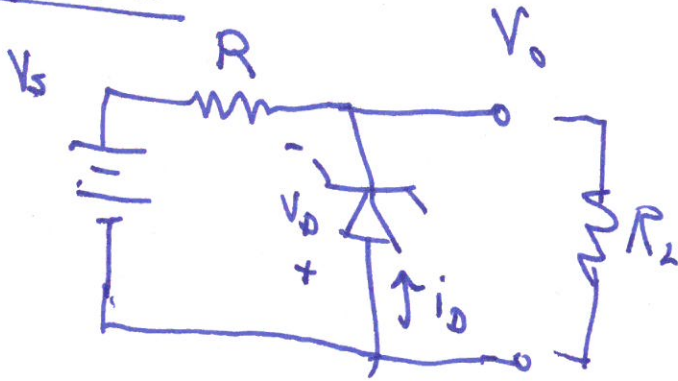


Monday, 3 Oct 2016

(46)

Regulator

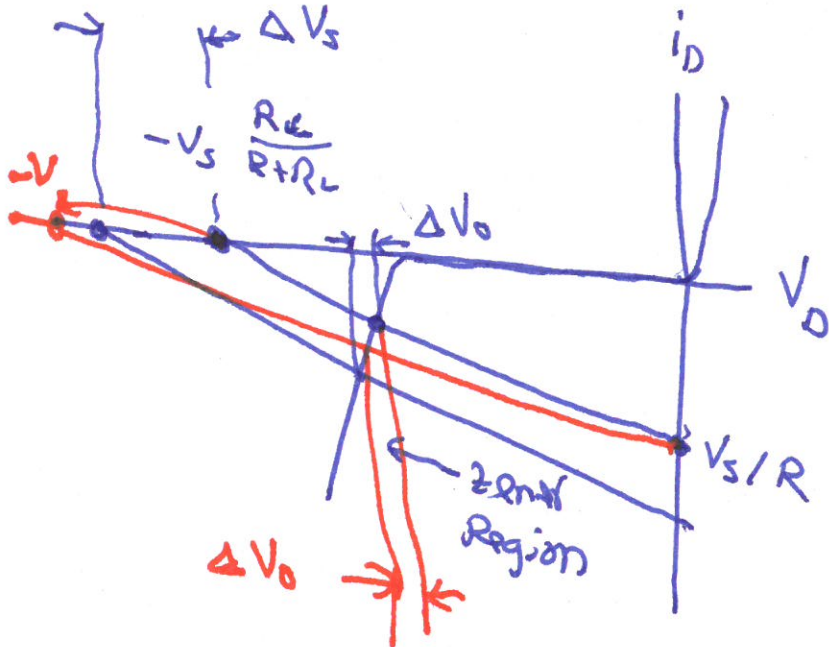


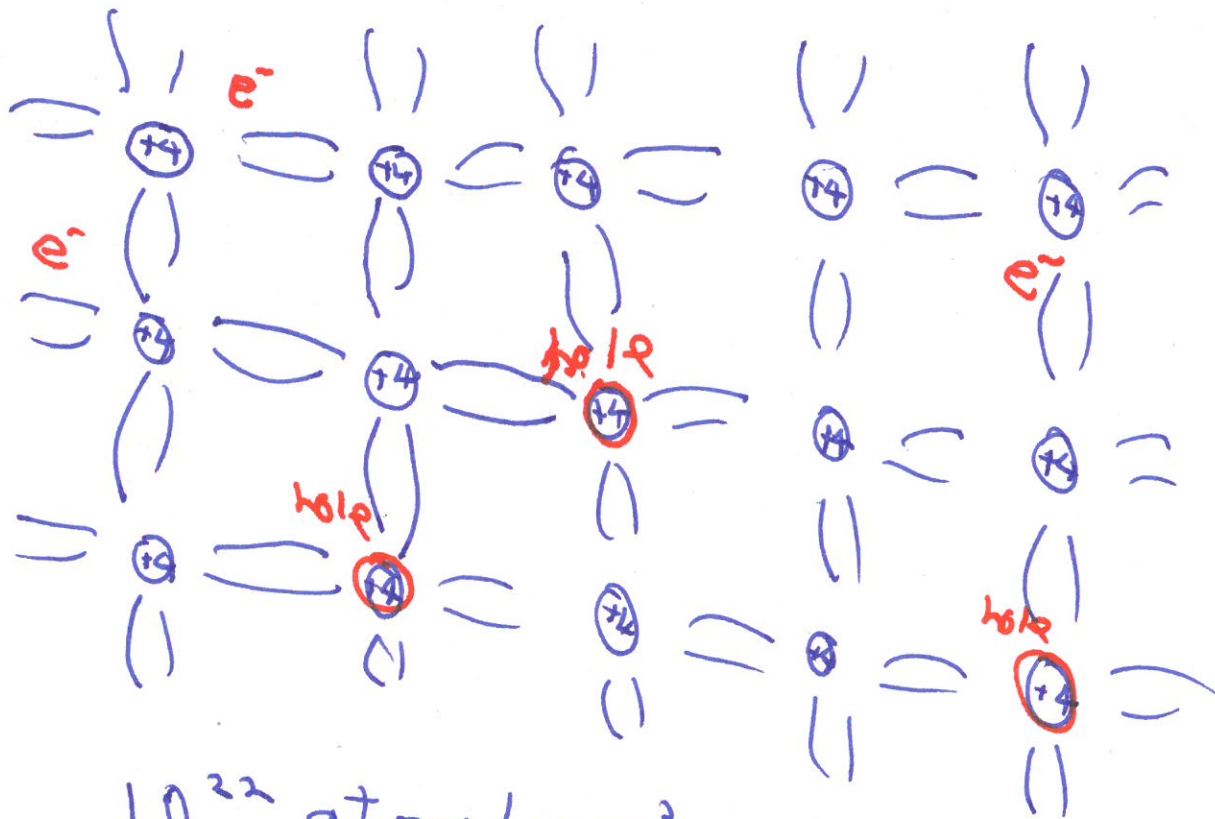
Source Regulation

$$\frac{\Delta V_O}{\Delta V_S}$$

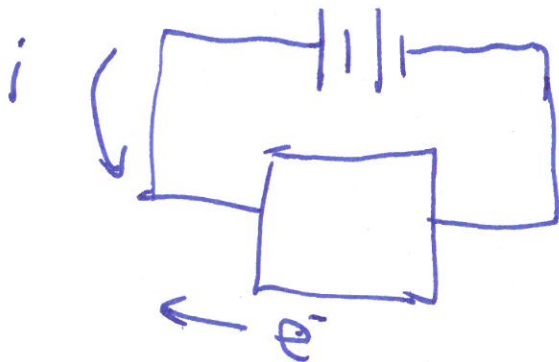
Load Regulation

$$\frac{V_{No\ Load} - V_{Full\ Load}}{V_{Full\ Load}}$$



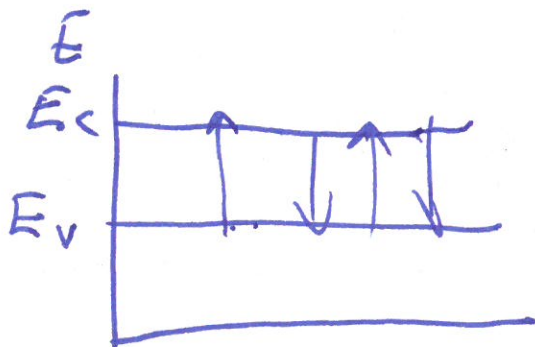


10^{22} atoms/cm³



Free
 10^{10} electrons
cm³

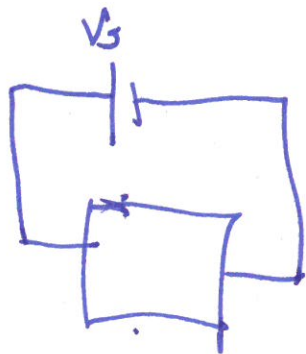
Semiconductor → Bad Conductor
Bad insulator



$$N \propto e^{-E_{gap}/kT}$$

↑ Absolute Temperature
Boltzmann Constant

$n_i = p_i$
 Negative (electrons) $\uparrow$
 intrinsic
 V_s
 Positive (holes) $\uparrow$



$i = J h w$

Drift velocity $\rightarrow$

