

ECE 111: Handout #18

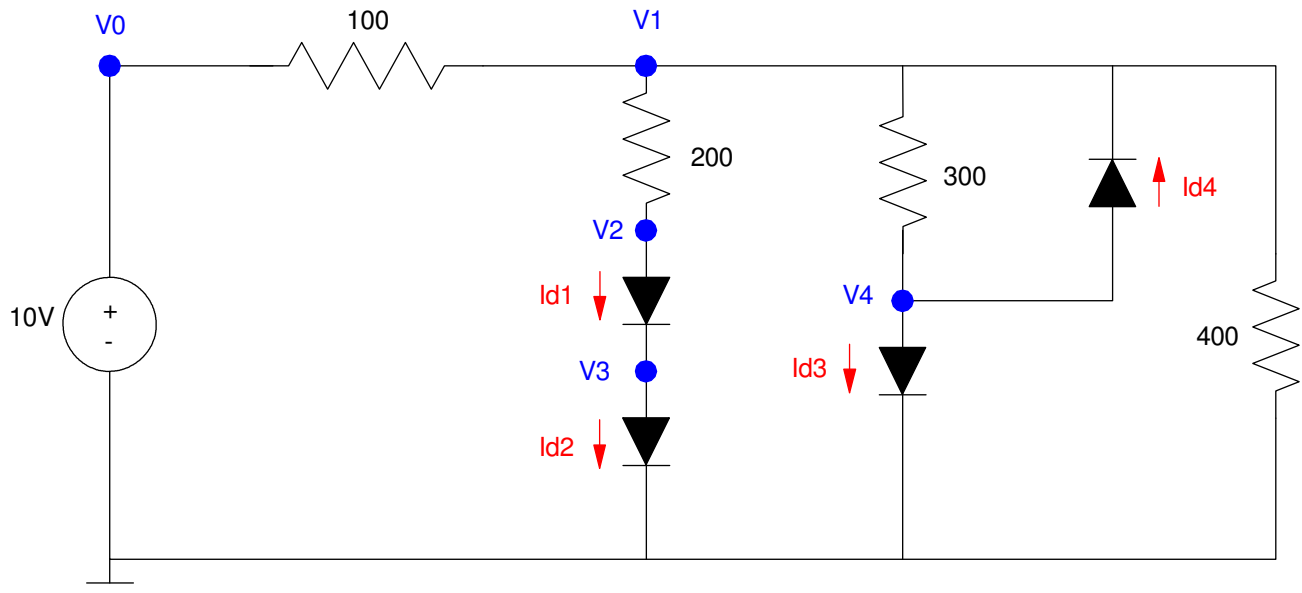
ECE 320 Electronics I: Diode Circuits

Assume the VI characteristics for a diode are

$$V_d = 0.052 \ln(10^8 I_d + 1)$$

$$I_d = 10^{-8} \left(\exp\left(\frac{V_d}{0.052}\right) - 1 \right)$$

Write the voltage node equations for the following diode circuit



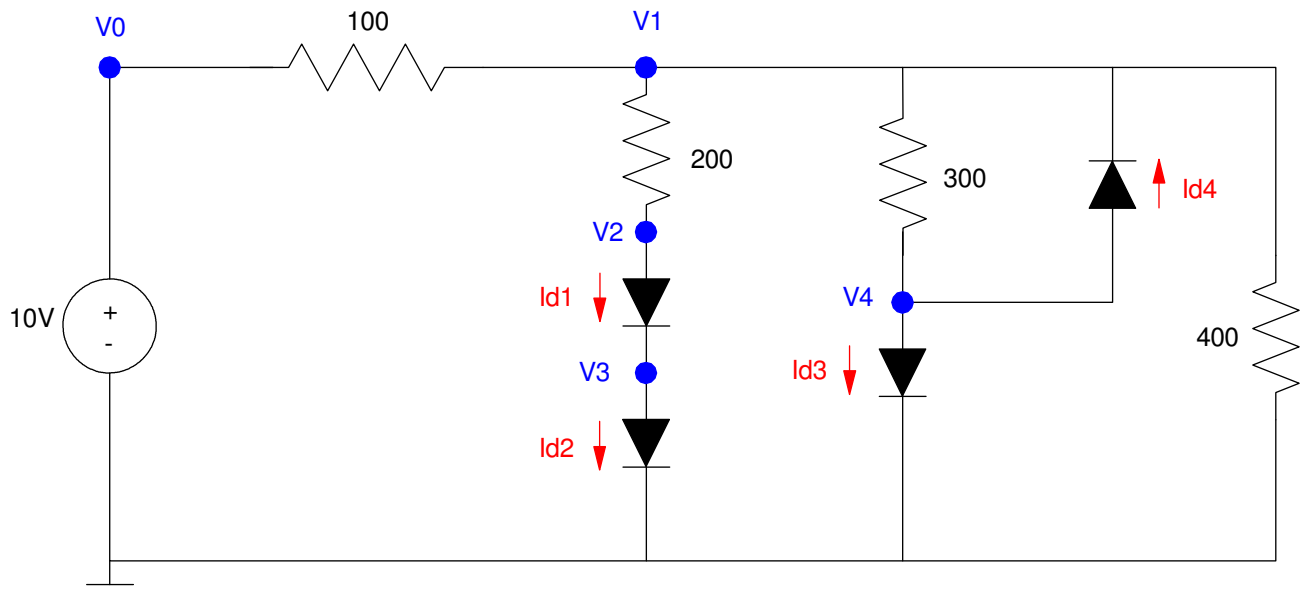
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Electronics I: Diode Circuits

Assume the VI characteristics for a diode

$$V_d = 0.052 \ln(10^8 I_d + 1) \quad I_d = 10^{-8} \left(\exp\left(\frac{V_d}{0.052}\right) - 1 \right)$$

Write the voltage node equations for the following diode circuit



Start with the diode equations

$$I_{d1} = 10^{-8} \left(\exp\left(\frac{V_2 - V_3}{0.052}\right) - 1 \right)$$

$$I_{d2} = 10^{-8} \left(\exp\left(\frac{V_3 - 0}{0.052}\right) - 1 \right)$$

$$I_{d3} = 10^{-8} \left(\exp\left(\frac{V_4 - 0}{0.052}\right) - 1 \right)$$

$$I_{d4} = 10^{-8} \left(\exp\left(\frac{V_4 - V_1}{0.052}\right) - 1 \right)$$

Now write the voltage node equations.

$$\left(\frac{V_1 - 10}{100}\right) + \left(\frac{V_1 - V_2}{200}\right) + \left(\frac{V_1 - V_4}{300}\right) - I_{d4} + \left(\frac{V_1 - 0}{400}\right) = 0$$

$$\left(\frac{V_2 - V_1}{200}\right) + I_{d1} = 0$$

$$-I_{d1} + I_{d2} = 0$$

$$\left(\frac{V_4 - V_1}{300}\right) + I_{d3} + I_{d4} = 0$$