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- IS/ENGG2012 Biomedical Engineering
- BASIC ELECT ASSIGNMENT (ENGG222)

Number 2

(a) First Voltage of Zener diode:

$$V = \frac{\text{Watts}}{\text{Current}} = \frac{5}{500\text{mA}} = 10\text{V}$$

This maximum value

$$R_s = \frac{V_s - V_Z}{I_Z} = \frac{20 - 10}{500\text{mA}}$$

$$R_s = 20\Omega$$

(b) Current at 500 Ω

$$I = \frac{V_Z}{R_L} = \frac{10}{500\Omega}$$

$$= 0.02\text{A}$$

$$\therefore I_Z = 0.02\text{A}$$

$$0.02\text{A} = 20\text{mA}$$

$$I_T = I_Z + I_L$$

$$20 - 10 = I_Z + (20 \times 10^{-3})$$

$$20$$

$$0.5 = I_Z + 0.02$$

$$\therefore I_Z = 0.5 - 0.02 = 0.48$$

$$\therefore I_Z = 480\text{mA}$$

→ The current across load the load of 500 Ω is 480mA.

Number 1

(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 the load in spite of variations in the input voltage or changes in the load current. The constant reverse voltage V_Z of the Zener diode makes it a valuable component for the regulation of the output voltage against both variations in the input voltage from an unregulated power supply or variations in the load resistance.

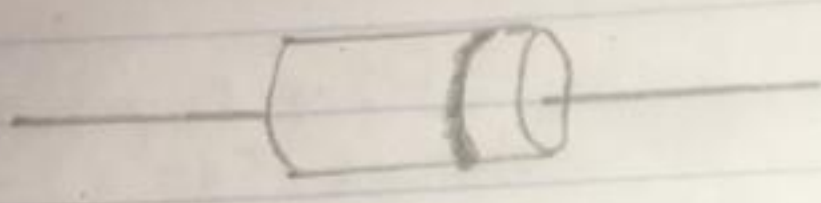
The current through the Zener will change to keep the voltage at within the limits of the threshold of Zener action and the maximum power it can dissipate.

The purpose of the Zener diode is to stabilize the value of the output. Hence it is used as the voltage regulator. This resistor (the resistor that limits the current) which is connected across the

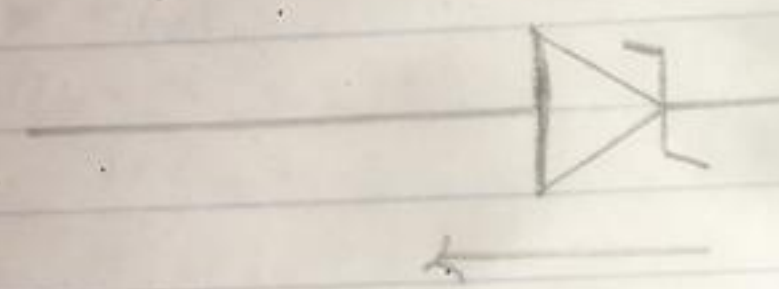
the load along with the Zener diode) is responsible for the stabilization of the output.

A Zener diode regulator consists of a current limiting resistor R_s connected in series with the input voltage V_s with the Zener diode connected in parallel with the load R_L in this reverse biased condition. ~~Be as to~~

① SYMBOL



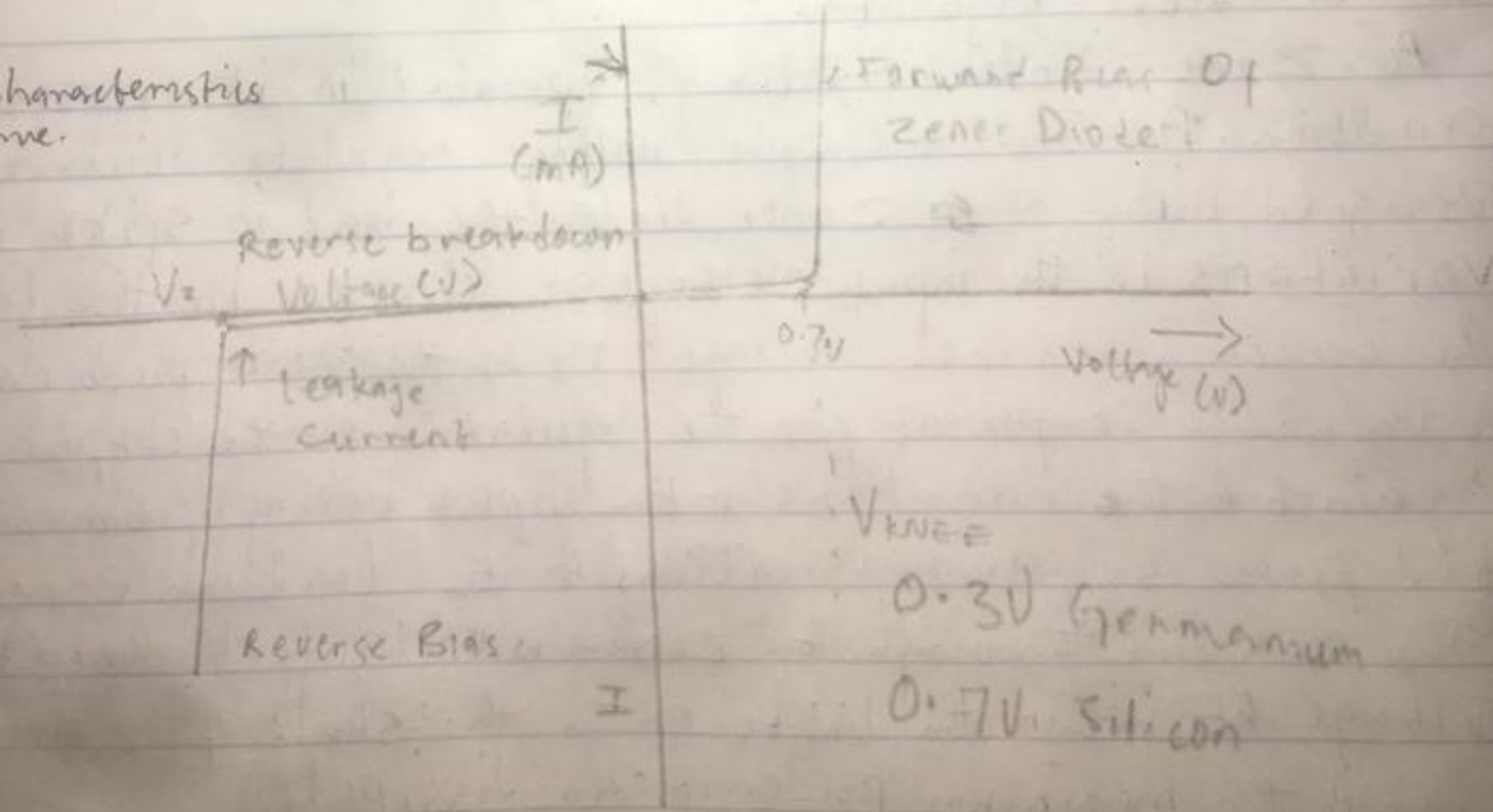
APPEARANCE



SCHEMATIC SYMBOL

Backwards current flow too, but only past the "Zener" breakdown voltage.

I-V Characteristics Curve.



(ii) Circuit Diagram:

