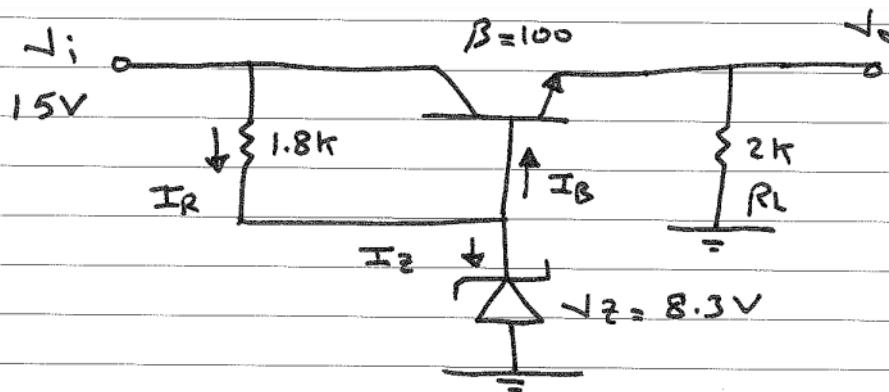


Voltage regulators Problems Solutions

15.19



$$V_o = V_{EB} + V_Z = 8.3 - 0.7 = 7.6V$$

$$I_L = \frac{V_o}{R_L} = \frac{7.6}{2k} = 3.8mA$$

$$I_B = \frac{I_L}{\beta + 1} \approx 38\mu A$$

$$I_R = \frac{V_i - V_Z}{1.8k} = 3.7mA$$

$$I_Z = I_R - I_B = 3.66mA$$

15.21

$$V_o = V_Z \left(1 + \frac{12k}{8.2k} \right)$$

$$V_o = 24.6V$$

15.27

$$V_o = V_{reg} \left(1 + \frac{R_2}{R_1} \right) + I_{adj} R_2$$

$$= 1.25 \left(1 + \frac{1.5k}{0.22k} \right) + (100\mu A)(1.5k)$$

$$V_o = 9.9V$$