1. A semiconductor has Nc=1018 cm-3 and Nv=3x1018 cm-3 and Eg=1.5 eV. Find the intrinsic carrier concentration.
2. In a uniformly doped silicon sample, the hole component of current is 10^4 times the electron component in an applied electric field. Assume

μn = 1350 cm^2/V-sec and μp = 450cm^2/V-sec. In this sample

1. the equilibrium electron concentration is n =
2. and hole concentration is p =
3. the net doping concentration (assuming 100% ionization) is NA –ND =
4. The electron concentration in silicon is given by p(x)=1015e-(x/Lp) cm-3 (x>0) where Lp=10-4 cm. The electron diffusion coefficient is Dp =25 cm2/s. Determine the hole diffusion current density at x =10-4 cm.
5. Find the conductivity of a silicon material if μn = 1000 cm2 /V-s and μp = 375 cm2/V-s, Nd=1015 cm-3.
6. If the drain of an n – channel MOSFET is shorted to the gate with a threshold voltage (VT) of MOSFET as 0.5 V, Identify the region of operation. Also, If the drain current (ID) is specified as 1 mA for VGS = 2 V, then estimate the drain current and transconductance using the appropriate formula for VGS = 6V.