Homework Assignment No. 1 – Solutions

Problem 1 (Corrected)

(a.) The first thing to do is to find Thevenin's equivalent circuit seen from the diode.

The Thevenin voltage is,

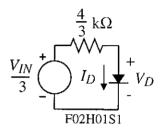$$V_{TH} = V_{IN}\left(\frac{2}{3} - \frac{1}{3}\right) = \frac{V_{IN}}{3}$$

The Thevenin resistance is,

$$R_{TH} = 1\text{k}\Omega \| 2\text{k}\Omega + 1\text{k}\Omega \| 2\text{k}\Omega = \frac{4}{3} \text{ k}\Omega$$

The equivalent circuit now becomes,

Now , with $V_{IN} = 10$V, we know the diode is forward biased. Therefore, replacing it with a short-circuit gives,

$$V_D = \underline{0\text{V}} \quad \text{and} \quad I_D = \frac{10}{3} \times \frac{3}{4\text{k}\Omega} = \underline{2.5\text{ mA}}$$

(b.) With $V_{IN} = -10$V, we know the diode is reverse biased. Therefore replacing it with an open-circuit gives,

$$V_D = \underline{-3.33\text{V}} \quad \text{and} \quad I_D = \underline{0\text{ mA}}$$

F02H01S1