

(Lecture 16) Voltage Regulators

- Electric devices works on high voltage.
- Electronic devices works on low voltage.

In voltage regulators, we use diode called Zener diode.

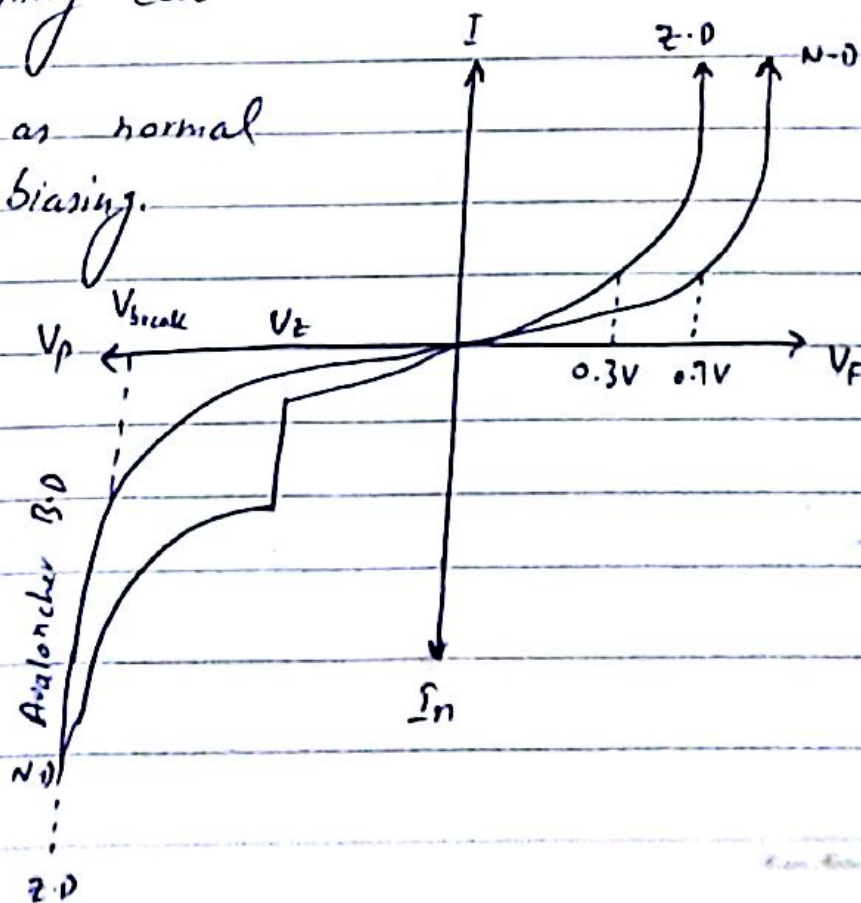
Zener diode:-

It is a heavy doped P-N Junction diode that works in reverse biased condition.

→ We can change properties of any diode by changing doping level.

- Zener diode works as normal diode in forward biasing.

- In zener diode, there are two break downs.

