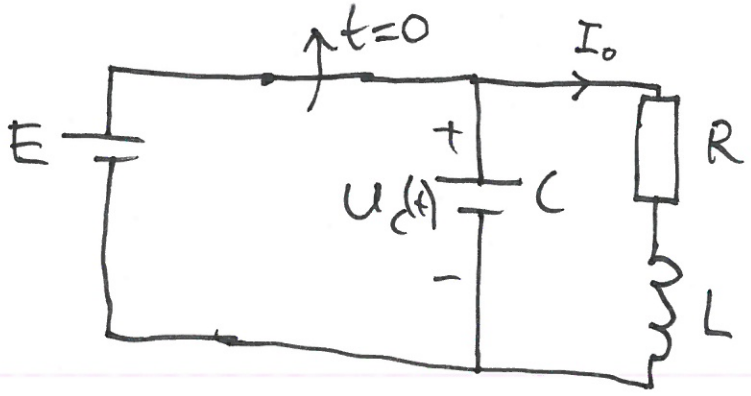
C-6)



$R = 20\,\Omega$, $L = 5.0\,H$

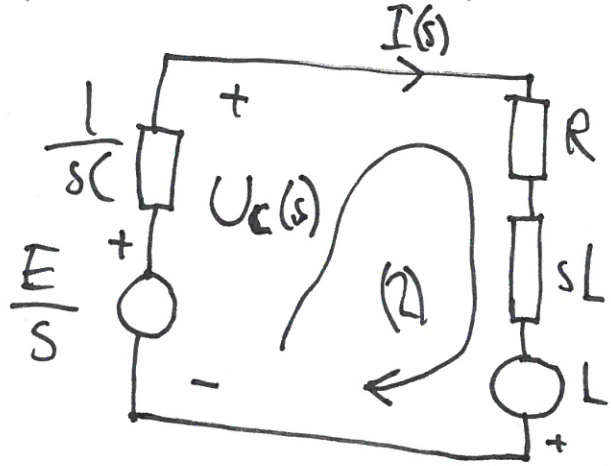
$C = 25\,mF$

$E = 10\,V$

$u_c(t) = E$ for $t < 0$

$I_0 = E/R \Rightarrow I_0 = 0.5\,A$

Operatorschema:



(1): $U_c(s) = -\frac{1}{sC} \cdot I(s) + \frac{E}{s}$

(2): $\frac{E}{s} - \frac{1}{sC} \cdot I(s) - R \cdot I(s) - sL \cdot I(s) + L \cdot I_0 = 0$

(2) $\Rightarrow I(s) = \frac{\frac{E}{s} + L \cdot I_0}{R + sL + \frac{1}{sC}}$

insatt i (1) $\Rightarrow$

$$U_c(s) = \frac{E}{s} - \frac{1}{sC} \cdot \frac{\frac{E}{s} + L \cdot I_0}{R + sL + \frac{1}{sC}}$$

$$= \frac{10}{s} - \frac{1}{s \cdot 0.025} \cdot \frac{\frac{10}{s} + 5 \cdot 0.5}{20 + 5 \cdot s + \frac{1}{s \cdot 0.025}}$$

$$= \frac{10}{s} - \frac{\frac{10}{s} + 2.5}{0.5s + 0.125s^2 + 1} = \frac{10}{s} - \frac{10 + 2.5s}{0.125s \cdot (s^2 + 4s + 8)}$$

$$= \frac{10 \cdot 0.125 \cdot (s^2 + 4s + 8) - 10 - 2.5s}{s \cdot 0.125 \cdot (s^2 + 4s + 8)}$$

$$= \frac{1.25s^2 + 5s + 10 - 10 - 2.5s}{0.125s \cdot (s^2 + 4s + 8)} = \frac{1.25s^2 + 2.5s}{0.125s \cdot (s^2 + 4s + 8)}$$

$$= \frac{10s + 20}{s^2 + 4s + 8} = \frac{10 \cdot (s + 2)}{s^2 + 4s + 2^2 - 2^2 + 8} = \frac{10 \cdot (s+2)}{(s+2)^2 + 2^2}$$

Parlören $\Rightarrow$ $\boxed{u_c(t) = 10 \cdot e^{-2t} \cdot \cos(2t)\ V}$ $t > 0$