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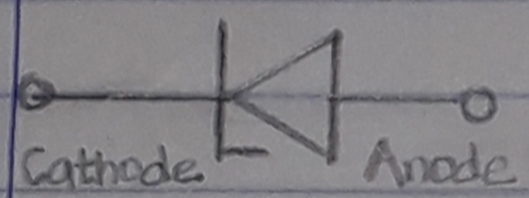
urse: ENG 222 (Basic Elect)

Assignment

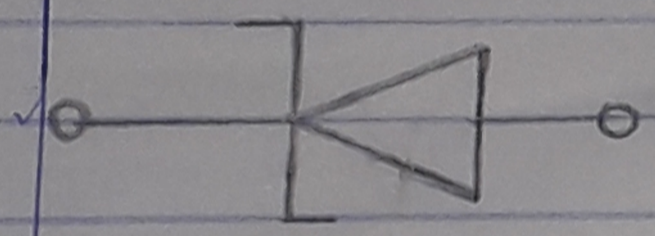
1. The zener diode behaves just like a normal general purpose diode consisting of a Silicon PN junction and when biased in the forward direction, that is Anode positive with respect to its cathode, it behaves just like a normal signal diode passing the rated current. The zener diode is used in its "reverse bias" or reverse breakdown mode, i.e the diodes anode connects to the negative supply.

