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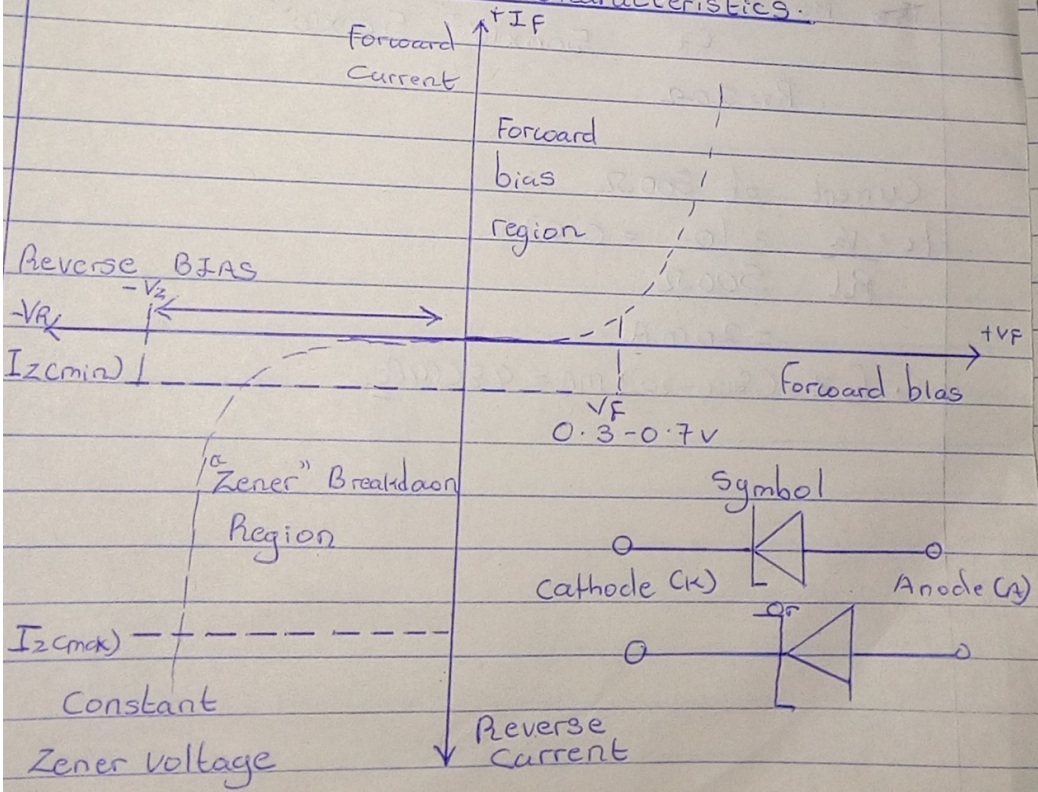
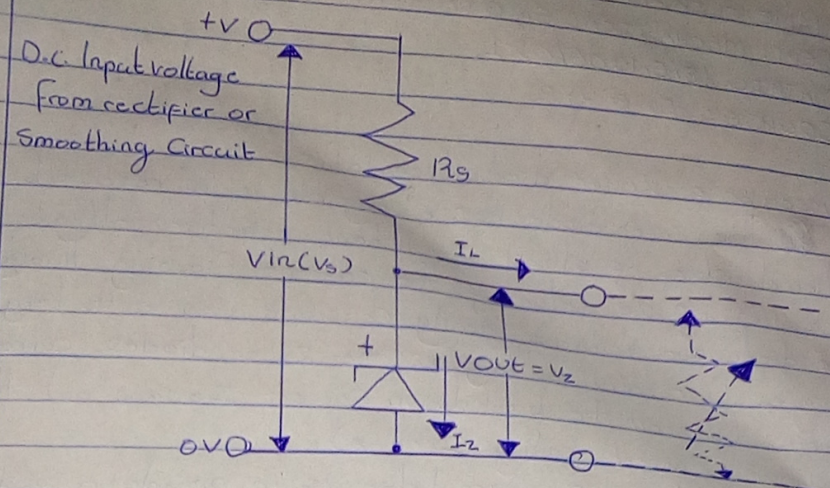
(1) Describe a Zener diode regulator,

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 diodes current remains between the breakdown current I_{zmin} and the maximum current rating I_{zmax}.

The Function of a regulator is to provide a constant output voltage to a load connected in parallel with it in spite of the ripples in the supply voltage or the variation in the load current and the Zener diode will continue to regulate the voltage until the diodes current falls below the minimum I_{zmin} value in the reverse breakdown region.

Zener Diode I-V characteristics.





(2) $V_S = 20V$

$V_Z = ?$

Mass current 500mA = I

$P_C = 5W$

First voltage of zener diode

$V_Z = \frac{Watt}{Current} = \frac{5}{500mA} = 10V$

$R_S = \frac{V_S - V_Z}{C_Z} = \frac{20-10}{500\times10^{-3}} = \frac{10}{500\times10^{-3}} = 20$

$R_S = 20\Omega$

Current at 500Ω

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

$= 20mA$

$\therefore [I = (500-20)]\ mA = 480mA$