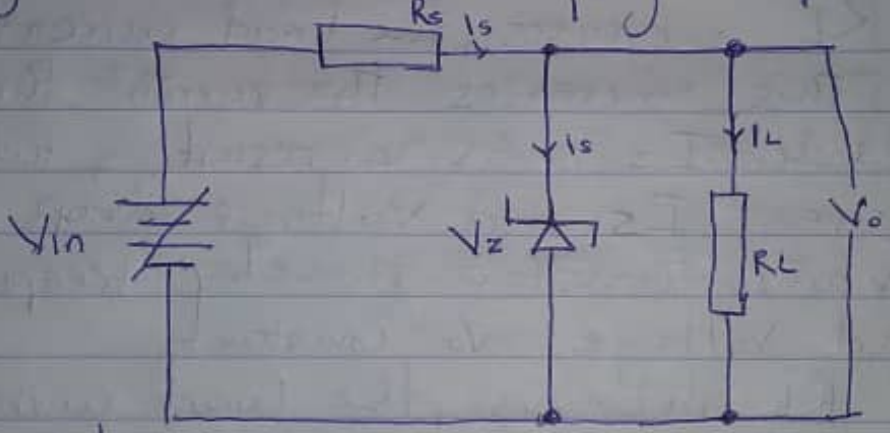
JOHN EDWIN AKPAN.
18/ENG06/1033
MECHANICAL ENG.
ENG 222.

Zener Diode Regulator.

This can be described under the following
(1) Regulation with Varying input Voltage V_{in}
(2) Regulation with Varying load Resistance R_L

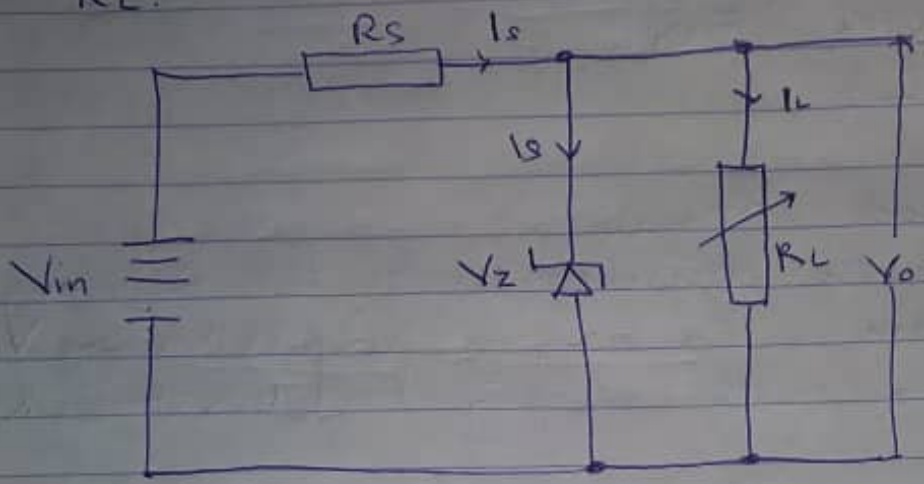
(1) Regulation with Varying input Voltage V_{in}



When Vin increases, input current Is also increases, This increases the current through Zener diode I_z without affecting the load current I_L. With the increase in input current the voltage drop across resistor Rs will also increase, thereby keeping the load voltage V_o constant.

When Vin decreases, the input current also decreases. This decreases the current through zener diode I_z without affecting the load current I_L. With the decrease in input current the voltage drop across resistor Rs will also decrease there by keeping the load V_o constant.

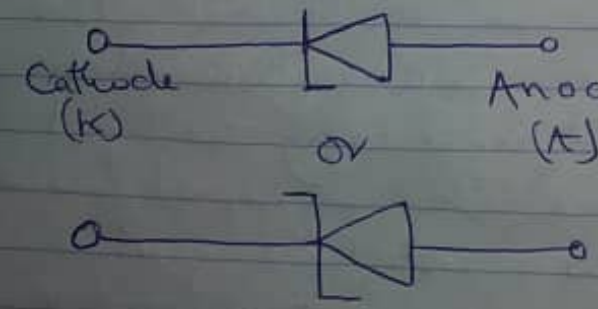
b) Regulation with varying load resistance R_L.



