Exercise 1

Electrons in the conduction band of silicon have effective mass 0.25 m_0 and mobility 0.14 m ^{2}/V while the holes in one of the valence bands have effectives mass 0.54 m_0 and mobility 0.048 m ^{2}/V-s, m_0 being free electron mass. Determine the relaxation times for the carriers.($\tau_e = 2 \times 10^{-13}$ s $\tau_h = 1.47 \times 10^{-13}$ s.)

Exercise 2

A sample of copper has an electron drift velocity of 2.5 m/s in an electric field of 500 V/m. Determine (i) electron mobility and (ii) relaxation time.

(Ans. (i) 5×10^{-3} m ^{2}/V-s (ii) 2.84×10^{-14} s.)

Exercise 3

Hall effect experiment is made in a sample of a flat semiconductor of length 1 cm and width 0.3 cm. The mobility of carriers in the sample is 4500 cm ^{2}/V-s. If the voltage along the length of the conductor is 1 volt, determine the Hall voltage across the width when a magnetic field of 0.02 T is applied.

(Ans. 2.7 mV)