Thapar University, Patiala
School of Physics and Materials Science

UPH004: APPLIED PHYSICS
Tutorial sheet 7 [Polarization]

1. A glass plate is to be used as polarizer. Find the angle of polarization for it. Also find the angle of refraction. Given μ for glass as = 1.54.

2. Two polarizing sheets have their polarizing directions parallel so that the intensity of transmitted light is a maximum. Through what angle either sheet is turned so that intensity becomes one half of the initial value.

3. Two nicols are first crossed and then one of them is rotated through 60^0. Calculate the percentage of incident light transmitted.

4. Light of irradiance 1000 W/m^2 is shone through two polarizers, with their transmission axes placed at a relative angle of 40°. What is the intensity of the transmitted light? If third polarizer is placed at an angle of 20° between the other two. What is the irradiance?

5. Unpolarised light of intensity that the 32 W/m^2 passes through two polaroids such that the intensity of the emerging light is 20 W/m^2. What is the angle between the axes of the polaroids?

6. Calculate the thickness of double refracting crystal to introduce a path difference of λ/2 between E and O rays, when λ = 6000Å, μ_o = 1.55 and μ_E = 1.54.

7. Discuss the state of polarization when x and y component of the electric field are given by the following equations
   (a) $E_x = E_0 \cos (\omega t + kz)$ and $E_y = E_0` \cos (\omega t + kz + \pi)$
   (b) $E_x = E_0 \cos (\omega t + kz)$ and $E_y = E_0` \cos (\omega t + kz + \pi/2)$