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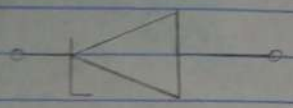
Computer Engineering.

1) The Zener diode is used in its "reverse bias" or reverse breakdown mode, i.e the diodes anode connects to the negative supply. 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 btwn the breakdown current $I_{Z(min)}$ and max current rating $I_{Z(max)}$

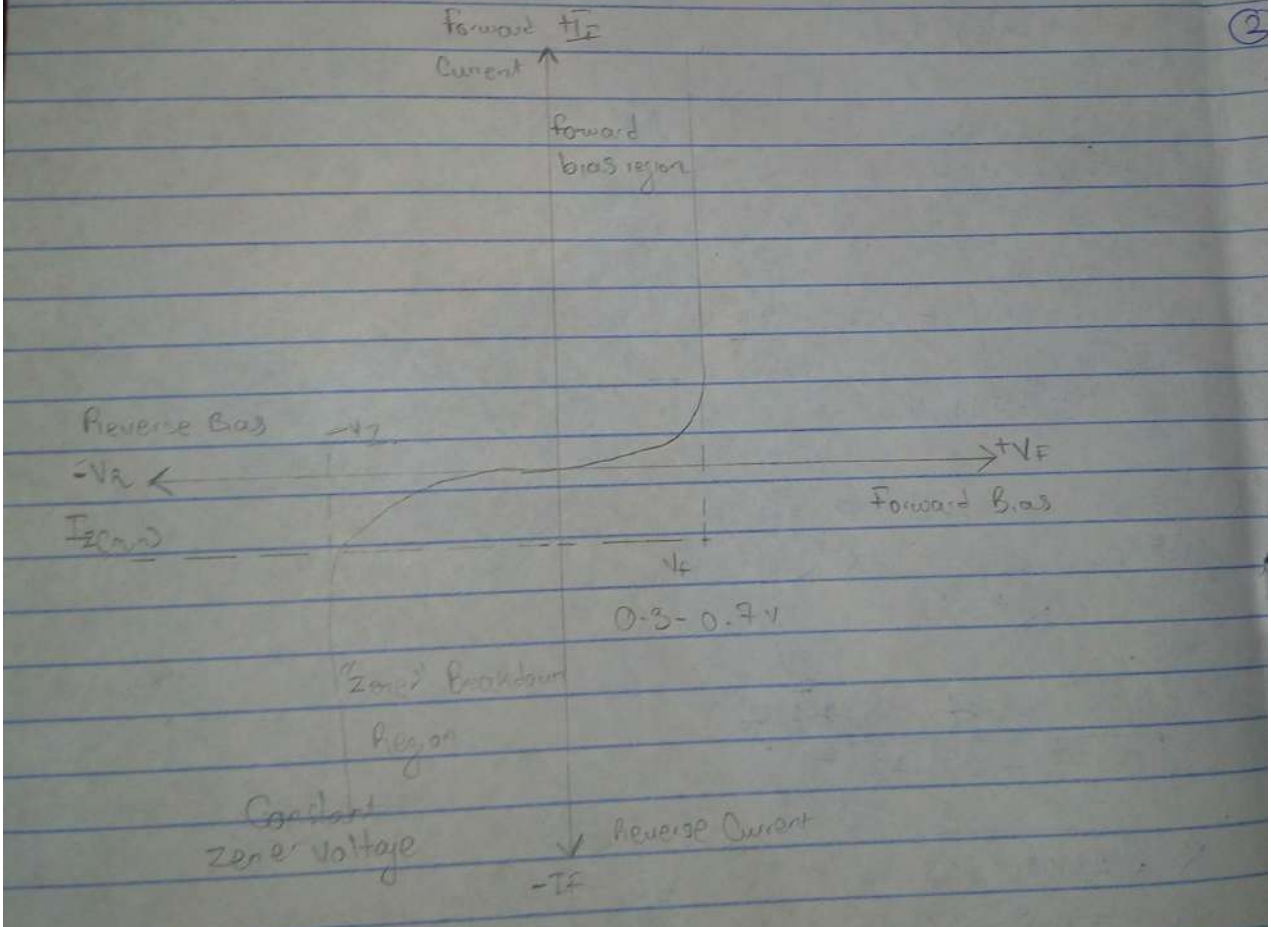
DC in from Rec Circuit

(1)



