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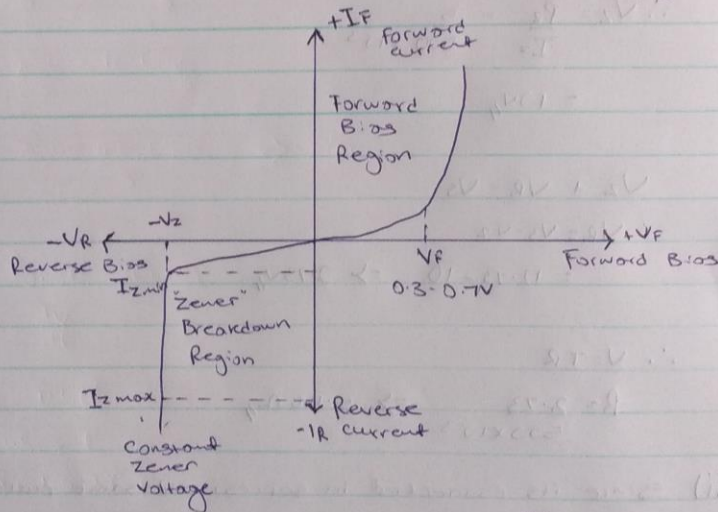
Dept: Chemical Engineering

Assignment

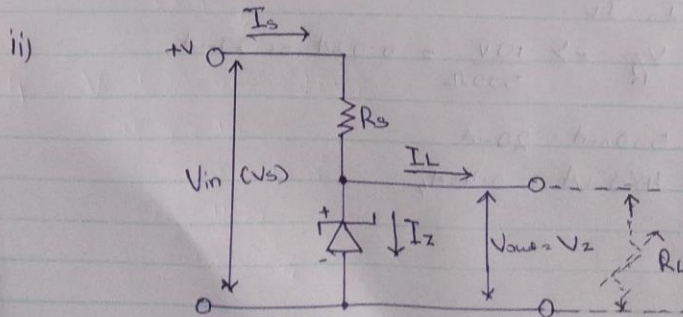
1. A Zener diode is like a general purpose diode consisting of a silicon P-N junction. But are designed to have low pre-determined Reverse Breakdown Voltage that takes advantage of this high reverse voltage.



Zener diode symbol



I-V Characteristics



Zener Diode Regulator

$$2. i) P_z = 5W$$

$$I_z = 500mA$$

$$20V_{max}$$

Convert V_{max} to V_{dc}

$$V_{dc} = \frac{2V_{max}}{\pi}$$

$$V_s = \frac{2 \times 20}{\pi} = 12.73 V_{dc}$$

Recall Recall that $P = IV$

$$\therefore V_z = \frac{P_z}{I_z} = \frac{5}{500 \times 10^{-3}}$$
$$= 10V_{dc}$$

$$V_z + V_R = V_s$$

$$\therefore V_R = V_s - V_z$$

$$= 12.73 - 10 \Rightarrow 2.73V_{dc}$$

$$\therefore V = IR$$

$$R = \frac{2.73}{500 \times 10^{-3}} \Rightarrow 5.46\Omega_{dc}$$

ii) Since it's connected in series, and same current flows

$$I_s = I_z + I_L$$

$$I_z = I_s - I_L$$

$$I_L = \frac{V_z}{R} \Rightarrow \frac{10V}{500\Omega} = 0.02A \text{ or } 20mA$$

$$I_z = 500mA - 20mA$$

$$= 480mA = 0.48A_{dc}$$