$V_n = -\mu_n E$

mobility $\uparrow$

$V_p = +\mu_p E$

Electric field

$E = V_s / \text{length}$

Force

$f = E q = E e$
 electron $\uparrow$ charge

$\mu_n \approx 1500 \frac{\text{cm}}{\text{s}} \frac{\text{cm}}{\text{V}}$

$\mu_p \approx 475 \frac{\text{cm}^2}{\text{Vs}}$

$J = \text{current density}$

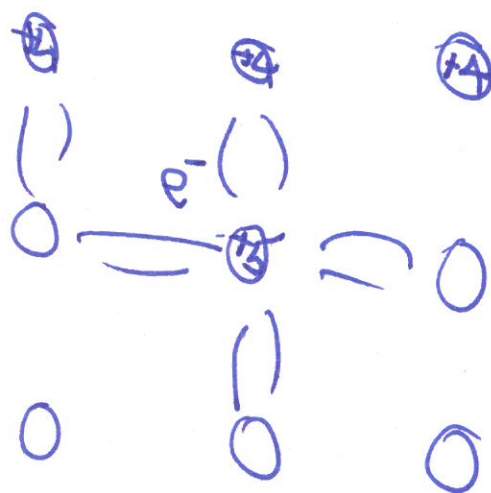
$= -e n V_n + e p V_p$
 $\uparrow \quad \uparrow \quad \uparrow$
 Coul. $\frac{1}{\text{cm}^3}$ $\frac{\text{cm}}{\text{s}}$

$$i = J A \quad E = V/l$$

$$i = \underbrace{(-en \mu_n + ep \mu_p)}_{\text{Ohms}^{-1} \text{ Conductivity}} \frac{A}{l} V$$

Doping

Donor



$$N_A + n = N_D + p$$

$$np = n_i p_i = (n_i)^2$$

$$n_i \approx 10^{10} / \text{cm}^3$$