

Assignment 1: ECE545, Monsoon 2020

October 4, 2020

Total marks: 30. Deadline: 6 p.m., Nov. 4, 2020

Handwritten submission will not be accepted. Combine your typed answers, codes, results in a single pdf and email the file to the instructor. Submissions will be checked for plagiarism in Turnitin.

Plagiarism policy: ZERO tolerance towards copying assignments from others/ plagiarism from any other sources. Such cases will be dealt strictly according to the institute policy.

Late submission policy: -5/day after the submission deadline (starts immediately after 6 p.m. Nov. 4, NO exceptions).

Q1. Download the “si.dat” file posted in the course webpage. This file contains the real and imaginary part of the r.i. of crystalline silicon as a function of wavelength. Fit this experimental data over the $300 - 1000nm$ wavelength range with Lorentz model of dispersion discussed in the course. You may need multiple oscillator terms. You can use MATLAB/Python/Mathematica/any other software of your choice. But duly commented codes must be supplied.

Now, repeat the same exercise by chopping up the wavelength into two sub-ranges (say, $300 - x$ nm and $x - 1000nm$) for better fitting.

[Do this on your own, if there are any case of copying assignment, it will be detected immediately from value of x and number of terms in Lorentz model. If you do it on your own, you are likely to get different values of x and number of terms in Lorentz model].

7.5 + 7.5 = 15 points

Q2. Calculate the group velocity of SPP. From this expression, calculate the group velocity of SPP at ω_{SP} .

12 + 3 = 15 points