Tutorial Sheet-6
Physics-2 (15B11PH211)
(Even Semester, 2021-2022)

Assignment 3 : Reflection, Refraction of Oblique incidence - s polarization.

1. A wave incident on a dielectric medium of $n = \sqrt{3}$. If angle of incidence is 60°. Find angle of refraction if wave incident from n=1. And also find the amplitude of reflected and refractive wave, considering E lies on the plane of incidence. [CO2]
2. Explain the following terms: (i) spontaneous emission, (ii) stimulated emission, (iii) meta-stable state, (iv) population inversion, and (v) optical pumping? [CO1]
3. Calculate the power per unit area delivered by a laser pulse of energy 4 x 10^{-3} Joule and pulse length in time as 10^{-9} sec. When the pulse is focused on target to a very small spot of radius 1.5 x 10^{-5} m. [CO2]
4. The ruby laser has 2.8 x 10^{9} ions of Cr^{3+}. If this laser emits 700 nm wavelength radiation, what will be (i) the energy of one emitted photon and (ii) the total energy available per laser pulse? [CO2]
5. The ruby laser has two states at 300 K and 500 K. If it emits light of 700 nm, then compute relative population. [CO2]
6. The wavelength of emission is 600 nm and the lifetime is 10^{-6} s. Determine the coefficient for the stimulated emission. [CO2]
7. A 10 mW laser has an efficiency of 1%. Suppose all input energy is utilized in pumping atoms from the ground state to the excited state, which is 20 eV above the ground state. Find how many atoms are promoted to the excited state in one second? [CO3]