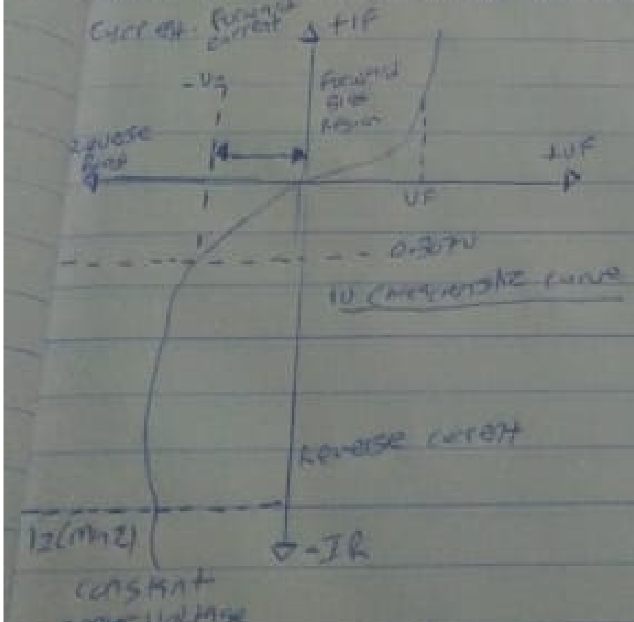
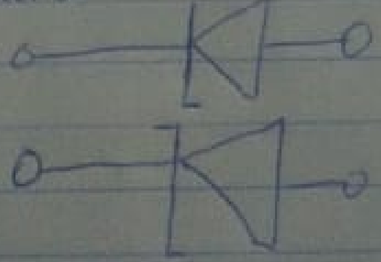
Hammed Abdulsamad Folawiyo
18/ENG04/025
Mechanical Engineering
Basic Elect
ENG 222

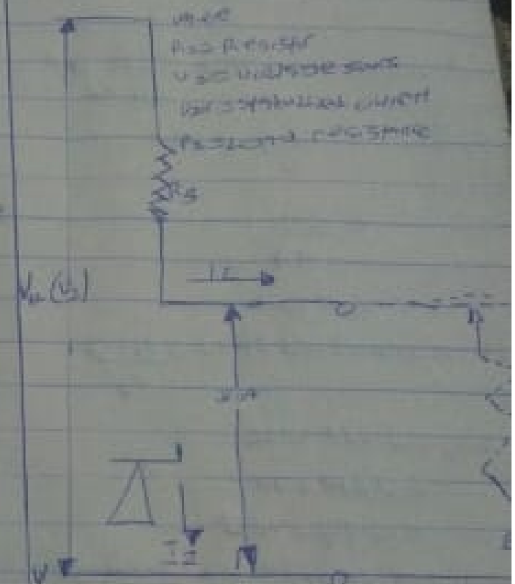
(1) Describe a zener diode Regulator, (a) sketch the symbol and I-V characteristic curve (b) sketch and label the circuit diagram

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 constant DC output voltage across the load inspite of variations in the input voltage or changes in the load current.



IV characteristic curve





Iz= Load current across zener diode

(a) The minimum value of the series resistor in the zener diode.

First: max power = 5 W
I_Z = 500 mA = 0.5 A
V_S = 20 Vmax

(i) Maximum current = $\frac{\text{max power}}{\text{voltage}}$

$= \frac{5\,W}{V} = 0.5\,A$

$V = \frac{5\,W}{0.5\,A}$

$= V_Z = 10\,V$

The minimum resistance $= \frac{V_S - V_Z}{I_Z}$

$V_{dc} = 0.637\,V_{max}$

$= 0.637 \times 20$

$= 12.74\,V_{dc}$

minimum resistance $= \frac{12.74 - 10}{0.5}$

$= 5.48\,\Omega$

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

Load current $I_L = \frac{V_Z}{R_L} = \frac{10}{500}$

$= 0.02\,A$ or $20\,mA$

$I_Z = I_S - I_L$

$= 500 - 20$

$= 480\,mA$