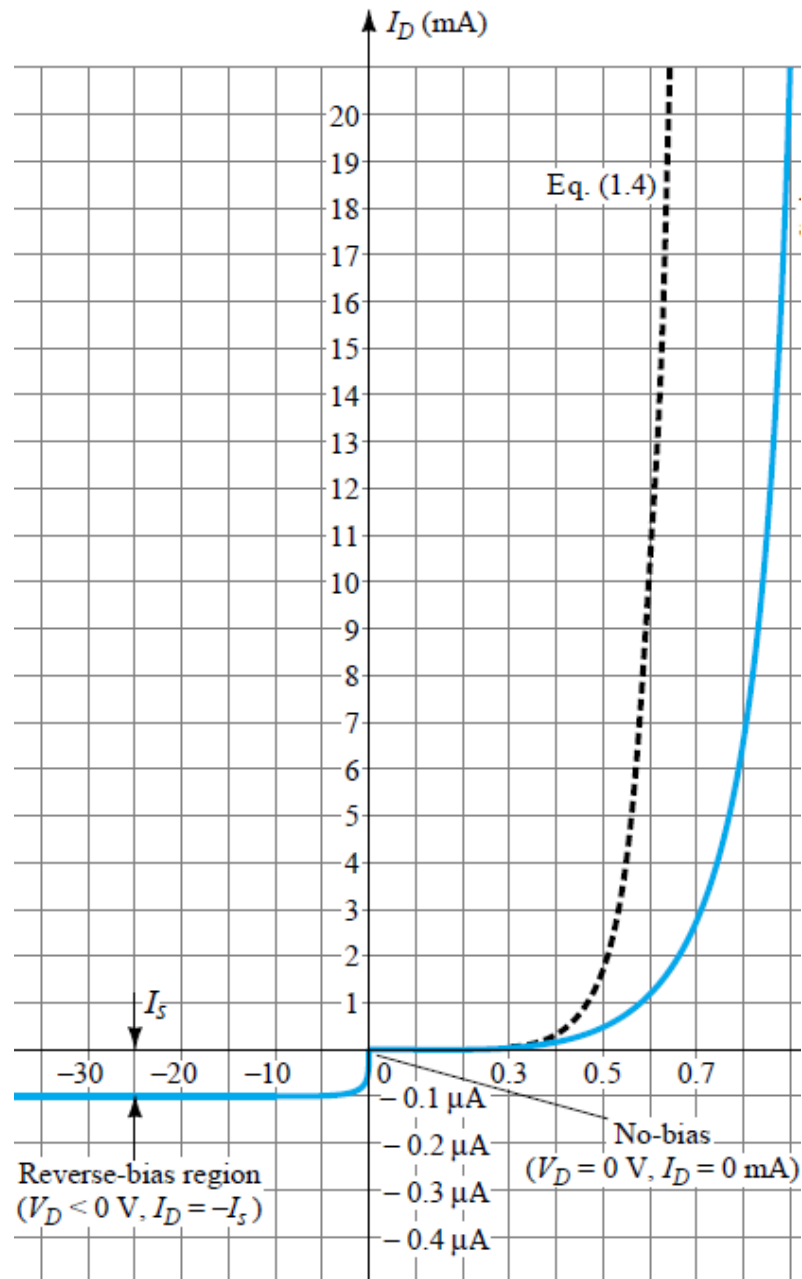
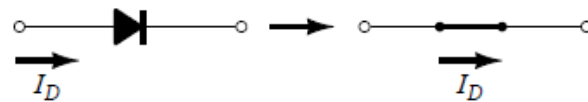
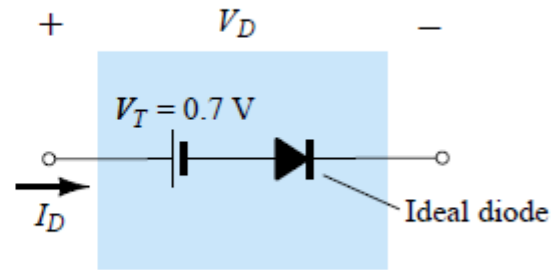
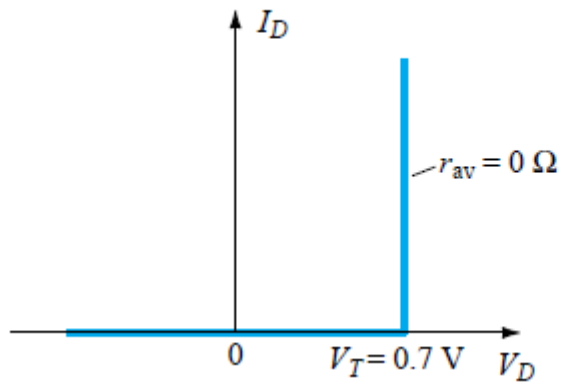
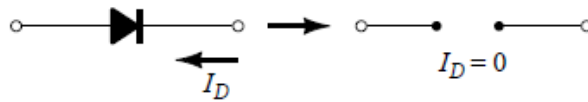


