18/ENG05/1010
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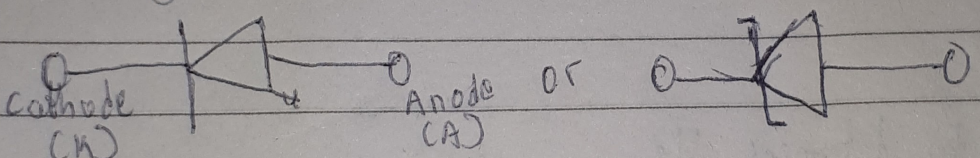
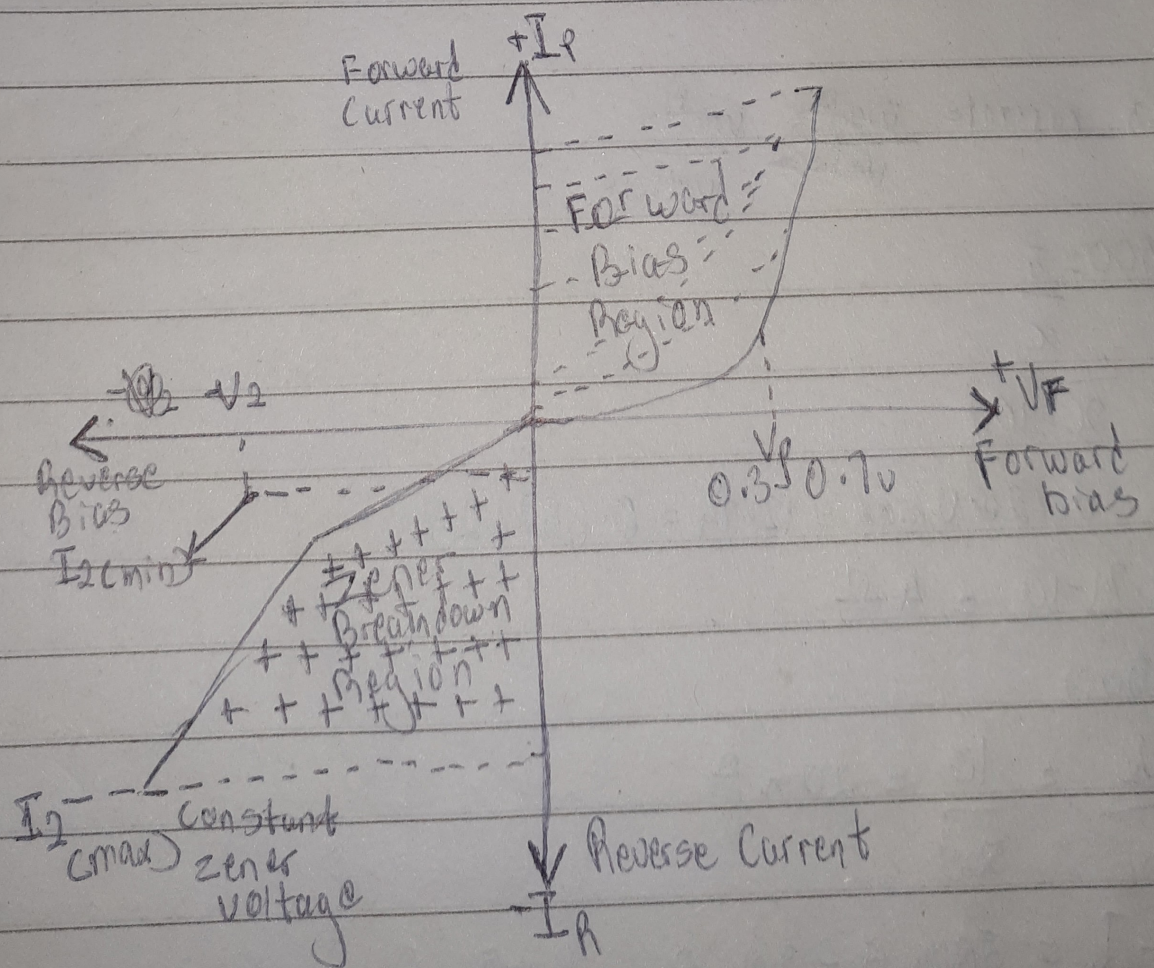
Mechatronics
ENG222
Assignment

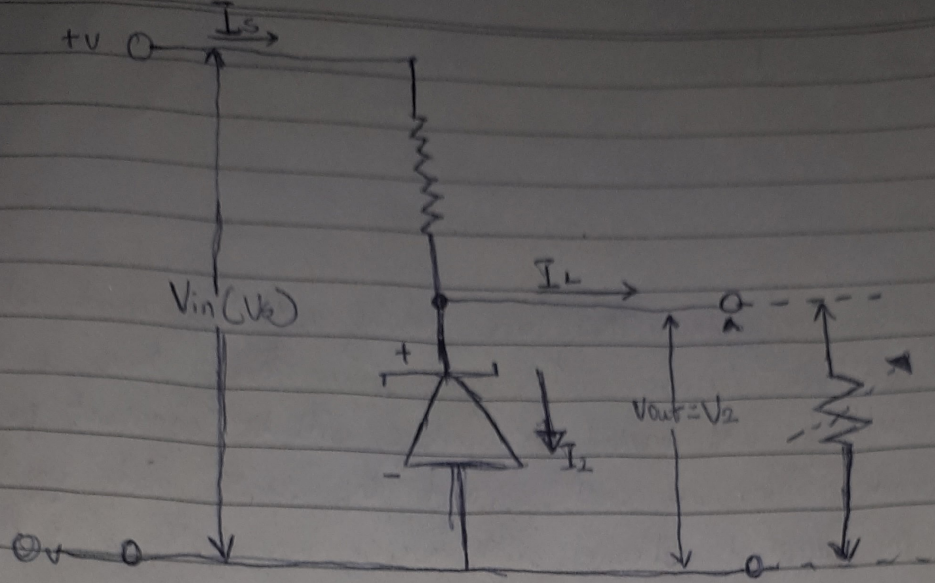
1 Zener Diode as voltage regulator. They are widely used as shunt voltage regulators to regulate voltage across small loads. Zener diodes have a sharp reverse breakdown voltage and breakdown voltage will be constant for a wide range of currents. Thus we will connect the zener diode parallel to the load such that the applied voltage will reverse bias it. Thus if the reverse bias voltage across the zener diode exceeds the knee voltage, the voltage across the load will be constant.

(i) Symbol





ii).



Zener Diode Regulator Circuit

2 To determine the minimum value of the series resistor to the zener diode.

$$R_S = \frac{V_S - V_Z}{I_Z}$$

We need to determine V_2

max current $\frac{\text{watts}}{\text{voltage}}$

$$500 = \frac{5}{x}$$

$$x = 10V$$

$V_S = 20V$ max $= 12.74 = 0.637 \times 20$

$$R_S = \frac{12.74 - 10}{500} = 4.5\Omega$$

$$I_L = \frac{V_2}{R_L} = \frac{10}{500} = 20mA$$

$$I_Z = I_S - I_L = 500mA - 20mA = 480mA$$