

ee101_rc7.sqproj

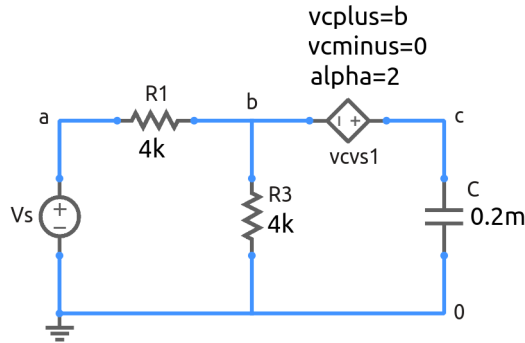


Figure 1: RC circuit with a step input.

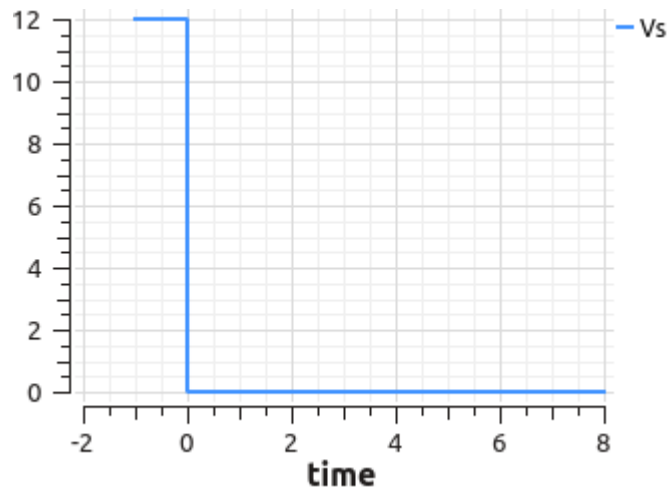


Figure 2: Step input voltage.

In the RC circuit shown in Fig. 1, the source voltage has been 12 V for a long time and changes to 0 V at $t = 0$ sec (see Fig. 2).

Exercise Set

1. Find the Thevenin resistance R_{Th} as seen from the capacitor and the circuit time constant $\tau = R_{Th}C$.
2. Find $V_C(0^+)$ and $V_C(\infty)$.
3. Let the capacitor voltage for $t > 0$ be $V_C(t) = A \exp(-t/\tau) + B$. Find A and B using $V_C(0^+)$ and $V_C(\infty)$.
4. Find $i_{R3}(0^+)$ and $i_{R3}(\infty)$.

5. Let i_{R3} for $t > 0$ be $i_{R3}(t) = A' \exp(-t/\tau) + B'$. Find A' and B' using $i_{R3}(0^+)$ and $i_{R3}(\infty)$.
6. Sketch $V_C(t)$, $i_C(t)$, and $i_{R3}(t)$ for $-1 \text{ s} < t < 8 \text{ s}$.
7. Check your answers against simulation results.