# Diode



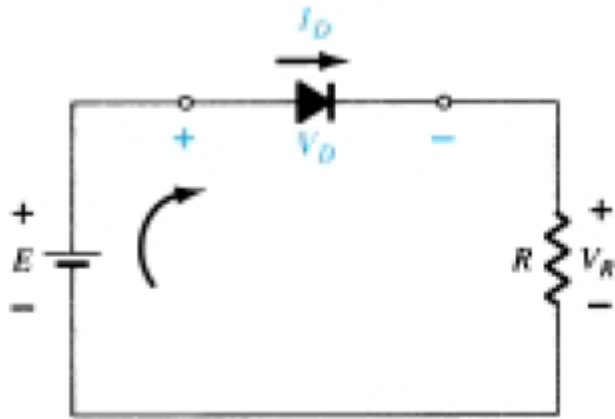


(a)



(b)

$V_T = 0.7 \text{ (Si)}$   
 $V_T = 0.3 \text{ (Ge)}$



$$E - V_D - V_R = 0$$

$$E = V_D + I_D R$$

$$E = V_D + I_D R$$

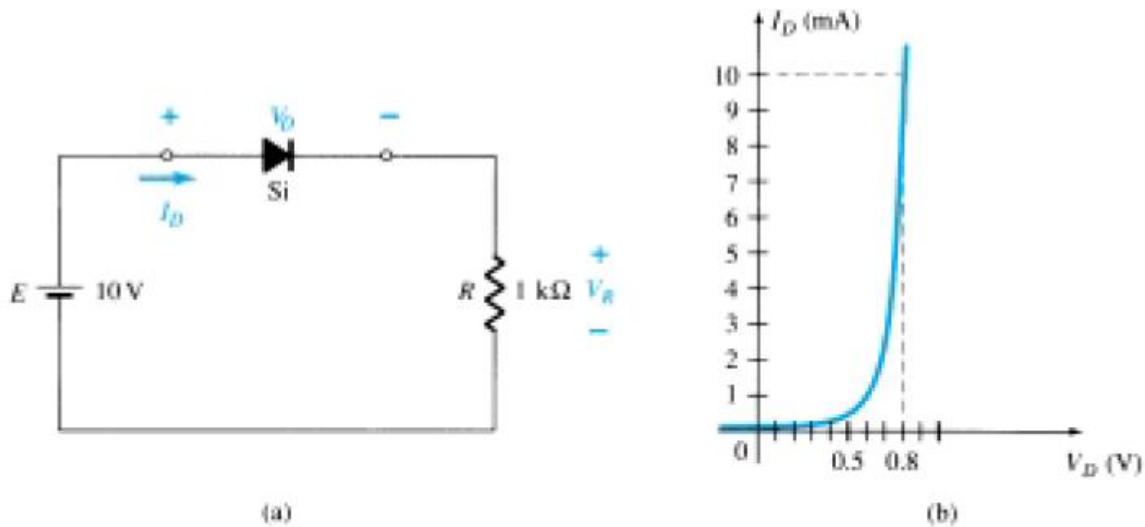
$$= 0 \text{ V} + I_D R$$

$$I_D = \frac{E}{R} \Big|_{V_D=0 \text{ V}}$$

$$E = V_D + I_D R$$

