Practice Problems Date: 20-01-2023

Course: PH30204/ PH41014 - Condensed Matter Physics

(Take standard fundamental constant values and the rest mass of an electron)

Q1. The density of silver is 10.5×10^{3} kg/m^{3}. Assuming that each silver atom provides one conduction electron. Mean free time τ is 2.84×10^{-14} sec. Calculate the density of electrons, conductivity and mobility of silver.

Q2. Evaluate the temperature at which there is one percent probability that a state, with an energy 0.5eV above the Fermi energy, will be occupied by an electron.

Q3. Calculate the mean free path of Potassium (K) if its Fermi energy is 2.1eV and the electrical conductivity is 1.5×10^{7} ohm^{-1}m^{-1}.

Q4. The Hall coefficient of a rod of silver of length 1 meter and diameter 1 cm is -1.25×10^{-10} m^{3}/C. If you apply 1 milli-Volt voltage drop between its ends, what should be the current flowing through it.

(Take τ of silver to be 2.84×10^{-14} seconds)