

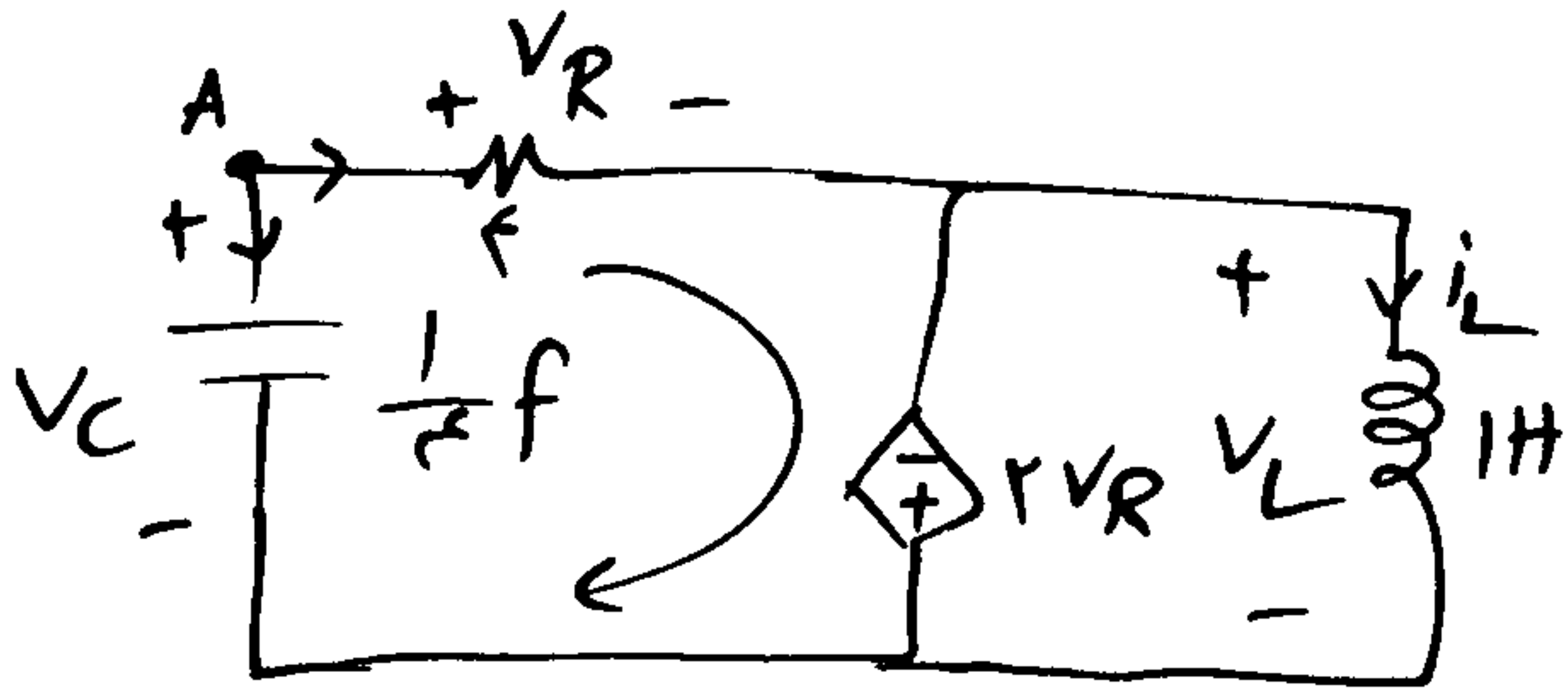
۱- گزینیه صحیح است.

KVL (ش): $1(I + V_x) + 2(I + 2V_x) = (13 - 2I - V_x) + 2I$

$5I = 13 - 4V_x$

KVL (پایین): $V_x + 2(I + 2V_x) = 1(I - V_x) \Rightarrow 6V_x = -I \Rightarrow I = -6V_x$

$5I = 13 - 4V_x \Rightarrow 5(-6V_x) + 4V_x = 13 \Rightarrow V_x = -\frac{13}{26} = -0.5$



۲- گزینیه (د) صحیح است.