$$= V_D + (0 \text{ A}) R$$

$$V_D = E \Big|_{I_D=0 \text{ A}}$$

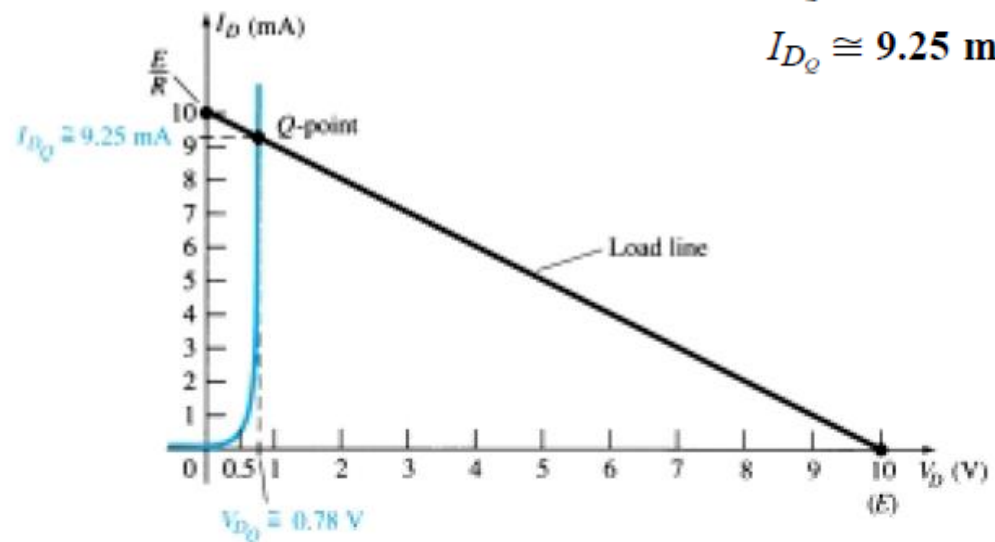


$$V_{D_Q} \cong 0.78 \text{ V}$$

$$I_{D_Q} \cong 9.25 \text{ mA}$$

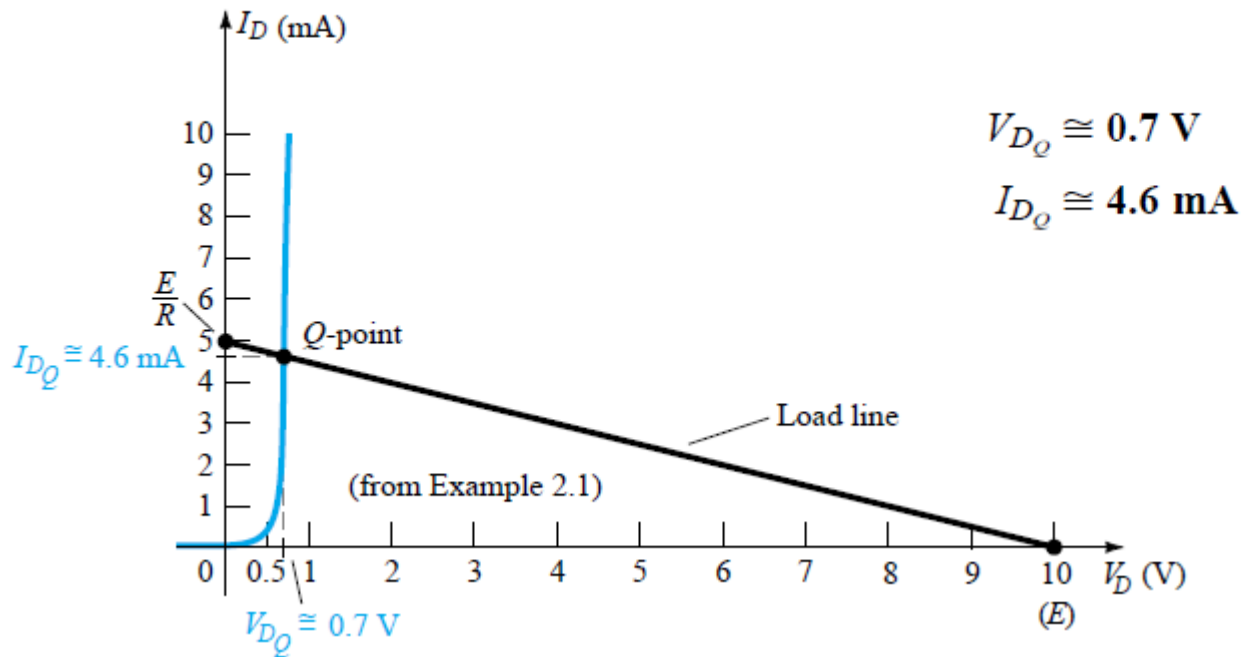
$$I_D = \frac{E}{R} \Big|_{V_D=0 \text{ V}} = \frac{10 \text{ V}}{2 \text{ k}\Omega} = 10 \text{ mA}$$

