UNIVERSITÀ DEGLI STUDI DI BRESCIA

Student ID:
First Name:
Last Name:

Instructions: You have 1.5 hours to complete the test. If you need extra blank sheets to complete the test please ask. Please write everything with blue or black ink pen. You can use your calculator. Use of cell phone, course notes or personal computer will invalidate the results of the test. If you don't have a calculator, you can leave the formulas in expression forms and still get full score for the questions/exercises.

Questions:

1. What happens if we sum a right- and a left-handed circularly polarized wave of the same amplitude A and same propagation direction?

2. A 1D photonic crystal is composed of two materials having permittivities ε_1=1 and ε_2=9. Calculate the mid-gap wavelength assuming the periodicity of the stack is equal to a = 400 nm.

3. A diffraction grating produces a deviation of θ=30° for the order m = 1 with light incident at normal incidence and wavelength λ=600 nm. What is the total number of lines if the grating is 2 cm wide?

4. Describe the Maxwell-Garnett and Bruggeman effective medium theories. What are the main differences between the two methods?

5. Describe the main characteristics of a metamaterial and their practical applications.

6. Describe the main characteristics of Electron Beam Lithography.