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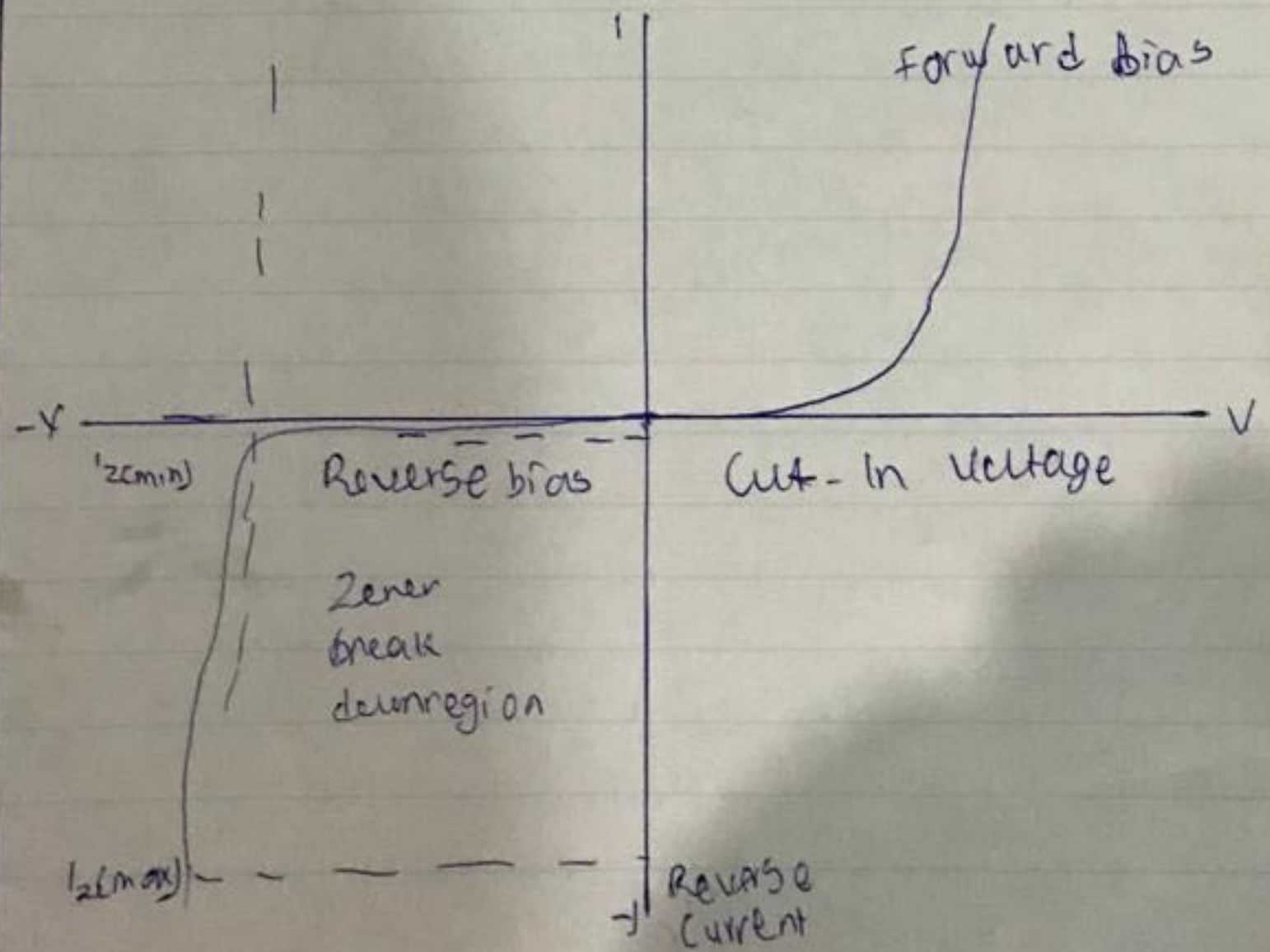
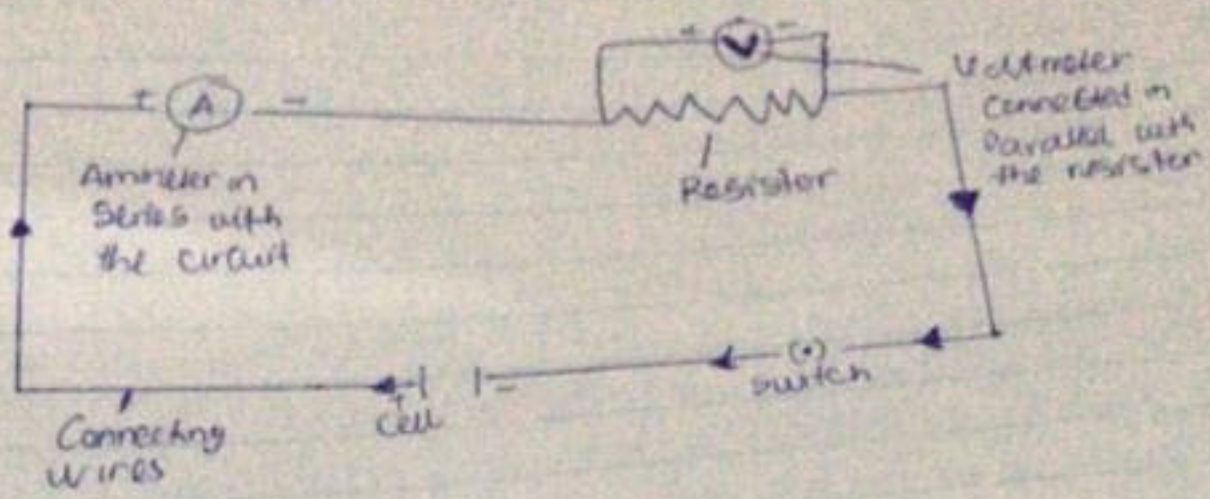
Biomedical Engineering
18/ENG08/015
ENG 222 Assignment

1. The zener diode is like a general-Purpose signal diode. When biased in the forward direction it behaves just like a normal signal diode, but when a reverse voltage is applied to it, the voltage remains constant for a wide rang of currents. The zener diode is used in its "reverse bias". From the I-V characteristics curve we can see that the zener diode has a region in its reverse bias characteristics of almost a constant negative voltage regardless of the value of the current flowing through the diode and remains nearly constant even with large changes in current as long as the zener diode current remains between the breakdown current ($I_{Z(min)}$) and the maximum current rating ($I_{Z(max)}$)

The ability to control itself can be used to great effect to regulate or Stabilize a voltage source against supply or load variations. The fact that the voltage across the diode in the breakdown region is almost constant turns out to be an important application of the zener diode as a voltage regulator.



a)



2 i) Current at 500Ω

$I_L = \frac{V_2}{R_L} = \frac{10}{500\Omega} = 0.02A$

$I_L = 0.02A$

ii) First voltage of zener diode

$V_2 = \frac{\text{watt}}{\text{current}} = \frac{5}{500\,ma}$

$= 10V$

∴ minimum value

$R_S = \frac{V_S - V_2}{I_2} = \frac{20 - 10}{500\,mA}$

$R_S = 20\Omega$

Symbol for zener diode