Tutorial Sheet-5 (Physics-1, 15B11PH111)
(Odd semester, 2021-2022)

1. Describe the Huygens theory of double refraction when the optic axis is parallel to the refracting surface and lies in the plane of incidence for the case of normal and oblique incidence. [CO2]

2. A phase retardation plate made by quartz has thickness 0.1436 mm. For what wavelength in the visible range (400- 750nm) it will act as (i) quarter-wave plate & (ii) half wave plate? Given μ_o= 1.5443 and μ_e=1.5533. [Ans: 738.6nm, 574.4 nm, 470 nm for QWP and 517 nm for HWP.] [CO3]

3. Plane polarized light is incident on a piece of quartz cut parallel to the axis. Find the least thickness for which the ordinary and the extraordinary rays combine to form plane polarized light. Given, μ_e = 1.5533, μ_o = 1.5442 and λ = 500 nm. [Ans: 27.5 μm] [CO3]

4. (a) A black dot is marked on a white paper and it is viewed through a calcite crystal from the top. How many images are expected to be seen and is it possible to see only one image? Explain briefly. [CO1]

   (b) A rotating polarizer is placed into the path of a light beam. If the intensity of the transmitted light varies with non-zero minima twice in one complete rotation, then the incident light will be? [CO1]

5. Explain how (i) Elliptically polarized light (EPL) may be distinguished from a mixture of plane polarized (PPL) and Unpolarized light (UPL), (ii) Circularly polarized light (CPL) from UPL? [CO4]

6. Show mathematically and diagrammatically how two linearly polarized lights with phase difference of $\pi/2$ give a Circularly Polarized light (CPL). [CO2]

7. Using two Nicol prisms, how would you find whether the given plate is HWP, QWP or simple glass plate? [CO4]