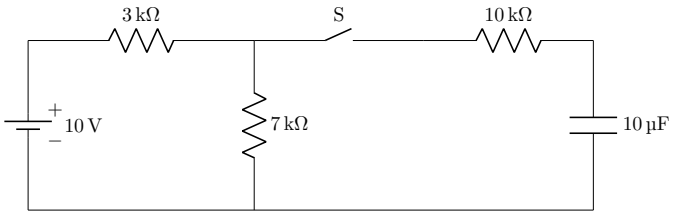
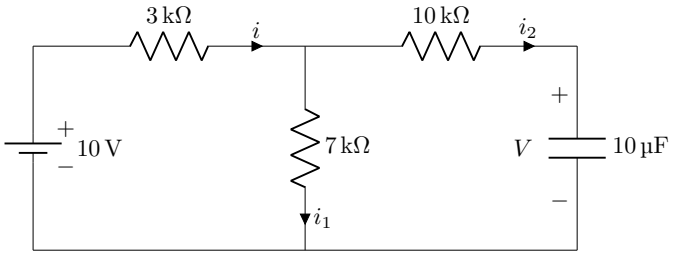
GATE 2023 BM 30

EE23BTECH11007 - Aneesh Kadiyala*

Question: In the following circuit, the switch S is open for $t < 0$ and closed for $t \geq 0$. What is the steady state voltage (in Volts) across the capacitor when the switch is closed?



Solution:
For $t \geq 0$:



In steady state, no current flows through capacitor.

$$i_2 = 0 \tag{1}$$
$$\implies i = i_1 \tag{2}$$
$$V = (7\text{k}\Omega)(i_1) \tag{3}$$
$$10\text{V} = (10\text{k}\Omega)(i_1) \tag{4}$$
$$\implies i_1 = 1\text{mA} \tag{5}$$
$$V = 7\text{V} \tag{6}$$