Q. What is NLO?

Q. Could you write down polarization relation with electric field for linear, time invariant local media?

A. eq. 1.9

Q. What is χ?

A. 3x3 matrix

Q. Can it be scalar?

A. Yes, in isotropic media?

Q. How equation does look like in case of second order nonlinearities?

A. eq. 2.1 first two members

Q. Could you expand it in multiplication by members? (or smth like that)

A. I didn't really get what he was asking, but eq. 2.2 was needed

Q. Opened a script and asked to explain members in 2.20

A. $S(w_p)$ – summation over all components which result in w_p ; $\chi^{(2)}$ rank 2+1; meaning of :

Q. 2.32 explain δ

A. If frequency is equal to 0, δ=1, otherwise δ=0.

Q. Why do we need this additional factor?

A. E(w=0) doesn't have c.c. part

Q. Write down eq. for electro optic effect

A. 2.35

Q. Explain how Mach-Zehnder modulator works

A. Ive painted fig. 3.16 b and 3.17b. Explained how phase shift occurs, difference between x-cut and z-cut. Also he asked for a drawing of phase shift in complex plane

Q. what is r_{33}, why do we make use of it? What is r matrix, also he asked to write down 3.24 and explain all members. Why η can be (1x6) matrix

I haven't really answered this section and exam was over.

In general, he gives a lot of hints and helps you.

Also, it seems, that questions are quite the same all day long, so get know first ones to take the exam 😊

Good luck!