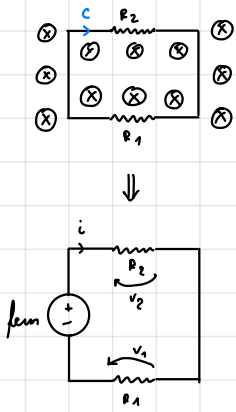


## ESERCITAZIONE

### ESERCIZIO 17.1



$$B = 0,1 \text{ T}$$

$$S = 1 \text{ m}^2$$

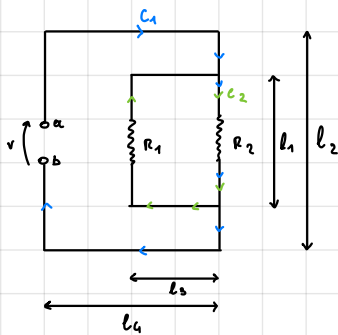
$$R_1 = 1 \Omega$$

$$R_2 = 2 \Omega$$

$$i = \frac{f_{em}}{R_1 + R_2} = -\frac{0,1}{3} \text{ A}$$

$$f_{em} = -\frac{d\Phi(B)}{dt} = -\frac{d(S \cdot 0,1t)}{dt} = -0,1 \text{ V}$$

### ESERCIZIO 17.3



Circolo magnetico

$$B = 2t \text{ mT}$$

$$R_1 = 50 \Omega$$

$$l_1 = 10 \text{ cm}$$

$$l_2 = 30 \text{ cm}$$

$$l_3 = 50 \text{ cm}$$

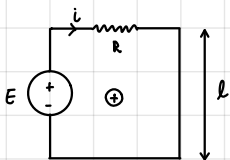
$$l_4 = 1 \text{ m}$$

$$v = v' + v'' = 0,6 - 0,067 = 0,53 \text{ mV}$$

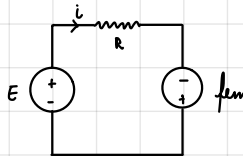
$$v' = -f_{em1} \rightarrow f_{em1} = -\frac{d\Phi(B)}{dt} = \dots = 0,6 \text{ mV} \rightarrow v' = 0,6 \text{ mV}$$

$$v'' = f_{em2} \frac{R_1}{R_1 + R_2} \rightarrow f_{em2} = -\frac{d\Phi(B)}{dt} = \dots = -0,1 \text{ mV} \rightarrow v'' = 0,1 \cdot \frac{100}{150} = -0,067 \text{ mV}$$

### ESERCIZIO 17.5



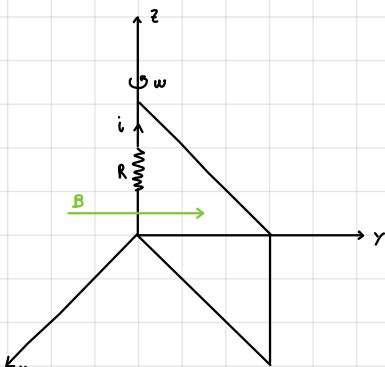
$$E, R, l, B = B_0 t$$



$$f_{em} = -\frac{d\Phi(B)}{dt} = \dots = -B_0 l^2 \text{ V}$$

$$i = \frac{E - B_0 l^2}{R}$$

### ESERCIZIO 17.10



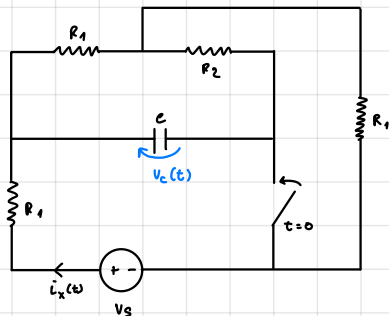
$$\vec{B} = 0,01 \hat{y} \text{ T}$$

$$w \text{ coul}$$

$$R, l_1, l_2$$

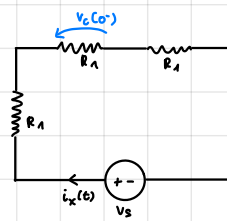
$$\Phi_0 = B \cdot l_1 l_2 \cos wt \rightarrow f_{em} = -\frac{d\Phi}{dt} = +B l_1 l_2 w \sin wt \text{ V} \rightarrow i = \frac{f_{em}}{R} = \frac{B l_1 l_2 w}{R} \sin wt \text{ A}$$

# ESERCIZIO 17.12



$$\begin{aligned} V_S &= 24 \text{ V} \\ C &= 20 \text{ mF} \\ R_1 &= 2 \text{ } \Omega \\ R_2 &= 4 \text{ } \Omega \end{aligned}$$

$t \leq 0^-$ :



$$V_C(0^-) = \frac{V_S}{3} = 8 \text{ V} \rightarrow i_X = \frac{V_S}{3R_1} = 4 \text{ A}$$

$t > 0$ :

$$R_{1+2} = R_1 + R_1 // R_2 = \dots = \frac{10}{3}$$

$$i_X(t) = i_C(t) + i_C(t)$$

$$= i_C(t) + \frac{V_C(t)}{R_{1+2}}$$

$$V_S = R_1 \cdot i_X(t) + V_C(t)$$

$$= R_1 \left[ i_C(t) + \frac{V_C(t)}{R_{1+2}} \right] + V_C(t)$$

$$= R_1 C \frac{dV_C}{dt} + \frac{R_1}{R_{1+2}} V_C(t) + V_C(t) \Rightarrow$$

$$\frac{dV_C(t)}{dt} = -\frac{R_1 + R_{1+2}}{R_{1+2} R_1 C} V_C(t) + \frac{V_S}{R_1 C} \Rightarrow$$

$$V_C(t) = K e^{-\frac{R_1 + R_{1+2}}{R_{1+2} R_1 C} t} + V_{IP}(t) = -7 e^{-\frac{t}{25 \cdot 10^{-3}}} + 15 \text{ V}$$

$$V_{IP}(t): 0 = \lambda \gamma + \frac{V_S}{R_1 C} \rightarrow \gamma = -\frac{V_S}{R_1 C \lambda} = \frac{V_S R_{1+2} C R_1}{R_1 C (R_1 + R_{1+2})} = 15 \text{ V}$$

$$K: t=0^-: V_C(0^-) = K e^{\lambda 0} + 15 \rightarrow K = -7 \text{ V}$$

$$i_X(t) = \begin{cases} \frac{V_S}{3R_1} & t \leq 0^- \\ i_C(t) + \frac{V_C(t)}{R_{1+2}} & t > 0 \end{cases} \rightarrow i_X(t) = \begin{cases} 4 \text{ A} \\ 3,5 e^{-\frac{t}{25 \cdot 10^{-3}}} + 4,5 \text{ A} \end{cases}$$