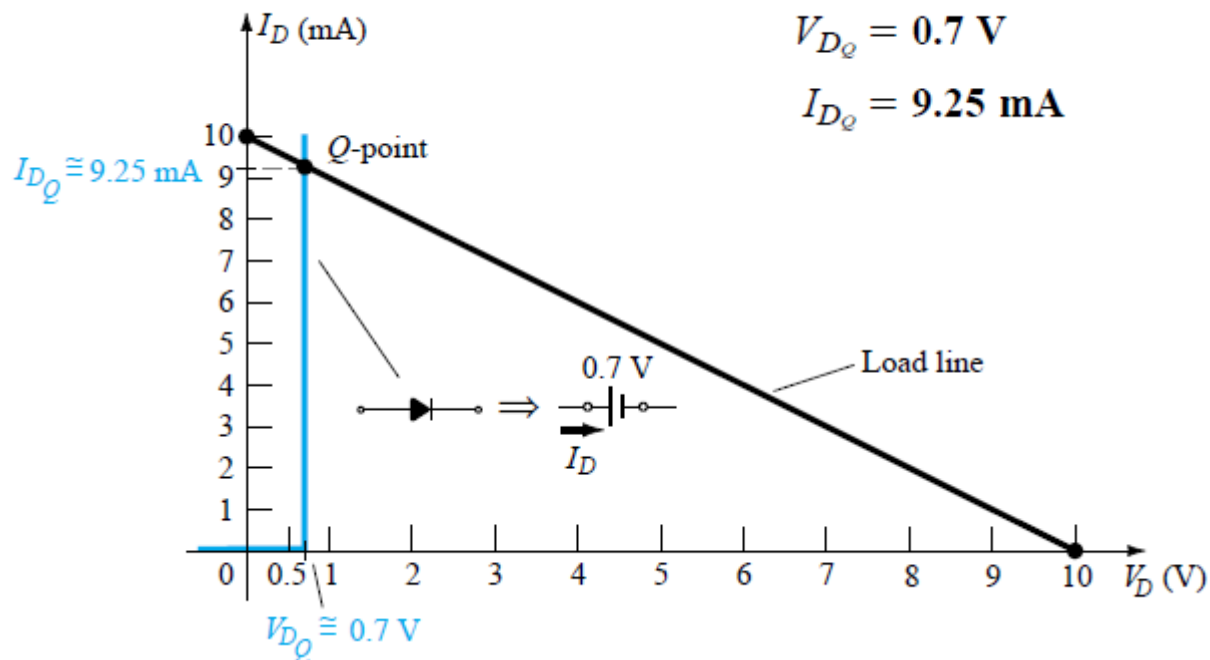
$$V_D = E \Big|_{I_D=0 \text{ A}} = 10 \text{ V}$$



$$I_D = \frac{E}{R} \Big|_{V_D=0\text{ V}} = \frac{10\text{ V}}{2\text{ k}\Omega} = 5\text{ mA}$$

