dt} = -2(i_1 - i_3) + V_c$

KVL②: $\frac{di_3}{dt} = 2(i_1 - i_3) - i_3$

$$\begin{bmatrix} \frac{dV}{dt} \\ \frac{di_1}{dt} \\ \frac{di_3}{dt} \end{bmatrix} = \begin{bmatrix} -1 & -1 & 0 \\ \frac{1}{3} & -\frac{2}{3} & \frac{2}{3} \\ 0 & 2 & -3 \end{bmatrix} \begin{bmatrix} V \\ i_1 \\ i_3 \end{bmatrix}$$

a) $\frac{di_1(0)}{dt} = \frac{1}{3}V(0) - \frac{2}{3}i(0) + \frac{2}{3}i_3(0)$

دی
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چهارشنبه

2015 ۱۳۹۴
30 December Wednesday
۱۸ ربیع‌الاول ۱۴۳۷

ش ی د س چ پ ج
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۵ ۶ ۷ ۸ ۹ ۱۰ ۱۱
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۱۹ ۲۰ ۲۱ ۲۲ ۲۳ ۲۴ ۲۵
۲۶ ۲۷ ۲۸ ۲۹ ۳۰

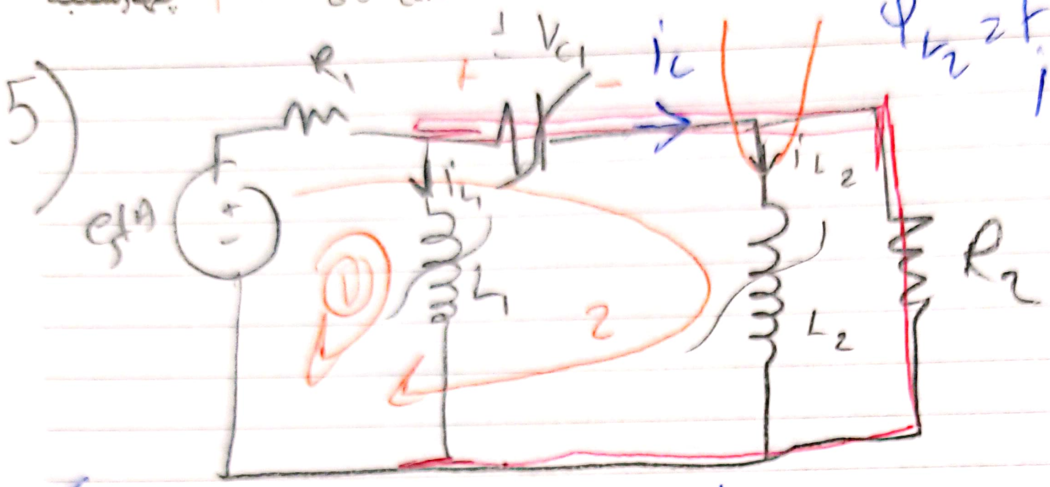
$i_{L_1} = F_1(\varphi_{L_1})$

$V_{C_1} = F_2(q_{C_1})$

$\varphi_{L_2} = F_3(i_{L_2})$

$i_C = \frac{dq_{C_1}}{dt}$

5)



$V_{L_1} = \frac{d\varphi_1}{dt}$

$V_{L_2} = \frac{d\varphi_2}{dt}$

KCL ①: $i_C = i_{L_2} + \frac{1}{R_2}\underbrace{\frac{d\varphi_{L_2}}{dt}}_{V_{L_1}}$ ①

KVL ①: $\frac{d\varphi_1}{dt} = e_s - R_1(i_C + i_{L_1}) = e_s - R_1\left(i_{L_2} + \frac{1}{R_2}\frac{d\varphi_{L_2}}{dt} + i_{L_1}\right)$ ②

KVL ②: $V_{L_2} = \frac{d\varphi_2}{dt} = \underbrace{e_s(t) - R_1\left(i_{L_2} + \frac{1}{R_2}\frac{d\varphi_{L_2}}{dt} + i_{L_2}\right) - V_{C_1}}$ ③

جاگذاری ③ در ②

$\Rightarrow \frac{d\varphi_1}{dt} = e_s(t) - R_1\left(i_{L_1} + i_{L_2} + \frac{1}{R_2}\left(\frac{d\varphi_{L_1}}{dt} - V_{C_1}\right)\right)$

$\Rightarrow \frac{d\varphi_1}{dt} = e_s(t) - R_1\left(i_{L_1} + i_{L_2} + \frac{1}{R_2}\frac{d\varphi_1}{dt} - \frac{V_{C_1}}{R_2}\right.$

$\left(1 + \frac{R_1}{R_2}\right)\frac{d\varphi_1}{dt} = e_s(t) - R_1 f(\varphi_1) - R_1 i_2 + \frac{R_1}{R_2} f_2(q_1)$

$$\boxed{\frac{d\varphi_1}{dt} = \frac{e_s(t) - R_1 F(\varphi_{L_1}) - R_1 i_2 + \frac{R_1}{R_2} F_2(q_{C_1})}{\left(\frac{R_1}{R_2} + 1\right)}}$$ ④

ادامه 5

جایگذاری (3) در (4)

$$\frac{d\varphi_2}{dt} = \frac{\left(e_s(t) - R_1 f(\varphi_{L_1}) - R_1 i_{L_2} + \frac{R_1}{R_2} f_2(q_{c_1})\right]}{\left(1 + \frac{R_1}{R_2}\right) f_3'(i_{L_2})} - \frac{f_2(q_{c_1})}{f_3'(i_{L_2})}$$

