Chapter 7, Solution 90.
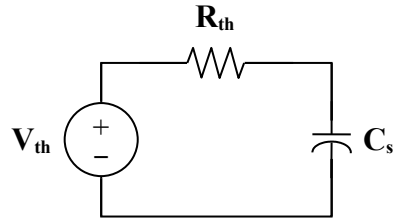
We determine the Thevenin equivalent circuit for the capacitor C_s.

$$V_{th} = \frac{R_s}{R_s + R_p} V_i, \qquad R_{th} = R_s \parallel R_p$$

The Thevenin equivalent is an RC circuit. Since

$$V_{th} = \frac{1}{10} V_i \longrightarrow \frac{1}{10} = \frac{R_s}{R_s + R_p}$$

$$R_s = \frac{1}{9} R_p = \frac{6}{9} = \frac{2}{3} \text{ M}\Omega$$

Also,

$$\tau = R_{th} C_s = 15 \text{ } \mu s$$

where $R_{th} = R_p \parallel R_s = \frac{6(2/3)}{6 + 2/3} = 0.6 \text{ M}\Omega$

$$C_s = \frac{\tau}{R_{th}} = \frac{15 \times 10^{-6}}{0.6 \times 10^{6}} = \textbf{25 pF}$$