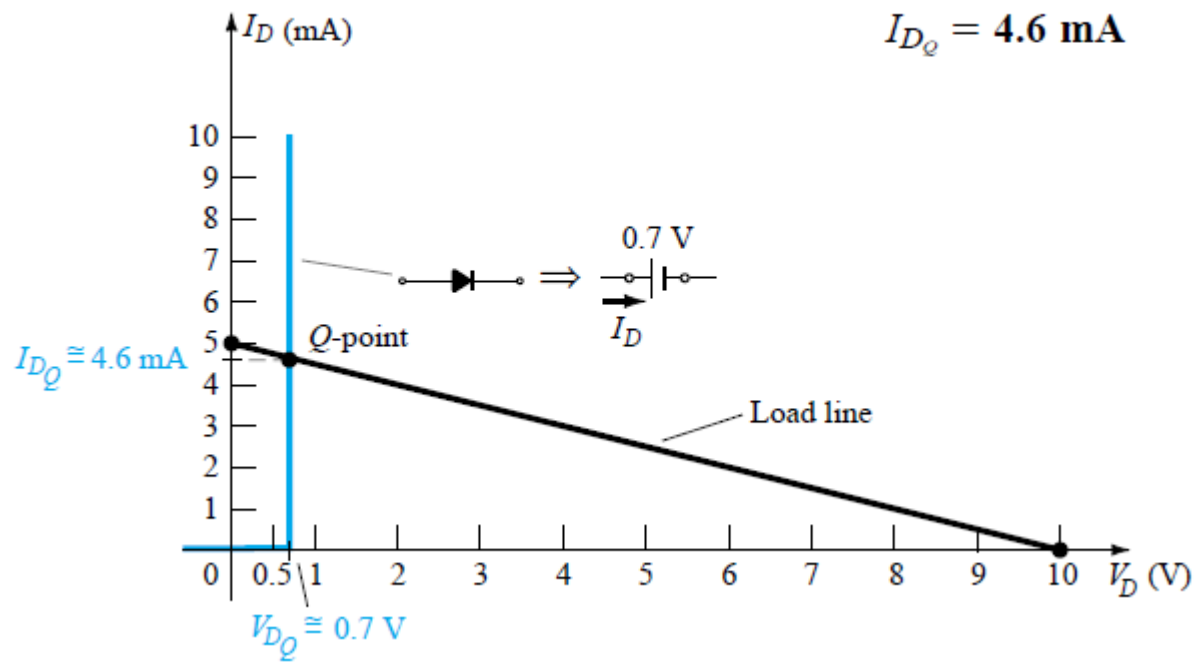
$$V_D = E \Big|_{I_D=0\text{ A}} = 10\text{ V}$$