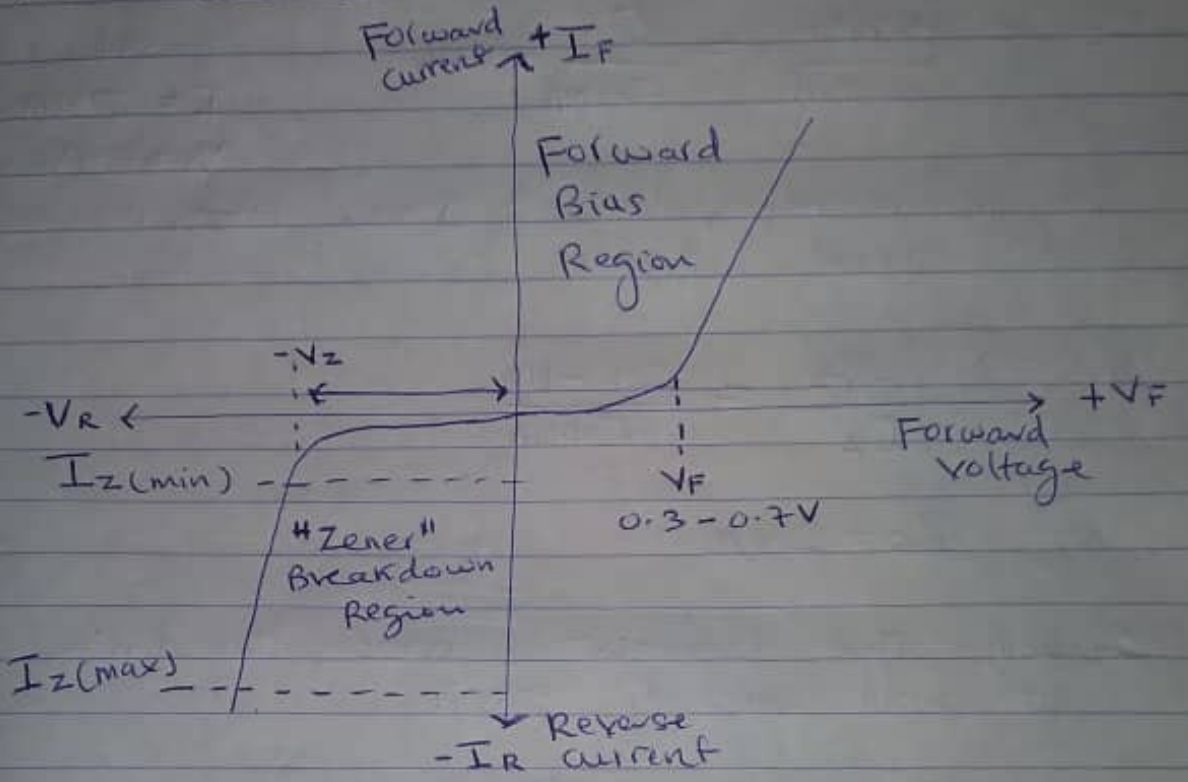
When R_L increases, the load current I_L decreases. This increases the current through Zener diode I_z. As a result of this the input current I_s and voltage drop across Rs remains constant. thereby keeping the load voltage V_o constant.

When R_L decreases, the load current I_L increases. this decreases the current through zener diode I_z. As a result of this the input I_s and voltage drop across Rs remains constant, thereby keeping the load voltage V_o constant.

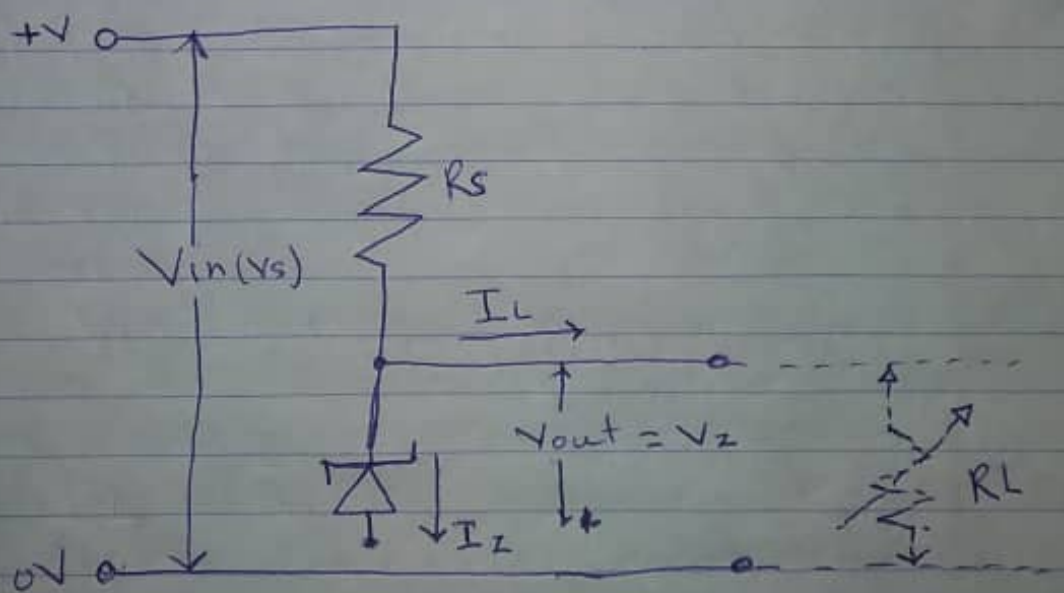
I(i) Symbols



I–V Characteristic Curve



Circuit Diagram.



(2)(i) Voltage of the zener diode.

$V_z = \frac{\text{Power}}{\text{current}} = \frac{5}{500mA} = 10V$

$P = 5W$

$I = 500mA$

$V_s = 20V_{max.}$

The Minimum Value of Series ~~Fistor~~ resister of the zener diode.

$R_s = \frac{V_s - V_z}{I_z} = \frac{20 - 10}{500mA}$

$R_s = 20\Omega$

(2)(ii) The current across the diode at full load of 500Ω

$I_L = \frac{V_z}{R_L} = \frac{10}{500\Omega}$

$I_L = 0.02A$