

# ELECTRICAL CIRCUIT THEORY

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## Task I\_2

The figure I\_2 shows an one input port passive  $RC$  electrical circuit with a voltage controlled current source. In the moment  $t = 0$  the circuit is connected to the independent time-varying voltage generator:

$$e(t) = \begin{cases} 6e^{-t} \text{ V} & 0 < t < T \\ -6e^{-t} \text{ V} & T < t < \infty \end{cases} \quad T = \ln 2, \text{ time normalized value}$$

If we know that  $RC = 1$ , determine the time function of the voltage change at the terminals of the condenser,  $u_c(t) = ?$ ,  $t \geq 0$ , by using Duhamel's superposition integral.

The circuit did not have the self energy in the moment  $t = 0$ .

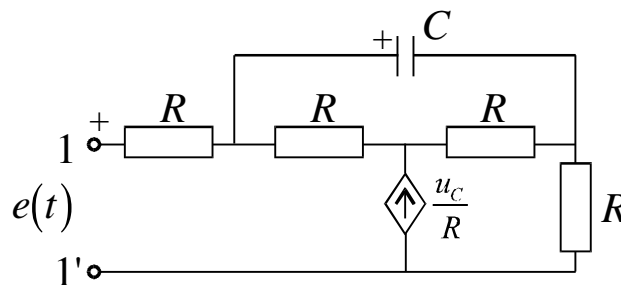


Fig. I\_2

Notice: it can be written

$$e(t) = 6e^{-t} (h(t) - 2h(t - T)) \text{ V}, \quad h(t) - \text{Heaviside unit function.}$$