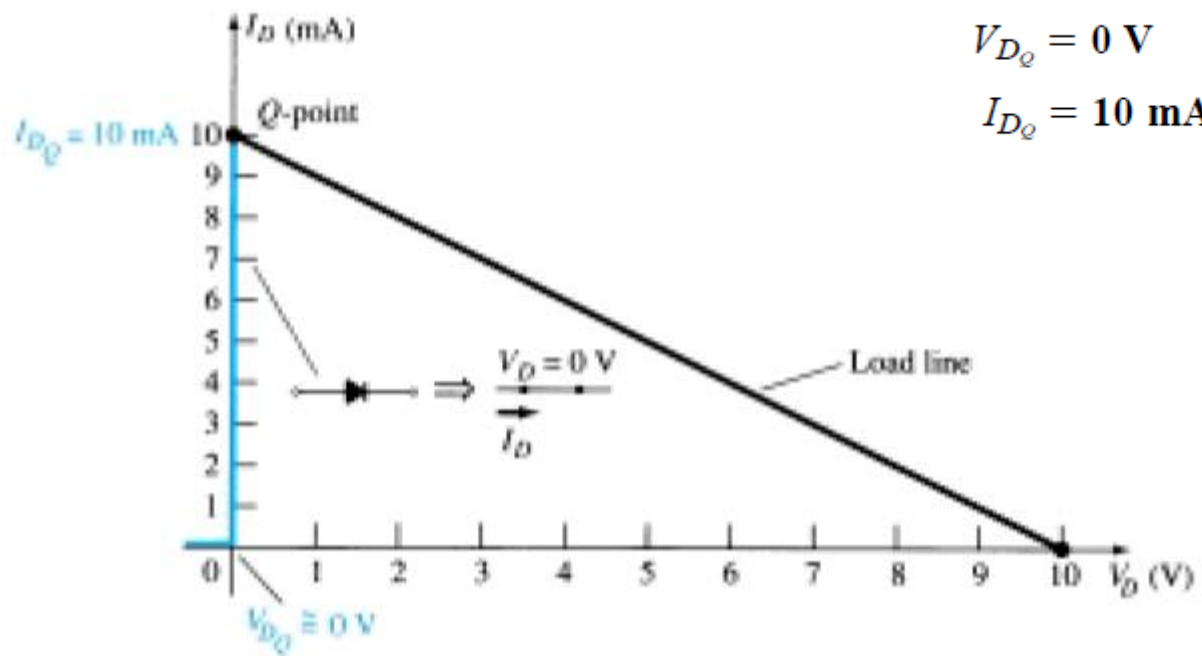




$$V_{D_Q} = 0.7 \text{ V}$$

$$I_{D_Q} = 4.6 \text{ mA}$$

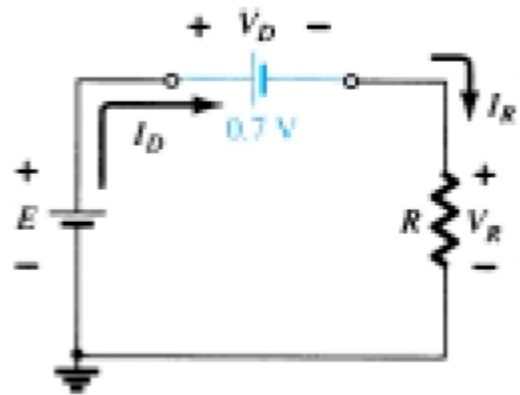




$$V_{DQ} = 0 \text{ V}$$

$$I_{DQ} = 10 \text{ mA}$$

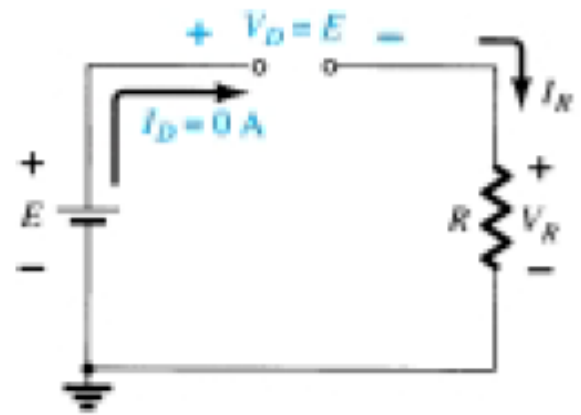
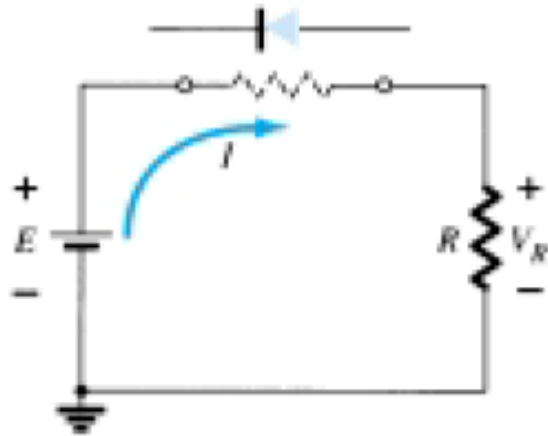
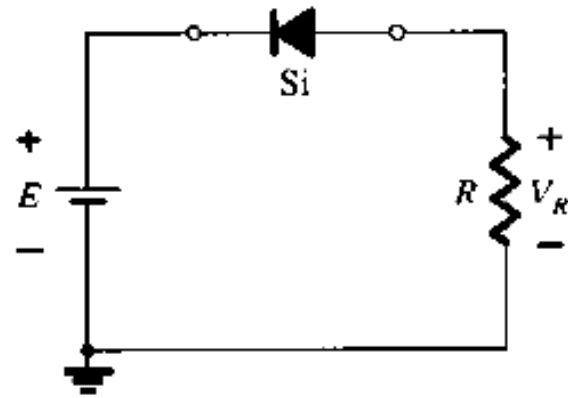


