Home Problem Set #12 Due : November 10, 2014

1. Express n and k in terms of ε and σ (or ε_1 and ε_2) by using $\varepsilon = n^2 - k^2$ and $\sigma = 4\pi\varepsilon_0 nk\nu$. (Compare with (10.15) and (10.16).)

2. Calculate the reflectivity of silver and compare it with the reflectivity of flint glass (n = 1.59). Use $\lambda = 0.6\ \mu m$

3. The transmissivity of a piece of glass of thickness d = 1 cm was measured at λ = 589 nm to be 89 %. What would the transmissivity of this glass be if the thickness were reduced to 0.5 cm?

4. Calculate the reflectivity of sodium in the frequency ranges $\nu > \nu_1$ and $\nu < \nu_1$ using the theory for free electrons without damping. Sketch R versus frequency.

5. Calculate the reflectivity of gold at $\nu = 9 \times 10^{12}\ s^{-1}$ from its conductivity. Is the reflectivity increasing or decreasing at this frequency when the temperature is increased? Explain.

6. Derive the Drude equations from (11.45) and (11.46) by setting $\nu_0 \rightarrow 0$.