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18/ENG02/1025.
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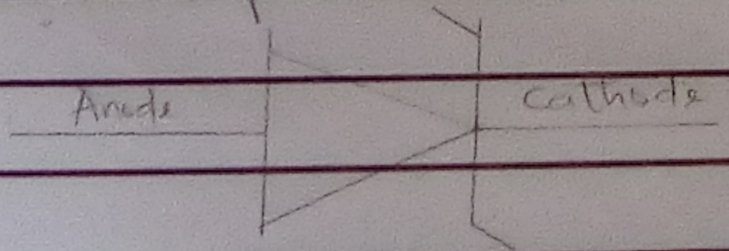
1) Zener diode.

This is a special property of diode that was invented by a man named Clarance zener. The special property of this diode is that can conduct in reverse bias. It can also conduct in forward bias just like a normal diode. The junction for the zener diode will be heavily doped. Because of this reason, it can work as normally as a basic junction in the forwarding bias. and can tolerate the reverse current during reverse bias. The main purpose of it is to used in stabilizers.

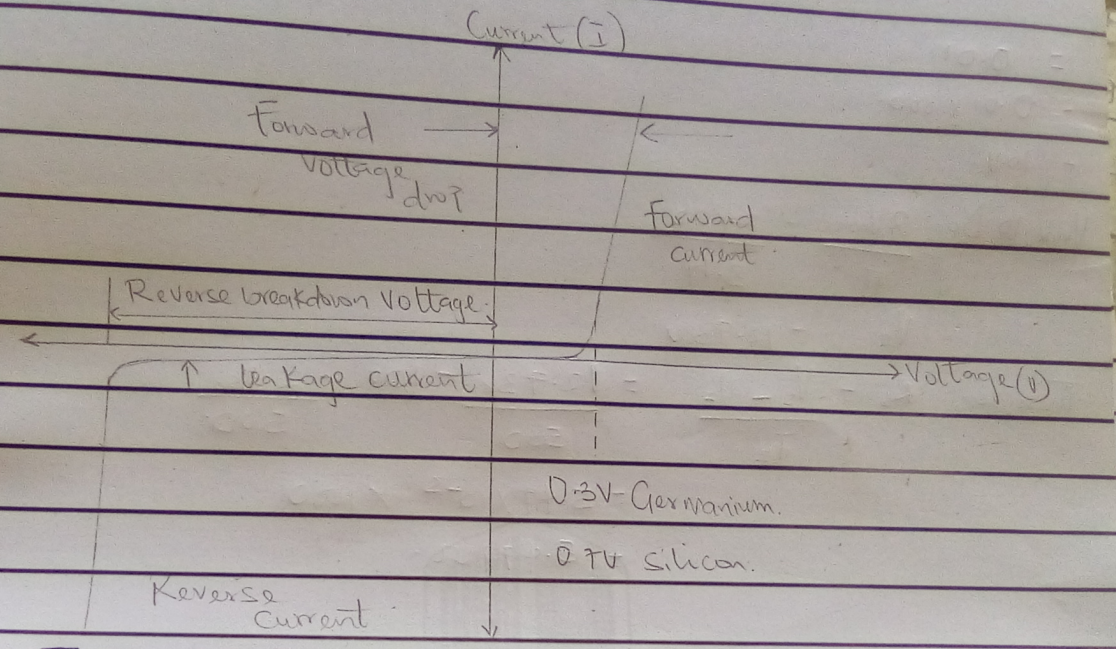
Zener diode is a diode in which the flow of current is f anode to cathode and cathode to anode defining that it has the capacity of conducting in both forward and reverse biases. It i used as voltage references and as shunt regulators to regulat the voltage across a small circuits.

2) i) a) The symbol:



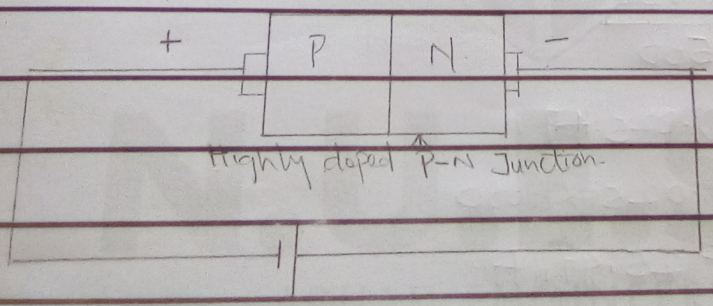
The zener diode symbol

b.

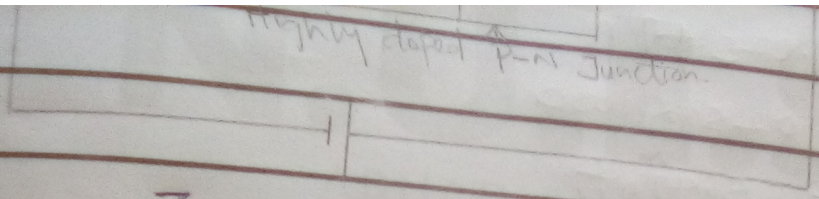


I-V Characteristic curve for a zener diode

ii).



Zener diode Circuit



Zener diode Circuit

2) Maximum power = 5W.

Maximum current I_S = 500 mA.

V_{max} = 20 V_{max}.

To the maximum value of the series resistor, $R_S = \frac{V_S - V_Z}{I_Z}$

To get V_Z :, Maximum current = $\frac{\text{watts}}{\text{Voltage (Vz)}}$

Voltage (V_z) = $\frac{\text{watt}}{\text{max current}}$ = $\frac{5\ W}{500\ mA}$

$= 0.01$

$= 0.01 \times 1000$

$= 10V$

$V_{max.}$ to $D_c = 2V_{max} = \frac{20 \times 20}{\pi} = \frac{2 \times 20}{3.14}$

$V_s = 12.738V.$

Therefore, $R_s = \frac{V_s - V_2}{I_2} = \frac{12.738V - 10V}{500} = \frac{2.738}{500}$

$= 5.47 \times 10^{-3} \times 1000$

$= 5.477\Omega.$

ii) The current across the diode.

$I = \frac{V_2}{R_2} = \frac{10}{500}$

$= 0.02A.$

$= 0.02 \times 1000 = 20mA.$

At full load $\therefore$ $500mA - 20mA$

$= 480mA.$