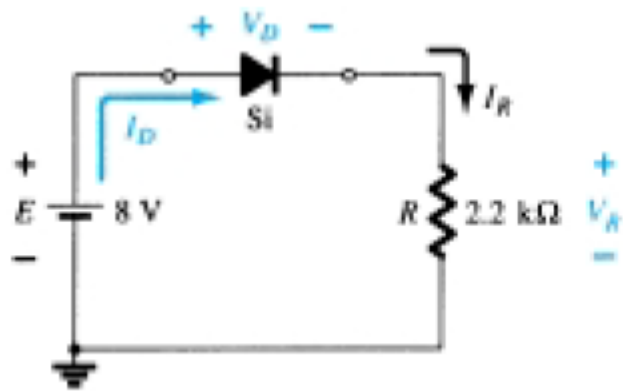


$$V_D = V_T$$

$$V_R = E - V_T$$

$$I_D = I_R = \frac{V_R}{R}$$

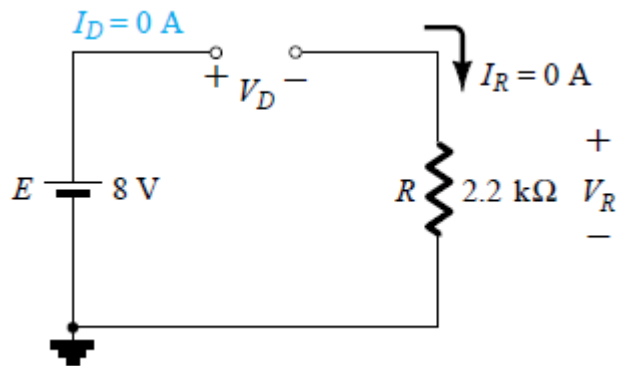




$$V_D = 0.7 \text{ V}$$

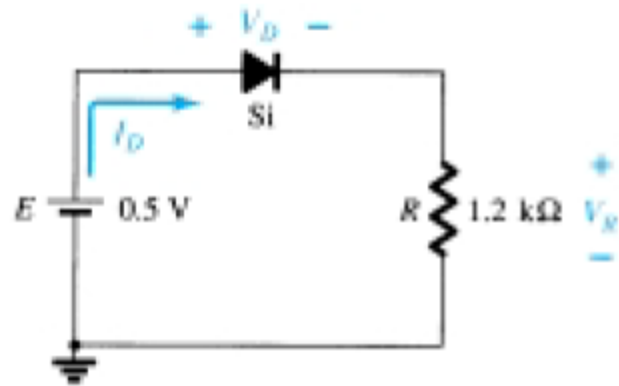
$$V_R = E - V_D = 8 \text{ V} - 0.7 \text{ V} = 7.3 \text{ V}$$

$$I_D = I_R = \frac{V_R}{R} = \frac{7.3 \text{ V}}{2.2 \text{ k}\Omega} \cong 3.32 \text{ mA}$$



