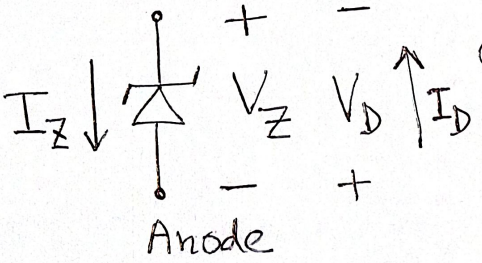
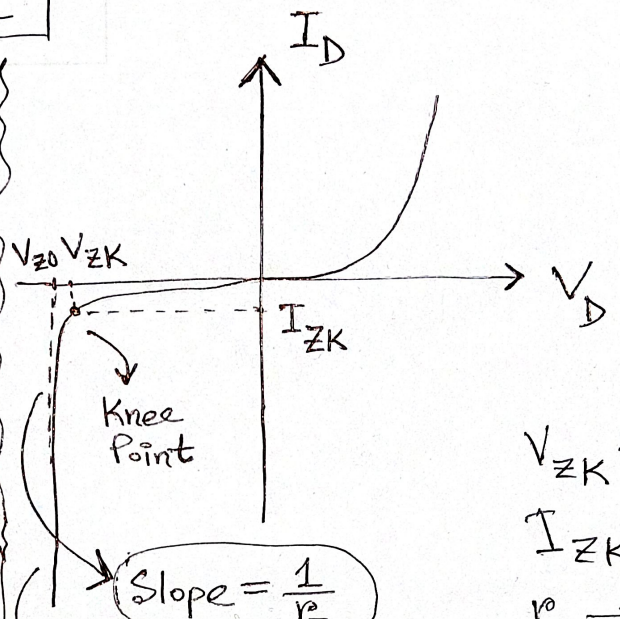
Zener Diode





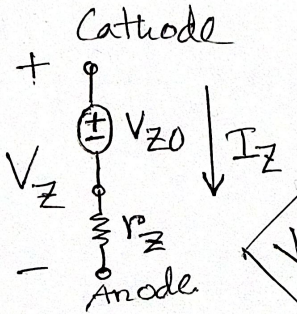
V_{ZK} → knee voltage

I_{ZK} → knee current

r_z → zener resistance

$V_{Z0} \approx V_{ZK}$

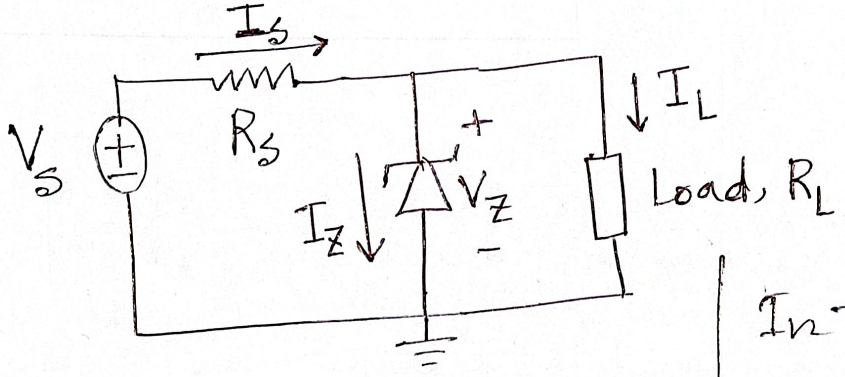
In breakdown region, zener diode can be modeled as,



$V_Z = V_{Z0} + I_Z r_z$

for breakdown region, $I_Z \geq I_{ZK}$

Zener Diode As A Regulator → zener diode has to be in the breakdown region



It will be best for zener diode if,

$V_S \longrightarrow$ max

$I_L \longrightarrow$ min

$I_Z \longrightarrow$ max

In the worst case,

$I_L \longrightarrow$ max

i.e. $I_Z \rightarrow$ min $= I_{ZK}$

$V_S \rightarrow$ min