KVL (ب): $V_c = V_R - 2V_R = -V_R$

(A) KCL: $i_c = \frac{1}{\epsilon} \frac{dV_c}{dt} = -\frac{V_R}{\epsilon} \Rightarrow V_c' = -V_R$

$V_c' = -V_R \Rightarrow (V_c) \Rightarrow \begin{cases} V_c' - V_c = 0 \Rightarrow V_c = Ke^t \\ s-1=0 \Rightarrow s=1 \Rightarrow V_c = Ke^t \end{cases}$

$V_c(0) = 1 = K \Rightarrow V_c(t) = e^t$

$V_R = -V_c = -e^t \Rightarrow V_L = -2V_R = 2V_c = 2e^t$

$i_L(t) = i_L(0) + \frac{1}{1} \int_0^t V_L dt' = 1 + \int_0^t 2e^{t'} dt' = 1 + 2(e^t - 1)$

$i_L(t) = 2e^t - 1$

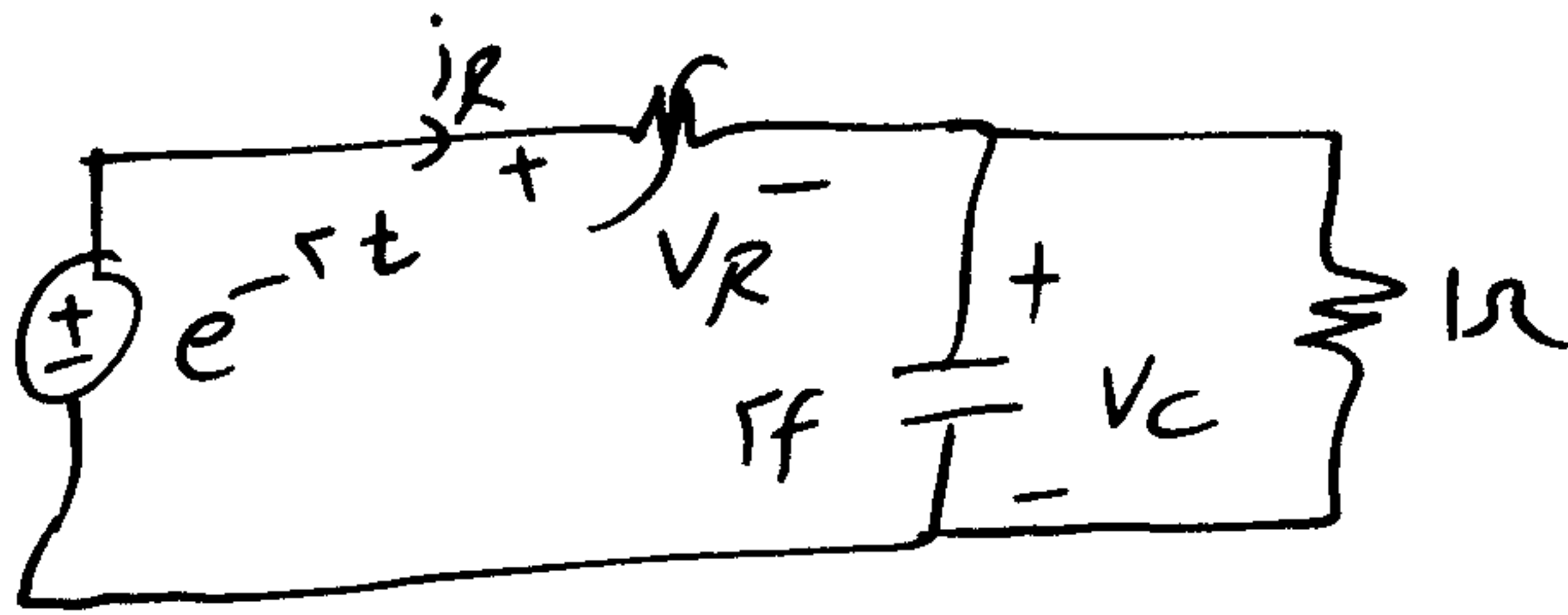
$V_c(\ln 2) = e^{\ln 2} = 2$, $i_L(\ln 2) = 2e^{\ln 2} - 1 = 3$