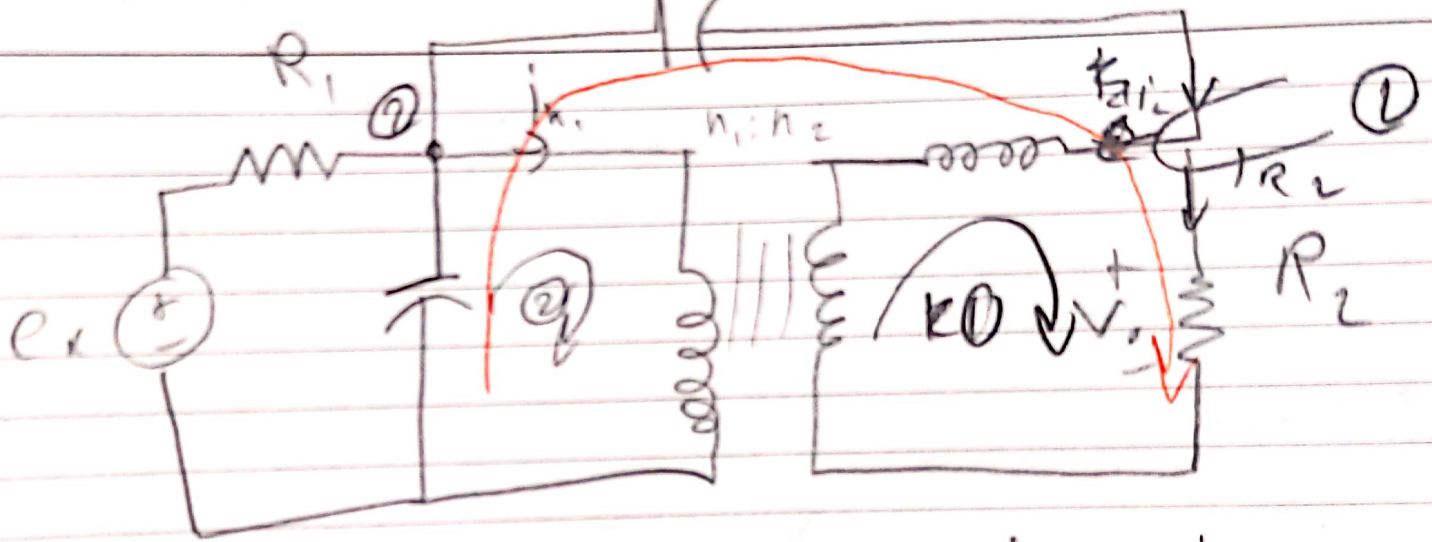
(5)

جاگذاری $\frac{d\varphi_2}{dt}$ در (1)

$$\frac{dq_{c_1}}{dt} = i_{L_2} + \left[\frac{e_s(t) - R_1 f(\varphi_{L_1}) - R_1 i_{L_2} + \frac{R_1}{R_2} f_2(q_{c_1})}{\left(1 + \frac{R_1}{R_2}\right) \times R_2}\right] - \frac{1}{R_2} f_2(q_{c_1})$$

$$\Rightarrow \frac{dq_{c_1}}{dt} = i_{L_2} + \frac{\left[e_s(t) - R_1 f(\varphi_{L_1}) - R_1 i_{L_2} + \frac{R_1}{R_2} f_2(q_{c_1})\right]}{(R_2 + R_1} - \frac{f_2(q_{c_1})}{R_2}$$

6 -



KVL

② $V_2 = \frac{n_2}{n_1} V_{c_1}$

① $V_2 + V_L = V_{R_2}$

KVL : $V_{C_1} = V_{C_2} + V_{R_2} \Rightarrow V_{R_2} = -V_{C_2} + V_{C_1} \Rightarrow i_{R_2} = \frac{V_{C_1} - V_{C_2}}{R_2}$

KCL ① $i_{C_2} = i_{R_2} + i_L \Rightarrow$

KCL ② $\frac{e_x(t) - V_{C_1}}{R_1} = i_{n_1} + i_{C_1} + i_{C_2} = i_{n_1} + i_{C_1} + i_L + i_{R_2}$

$= C_1 V_1 + \frac{n_2}{n_1} i_L + \frac{V_{C_1} - V_{C_2}}{R_2} - i_L$

$\frac{n_2}{n_1} V_{C_1} + L i_L = V_{C_1} - V_{C_2}$

$$\begin{bmatrix} V_{C_1} \\ V_{C_2} \\ i_{L_1} \end{bmatrix} = \begin{bmatrix} -\frac{G_1+G_2}{C_1} & \frac{G_2}{C_1} & \frac{\left(1-\frac{n_2}{n_1}\right)}{C_1} \\ G_2 & -G_2 & -1 \\ \frac{1-\frac{n_2}{n_1}}{L} & \frac{-1}{L} & 0 \end{bmatrix} \begin{bmatrix} V_{C_1} \\ V_{C_2} \\ i_L \end{bmatrix} + e_s(t) \begin{bmatrix} \frac{G_2}{C_1} \\ 0 \\ 0 \end{bmatrix}$$

$$V_0 = V_{R_2} = V_{C_1} - V_{C_2} \Rightarrow V_0 = \begin{bmatrix} +1 & -1 & 0 \end{bmatrix} \begin{bmatrix} V_{C_1} \\ V_{C_2} \\ i_L \end{bmatrix}$$