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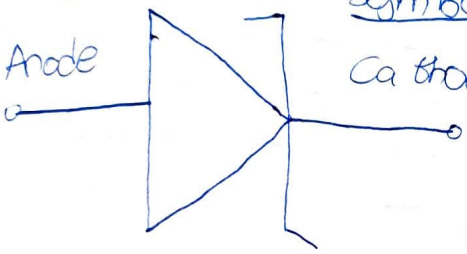
18/ENG04/054
Electrical/Electronics

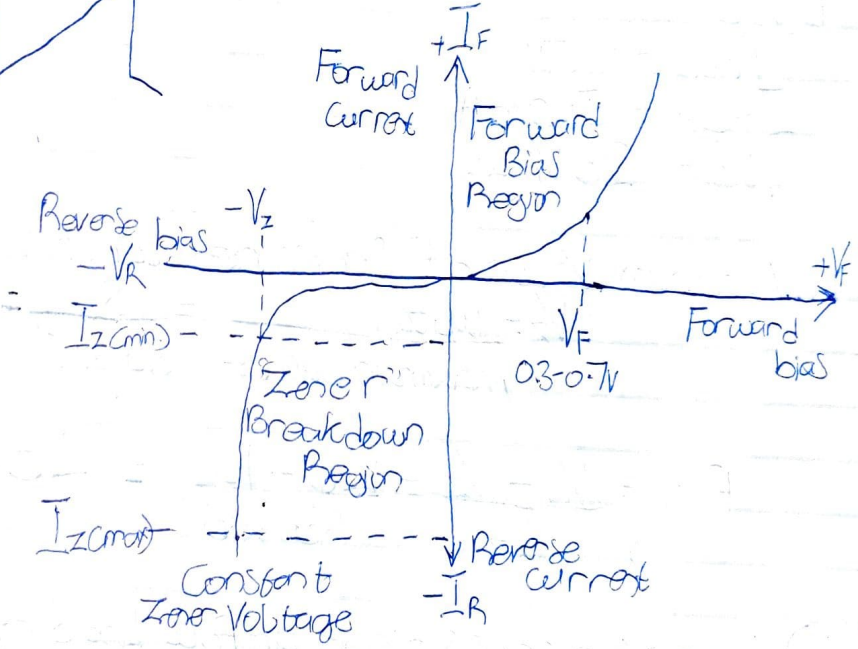
1.) Zener diode Regulator;
A Zener diode is always operated in its reverse biased condition. As such a simple voltage regulator circuit can be designed using a zener diode to maintain a ~~coff~~ constant DC output voltage across the load in spite of variations in the Input voltage or changes in the load current

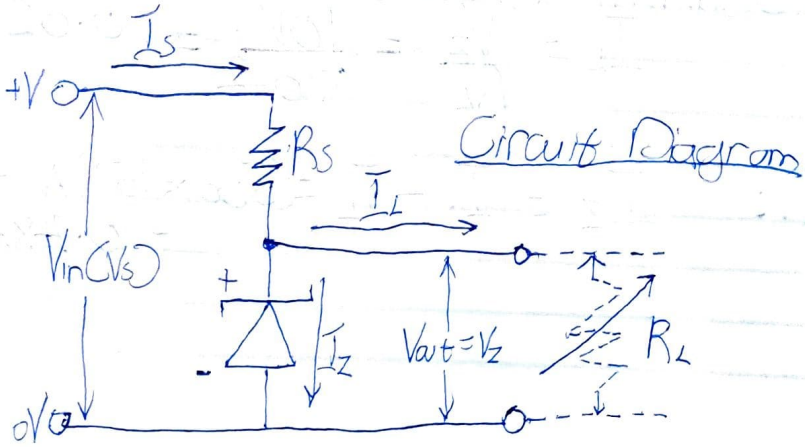
It merely entails connecting the Zener diode between the unregulated source of voltage and ground.

Symbol



I-V Characteristics





Circuit Diagram

D.C Input Voltage from rectifier or Smoothing Circuit

Number 2

Data

Power = 5W

I_{max} = 500mA

V_S = 20 V_{max}

i) Minimum Value of Series resistor, R_S

$$V_Z = \frac{\text{Watts}}{\text{maximum current}} = \frac{5}{500 \times 10^{-3}} = 10V$$

$$R_S = \frac{V_S - V_Z}{I_Z} = \frac{20 - 10}{500 \times 10^{-3}} = 20\Omega$$

ii) Current across diode at full Load of 500 Ω

$$I_L = \frac{V_Z}{R_L} = \frac{10V}{500\Omega} = 0.02A$$

$$\therefore \quad I_Z = I_S - I_L = (500 \times 10^{-3})A - 0.02A$$

$$= 0.48A$$