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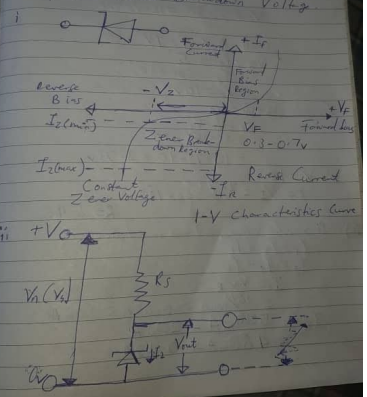
18/ENG02/086 Computer Engineering

12) A Zener diode is a diode similar to the standard PN junction diode but they are specially designed to have a low and specified Reverse Breakdown Voltage

i)



I-V Characteristics Curve

ii)

$P_Z = 5W$

$I_Z = 500mA$

$20V_{max}$

To Convert V_{max} to V_{DC},

$V_{dc} = \frac{2V_{max}}{\pi}$

$V_S = \frac{2 \times 20}{\pi} = 12.73\ V_{DC}$

Recall that $P = IV$

$\therefore V_Z = \frac{P_Z}{I_Z} = \frac{5}{500 \times 10^{-3}}$

$V_Z = 10V$

Remember $V_S + V_R = V_S$

$\therefore V_R = V_S - V_Z$

$= \frac{20 \times 20}{\pi} - 10$

$= 12.73 - 10 = 2.73V$

$\therefore V = IR$

$R = V/I = 2.73/500 \times 10^{-3}$

$R = 5.46\Omega$

iii) If connected in series and since current flows

$I_S = I_Z + I_L$

$I_Z = I_S - I_L$

$I_L = V_R/R$

$= 10V/500\Omega = 0.02A = 20mA$

$I_Z = 500mA - 20mA$

$= 480mA = 0.48A$