$W_c = \frac{1}{\epsilon} C V_c^2 = \frac{1}{\epsilon} V_c^2 \Rightarrow W_c(\ln 2) = \frac{1}{\epsilon} (2)^2 = 0.5 \text{ J}$

$W_L = \frac{1}{\epsilon} L I_L^2 = \frac{I_L^2}{\epsilon} \Rightarrow W_L(\ln 2) = \frac{3^2}{\epsilon} = \frac{9}{\epsilon} = 4.5 \text{ J}$

$W(\ln 2) = W_c + W_L = 0.5 + 4.5 = 5 \text{ J}$

۳- گزینیه درم صحیح است.



$$t=0^+ \Rightarrow e^{-\tau t} = V_R + V_C \Rightarrow V_R(0^+) = 1 - V_C(0^+) = 1 - \tau = -1^V$$

$$V_R(0^+) = -1 \Rightarrow i_R = V_R^r \quad (\text{حول } t=0^+)$$

$$i_R = V_R^r \Rightarrow \frac{di_R}{dt} = r V_R^r \frac{dV_R}{dt} \Rightarrow \frac{di_R}{dt}(0^+) = r V_R^r \frac{dV_R}{dt}(0^+)$$

$$\frac{di_R}{dt}(0^+) = r(-1)^r \frac{dV_R}{dt}(0^+) = r \frac{dV_R}{dt}(0^+)$$

$$e^{-\tau t} = V_R + V_C \Rightarrow \frac{dV_R}{dt} = -\tau e^{-\tau t} - \frac{dV_C}{dt} \Rightarrow \frac{dV_R}{dt}(0^+) = -\tau - \frac{dV_C}{dt}(0^+)$$

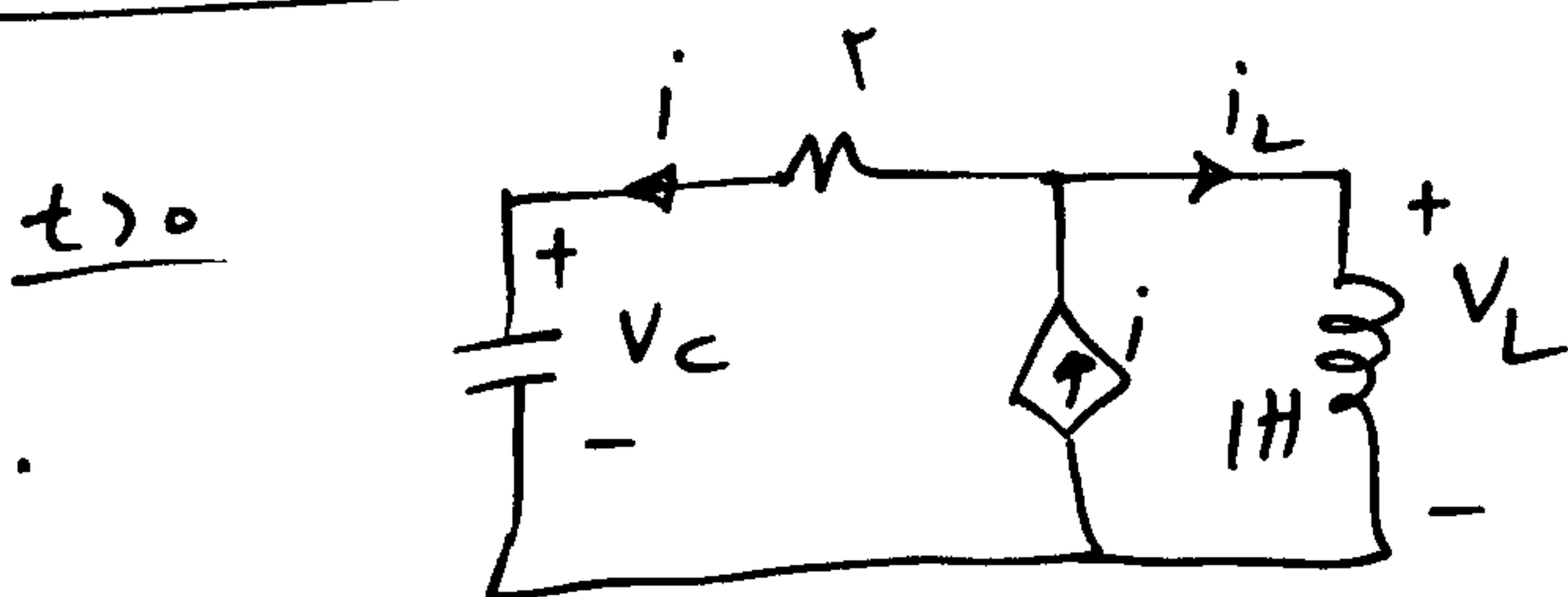
$$\text{KCL: } i_R = i_C + \frac{V_C}{1} \Rightarrow i_R = r \frac{dV_C}{dt} + V_C \Rightarrow i_R(0^+) = r \frac{dV_C}{dt}(0^+) + V_C(0^+)$$

