P-n-Junction

depletion region

contact potie. $V_o = \frac{KT}{e} \ln \frac{N_A N_D}{n_i^2}$

$$\frac{W_p}{W_n} = \frac{N_D}{N_A}$$

we link P-n junction band energ diagrom

fermi level postion

Pn Junction Si $E_{fi} = E_g/2 = 0.55eV$

$n_i = 10^{10}\ cm^{-3}$

$N_A = 10^{17}\ cm^{-3}$

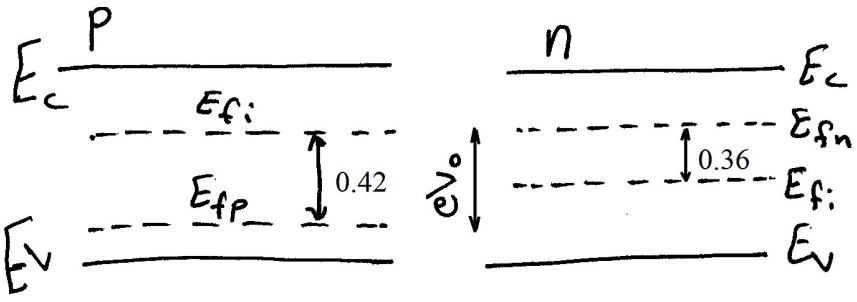
$N_D = 10^{16}\ cm^{-3}$

$$\Rightarrow V_o = \frac{KT}{e} \ln \frac{N_A N_D}{n_i^2}$$

$$= \boxed{0.78\ V}$$

$$E_{FP} - E_{fi} = -KT \ln\left(\frac{N_A}{N_i}\right) = 0.42\ eV$$

P side



$$E_{fn} - E_{fi} = KT \ln\left(\frac{N_D}{n_i}\right) = 0.36\ eV$$

n side

$$eV_o = (E_{fn} - E_{fi}) + (E_{fp} - E_{fi}) = \boxed{0.78}\ eV$$

$V_o = 0.78$

This is in equilibirum case.