$$E - V_D - V_R = 0$$

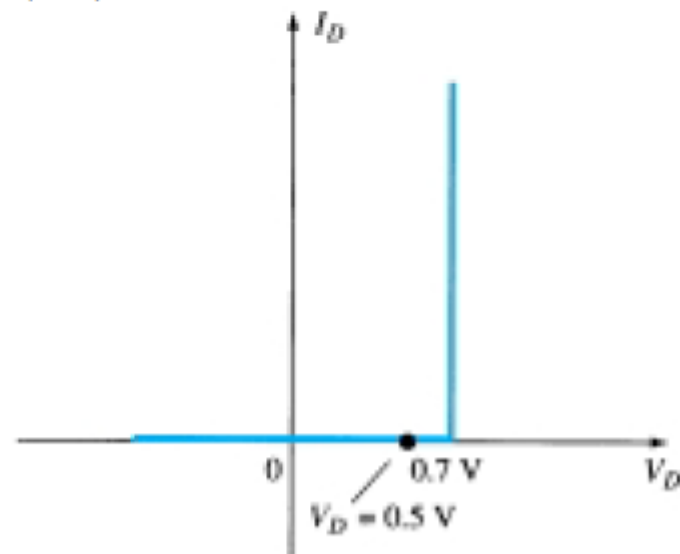
$$V_D = E - V_R = E - 0 = E = 8 \text{ V}$$

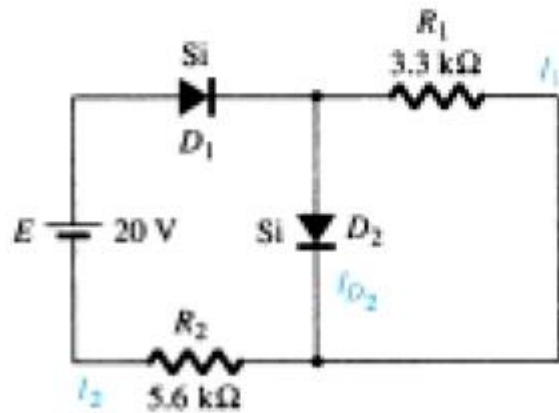


$$I_D = 0\text{ A}$$

$$V_R = I_R R = I_D R = (0\text{ A})1.2\text{ k}\Omega = 0\text{ V}$$

$$V_D = E = 0.5\text{ V}$$



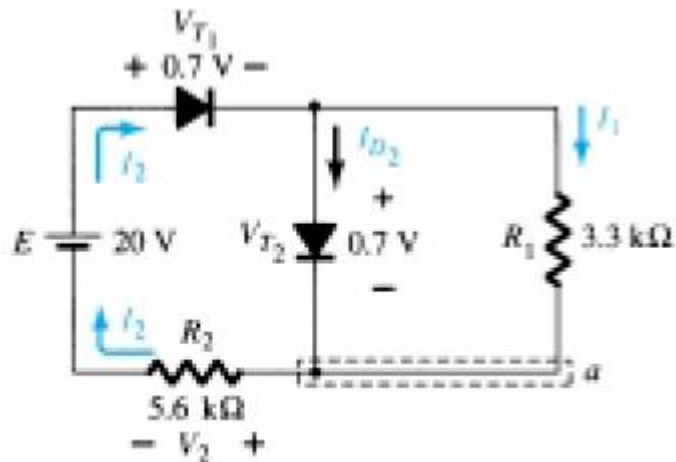


$$I_1 = \frac{V_{T_2}}{R_1} = \frac{0.7 \text{ V}}{3.3 \text{ k}\Omega} = 0.212 \text{ mA}$$

$$-V_2 + E - V_{T_1} - V_{T_2} = 0$$

$$V_2 = E - V_{T_1} - V_{T_2} = 20 \text{ V} - 0.7 \text{ V} - 0.7 \text{ V} = 18.6 \text{ V}$$

$$I_2 = \frac{V_2}{R_2} = \frac{18.6 \text{ V}}{5.6 \text{ k}\Omega} = 3.32 \text{ mA}$$



$$I_{D_2} + I_1 = I_2$$

$$I_{D_2} = I_2 - I_1 = 3.32 \text{ mA} - 0.212 \text{ mA} = 3.108 \text{ mA}$$


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