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MAT NO: 18/ENG03/002
DEPARTMENT: CIVIL ENGINEERING
COURSE: BASIC ELECT
COURSE CODE: ENG 222

2, The minimum Value of the Series Resistor to the Zener diode;

Firstly: Max Power = 5W

$I_Z = 500mA = 0.5A$

$V_S = 20V_{max}$

(i) Maximum current = $\frac{\text{Max Power}}{\text{Voltage}}$

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

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

$\therefore V_Z = 10V$

$\therefore$ The minimum resistance = $\frac{V_S - V_2}{I_Z}$

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

$= 0.637 \times 20$

$= 12.74 V_{dc}$

$\therefore$ Minimum Resistance = $\frac{12.74 - 10}{0.5} = 5.48\Omega$

(ii) The Current Across the diode at full Load of 500Ω

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

$= 0.02A$ or $20mA$

$I_Z = I_S - I_L$

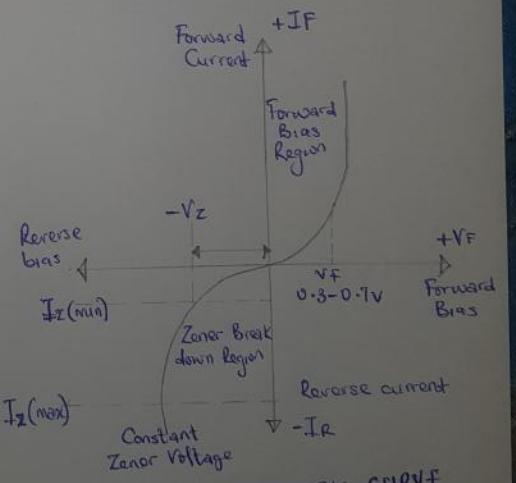
$= 500 - 20$

$= 480mA$,

(i) Describe a Zener diode Regulator, and;
(i) Sketch the symbol and I-V characteristics curve,
(ii) Sketch and Label the Circuit diagram

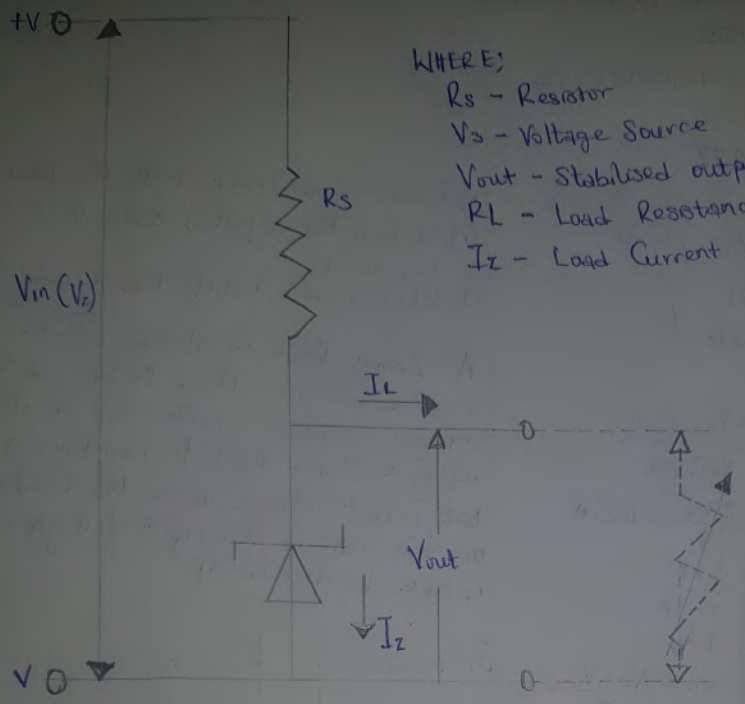
A Zener diode is always operated in its reverse biased condition. As such a simple voltage regulator circuit can be designed using a Zener diode to maintain a constant DC output voltage across the Load in spite of Variations in the input Voltage or Changes in the Load current

i,



I-V CHARACTERISTIC CURVE

(A)



WHERE;

Rs - Resistor

Vs - Voltage Source

Vout - Stabilised output voltage

RL - Load Resistance

Iz - Load Current Across Zener diode.