$$-1 = r \frac{dV_C}{dt}(0^+) + \tau \Rightarrow \frac{dV_C}{dt}(0^+) = -1,5$$

$$\frac{dV_R}{dt}(0^+) = -\tau - \frac{dV_C}{dt}(0^+) = -\tau + 1,5 = -0,5$$

$$\frac{di_R}{dt}(0^+) = r V_R^r \frac{dV_R}{dt}(0^+) = r(-0,5) = -1,5$$

۴- گزینیه درم صحیح است.



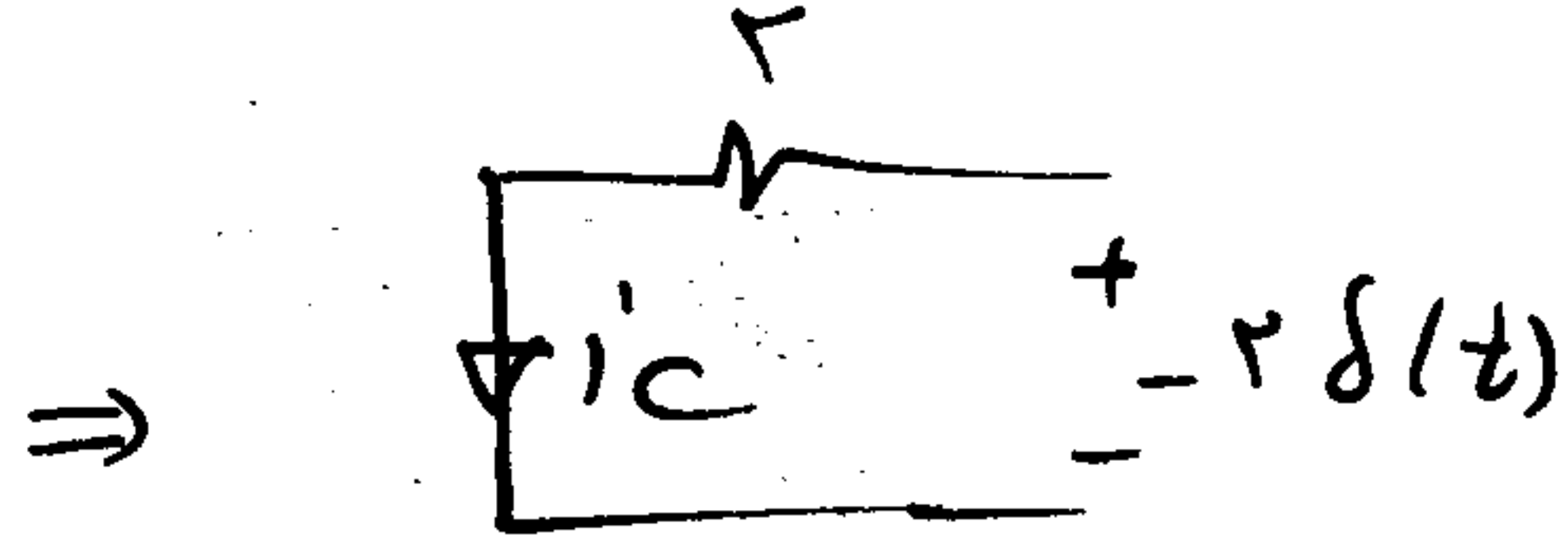
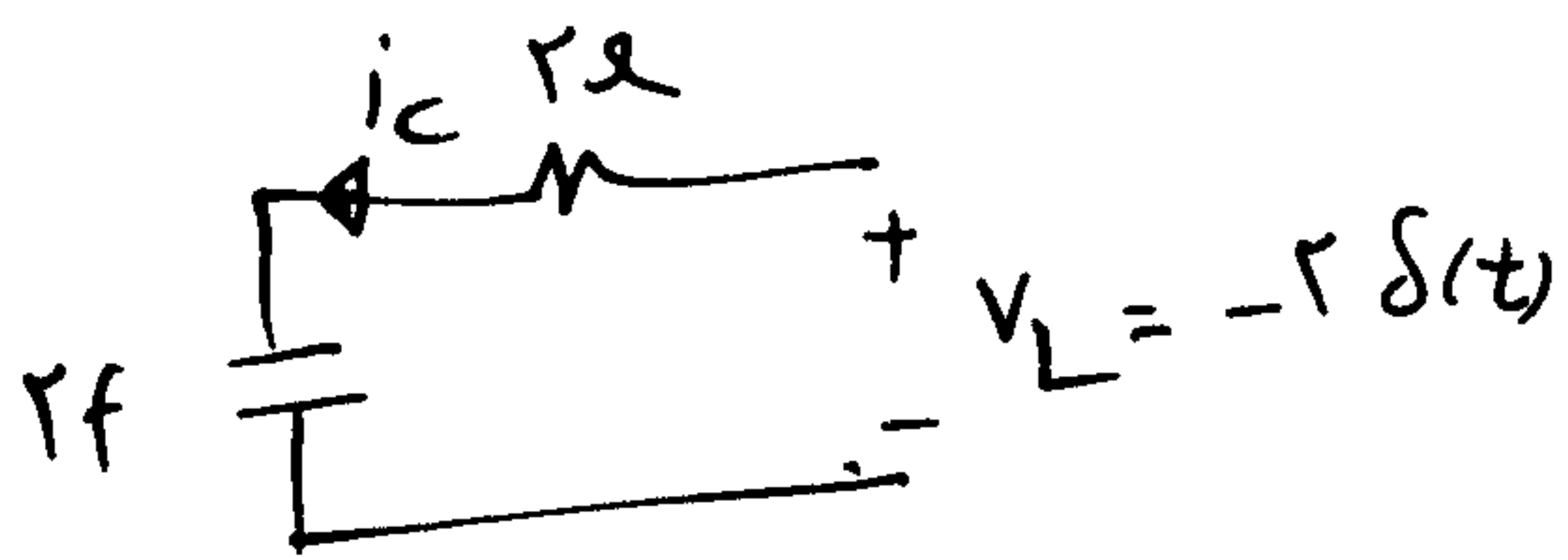
$$i = i + i_L \Rightarrow i_L(0^+) = 0$$

$$i_L(0^-) = 2A$$

چون i_L از $t=0^+$ به اندازه $2A$ کاهش یافته، پس force وجودش $\sqrt{}$

$$V_L = A \delta(t) \Rightarrow i_L(0^+) = 0 = i_L(0^-) + \frac{A}{1} = 2 + A \Rightarrow A = -2$$

$$V_L = A \delta(t) = -r \delta(t)$$



$$i_C = -\frac{r \delta(t)}{r} = -\delta(t) \Rightarrow V_C(0^+) = V_C(0^-) + \frac{A}{C} = 1 + \frac{-1}{r} = \underline{0.5 \text{ V}}$$

(موفق باشید. رضایی)