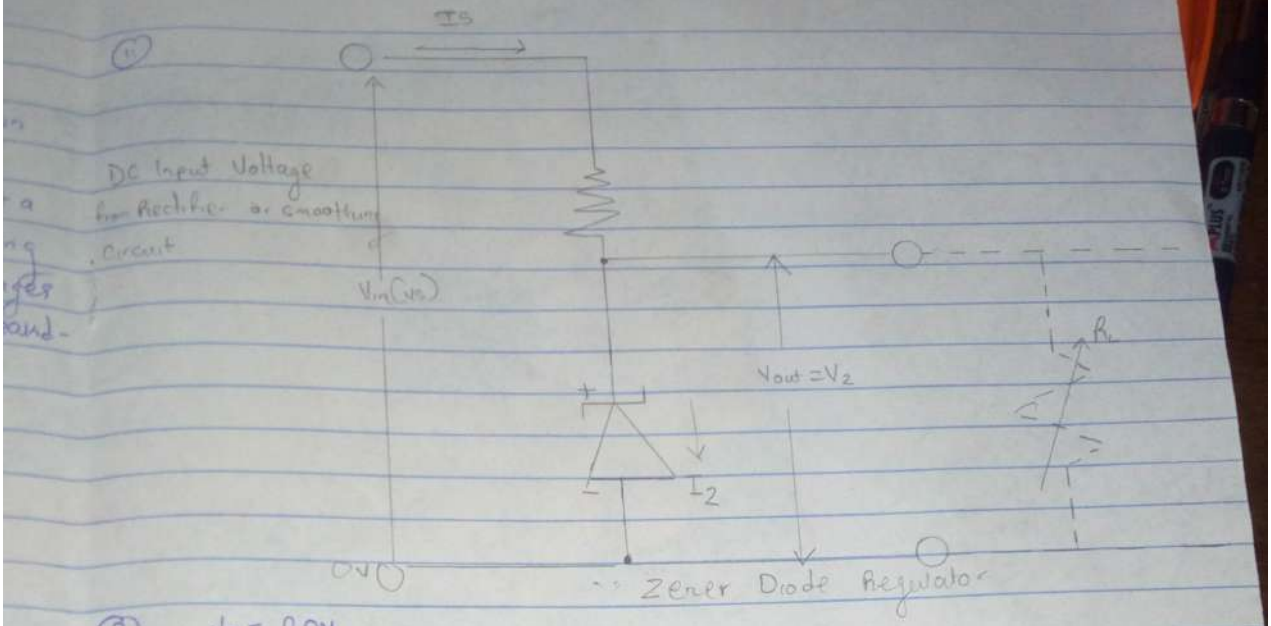
Cathode (K) Anode (A)

(2)



ZENER DIODE I-V CHARACTERISTICS

When $t = 2$, $P = 20$, $K = -2$



(2) $V_S = 20V$

$V_Z = ?$

max Current = 500mA = Is

$P_Z = 5w$

i) $Is = \frac{P_Z}{V_Z} = \frac{5}{500 \times 10^{-3}} = 10V$

$\therefore V_Z = 10V$

$R_S = \frac{V_S - V_Z}{I_Z} = \frac{20-10}{500 \times 10^{-3}} = 20$

$R_S = 20\Omega$

ii) $I_Z = Is - I_L$

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

$\therefore I_Z = (500 - 20)\,mA = 480\,mA$

$t = 2, \quad P = 20, \quad K = -2$