Show that

Where P0=Effective Density of State (cm-3) Located at valence band edge

F(EV )=Probability of having electrons at EV

Since

Since

Then,

Show that

Recall that

Divide No by Ni

)/

Divide Po by Pi

)/

But recall ni = pi

ASSIGNMENT 1

Consider a semiconductor at T=300K with doping concentration Nd­=1016cm-3 , µn = 1350(cm2/Vs). Calculate the drift current density for an applied electric field of E = 35V/cm, ni = 1.5 \* 1010cm-3. State what type of material is the semiconductor.

# answer

Recall that,

When ND>>NA

ND=1016cm-3

q= charge of an electron = 1.6×10-19C

= 1350)

)

ni = 1.5 X

E=35V/cm

Nd=n= ; np=

p= =

b. Since therefore the material is an n-type material

ASSIGNMENT 2

Consider a rectangular bar of silicon uniformly doped with acceptor impurity. For an applied voltage 5V, a current of 2mA is required. The current density J = 100A/m2. Find the required cross-sectional area A, length l, and doping concentration.

## Answer

From the information above,

J = current density = 100A/m2

V =Voltage applied = 5V

I = Current = 2mA

L = length = ?

A = cross-sectional area = ?

Recall that,

,

=> =2×10-5m2

**Therefore Cross sectional area A = 2**×**10-5m2**

**BUT RECALL THAT**