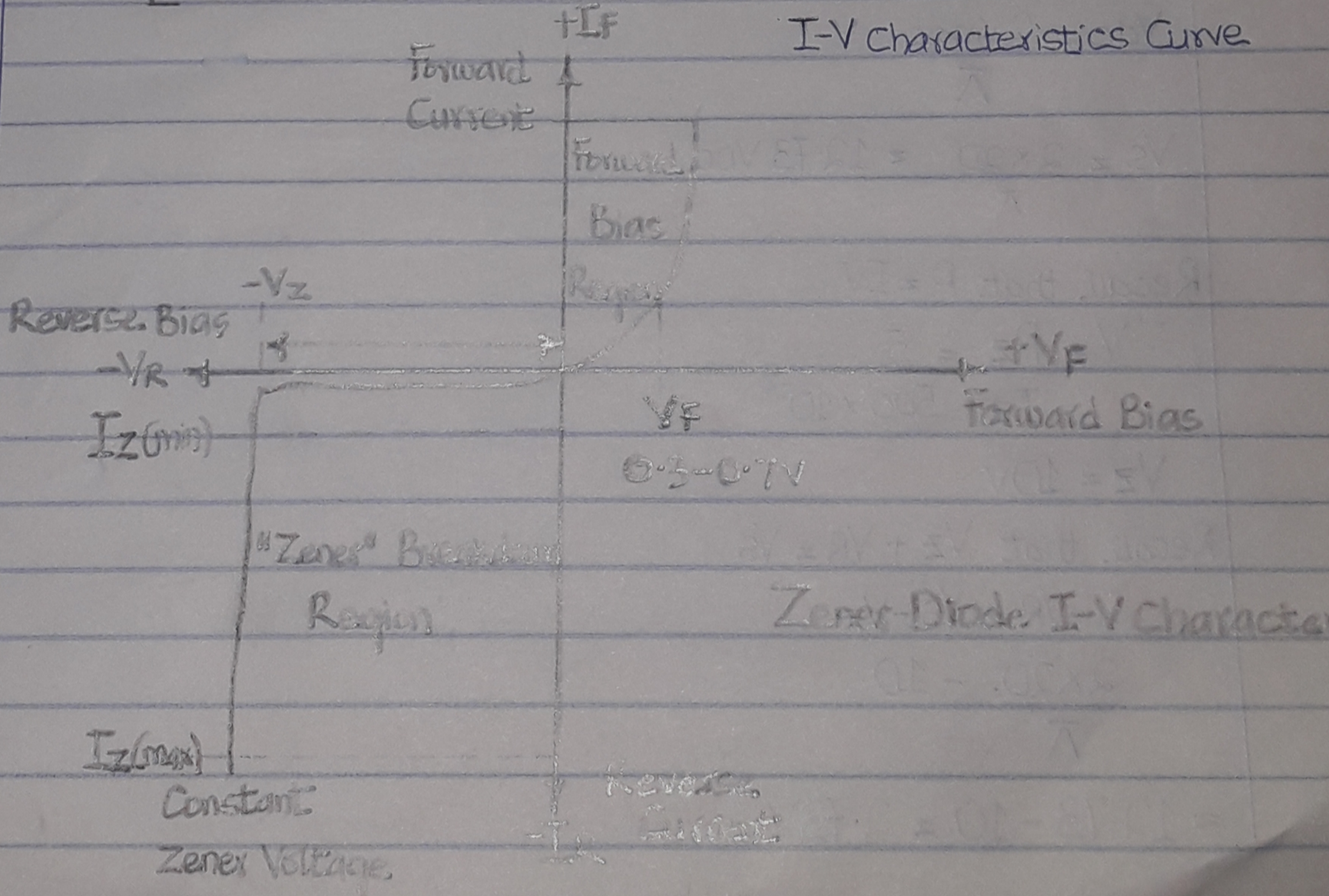
Symbol

i



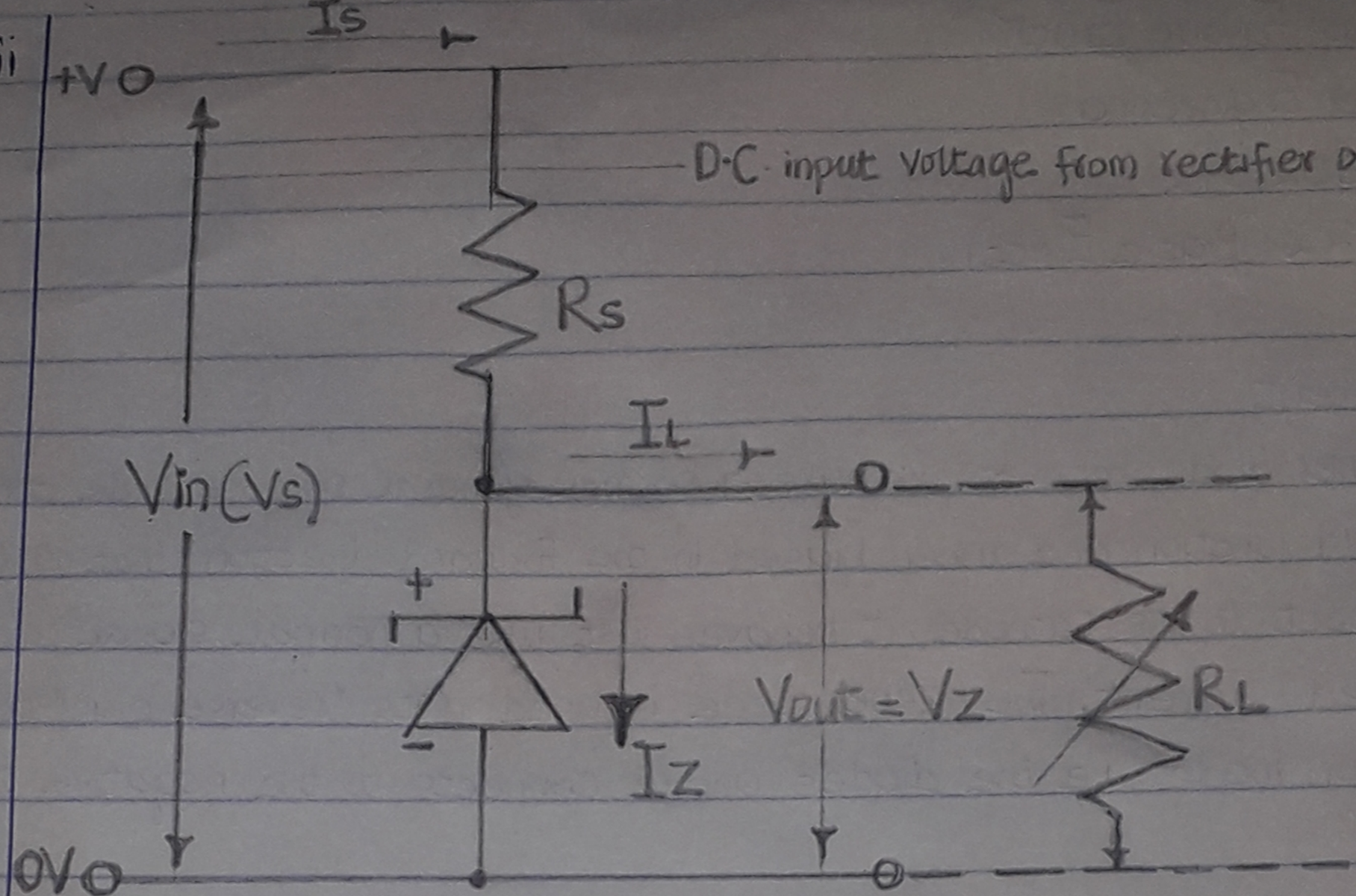
(K) or (A)





I-V characteristics Curve

Zener Diode I-V Characteristics



Circuit diagram

2) $P_Z = 5W$

$I_Z = 500mA$

20Vmax

To Convert Vmax to VDC

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

$$V_S = \frac{2 \times 20}{\pi} = 12.73\ V_{DC}$$

Recall that $P = IV$

$$\therefore V = \frac{P_Z}{I_Z} = \frac{5}{500 \times 10^{-3}}$$

$V_Z = 10V$

Recall that $V_Z + V_R = V_S$

$$\therefore V_R = V_S - V_Z$$

$$\frac{2 \times 20}{\pi} - 10$$

$= 12.73 - 10 = 2.73V$

$V = IR$

$R = \frac{V}{I} = \frac{2.73}{500 \times 10^{-3}}$

~~$R = 5\,V$~~ $R = 5.46\,\Omega$

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

$I_S = I_Z + I_L$

$I_Z = I_S - I_L$

$I_L = \frac{V_Z}{R}$

$= \frac{10V}{500\Omega} = 0.02A = 20mA$

$I_Z = 500mA - 20mA$

$= 480mA = 0.48A.$