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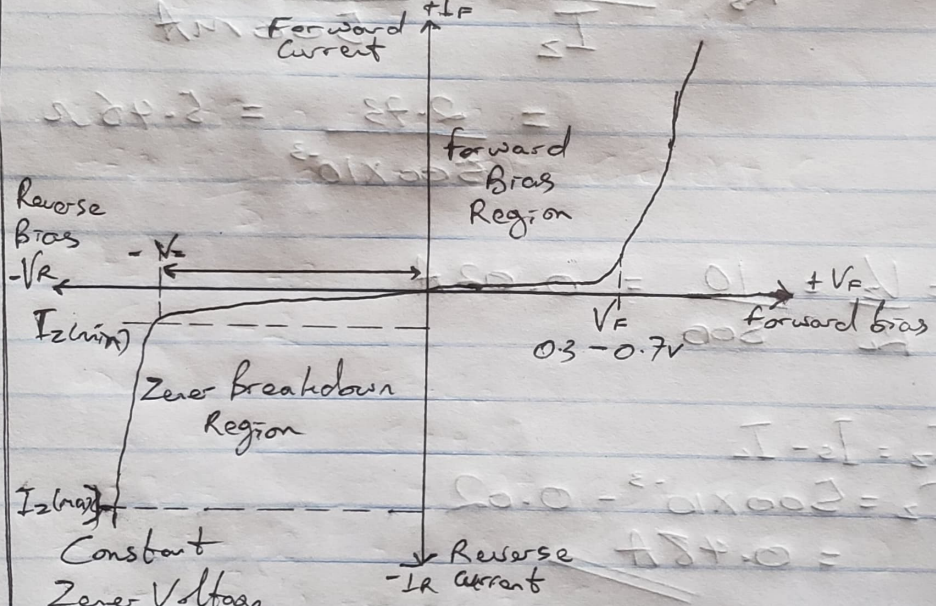
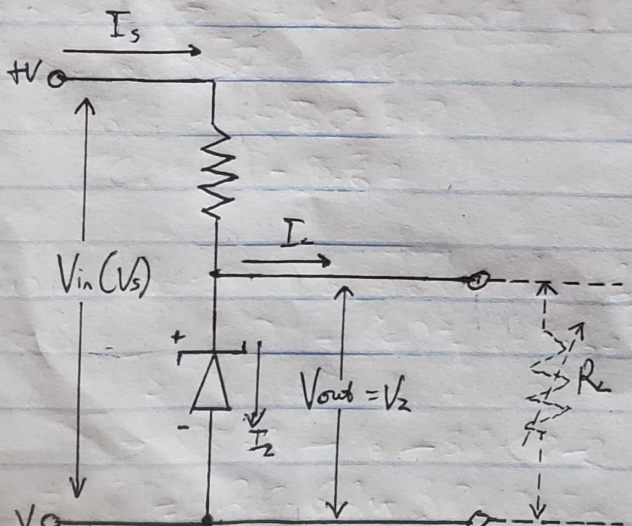
1) Zener diode regulator is like a general-purpose signal diode which when biased in the forward direction behaves just like a normal signal diode, but when a reverse voltage is applied to it, the voltage remains constant for a wide range of currents.

b

Zener diode Symbol



I-V Characteristics Curve



Circuit diagram

2 $P_z = 5$ watts

$V_z = 3$ $V_s = 20\ V_{max}$

$R_s =$

$I_z = 500mA$

$$\text{Voltage} = \frac{\text{Watt}}{\text{Current}} = \frac{5}{500 \times 10^{-3}} = 10V$$

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

i The minimum Value of the series resistor to the Zener diode,

$$R_s = \frac{V_s - V_z}{I_z} = \frac{12.73 - 10}{500mA}$$

$$= \frac{2.73}{500 \times 10^{-3}} = 5.46\Omega$$

ii $$I_L = \frac{V_z}{R_L} = \frac{10}{500} = 0.02A$$

$$I_z = I_s - I_L$$

$$I_z = 500 \times 10^{-3} - 0.02$$

$$= 0.48A$$