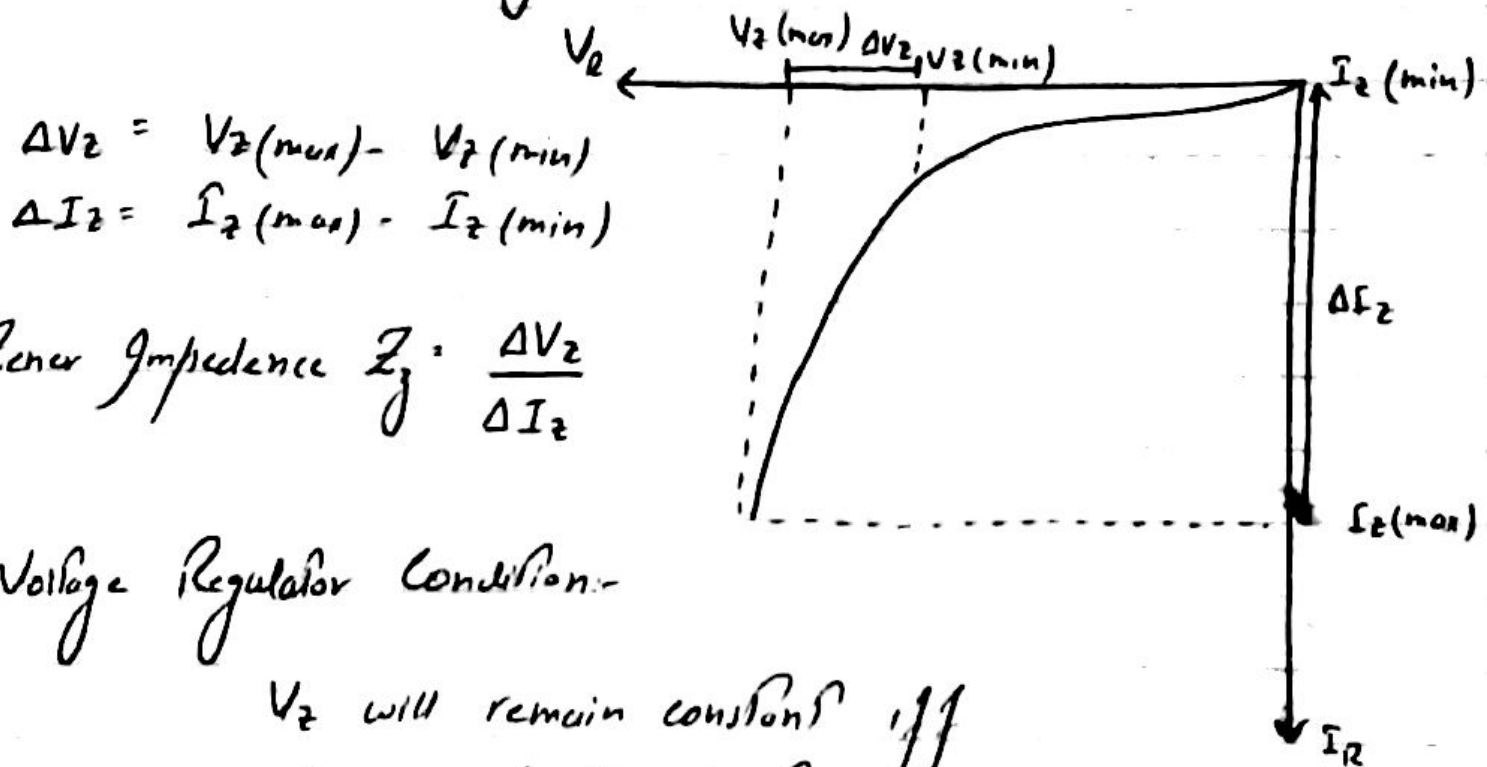


Page No. _____

In zener diode, first breakdown called zener breakdown and voltage at that point called zener voltage

$I_z(\text{min})$ = Minimum zener current to start breakdown.

$I_z(\text{max})$ = Maximum zener current to sustain breakdown.



$$\Delta V_z = V_z(\text{max}) - V_z(\text{min})$$

$$\Delta I_z = I_z(\text{max}) - I_z(\text{min})$$

Zener Impedance $Z_z = \frac{\Delta V_z}{\Delta I_z}$

Voltage Regulator Condition:-

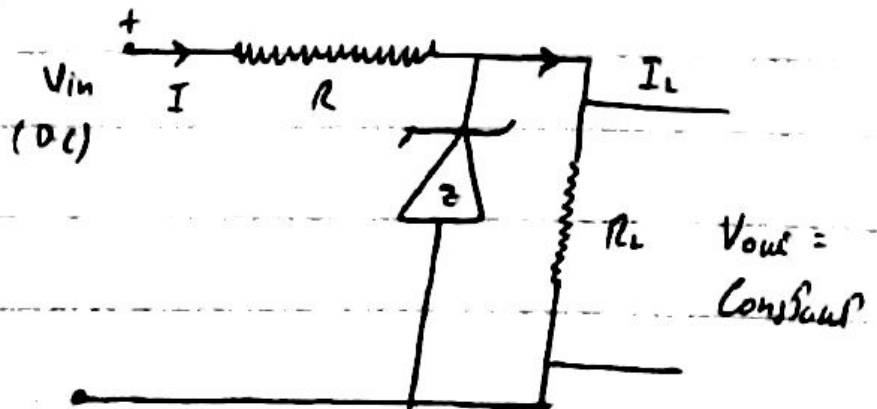
V_z will remain constant iff

$$I_z(\text{min}) \leq I \leq I_z(\text{max})$$

Circuit for Voltage Regulator:-



(Symbol for Zener diode)



$V_{out} = \text{Constant}$