Haldia Institute of Technology
Department of Applied Science

Assignment - III
Course: PH 101/PH 201
Module – 3: *Optics - II*

Polarization:

1. Define polarization phenomenon of light wave. What is linearly and circularly polarized light?
2. What is Polaroid? Define Brewster's law in polarization.
3. Write a short note on Nicol prism.
4. Describe Malus's law in polarization.
5. Define ordinary ray, extra-ordinary ray and optic axis.
6. Describe the different state of polarization when two disturbances superimpose to each other.
7. A left circularly polarized beam of $\lambda = 5.893 \times 10^{-5}$ cm. is incident normally on a calcite crystal (with its optic axis cut parallel to the surface) of thickness 0.005141 mm. What will be the state of polarization of the emergent beam? Given $n_o - n_e = 0.17195$.
8. An unpolarized light is incident on a air-glass interface. After reflection, the reflected light is found to be polarized with its plane of vibration perpendicular to the plane of incidence. If the r.i. of the glass is 1.5, find the angle of incidence and angle of refraction.
9. A polarized light if intensity 160 mW/m^2.s., coming from a polarizer is allowed to pass through two successive analysers whose optic axis make an angle 60^o. If the angle between the optic axis of the polarizer and the 1st analyzer is also 60^o, find the intensity of the polarized light coming out of the 2nd analyzer.
10. What is retardation plate? Write down briefly the production of elliptically and circularly polarized light by a quarter – wave plate.

Laser:

1. Describe spontaneous and stimulated emission.
2. What is Einstein's 'A' and 'B' coefficient? Relate Spontaneous and stimulated emission probabilities and hence find out the relation between field energy and 'A','B' coefficient.
3. What is metastable state? Define population inversion in laser.
4. Describe an optical resonator with schematic diagram.
5. Describe briefly the action of He-Ne laser with energy band diagram.
6. Describe briefly the working principle of a Ruby laser with energy band diagram.
7. Describe some applications of laser.

Holography:

1. What do you mean by holography and hologram?
2. Discuss briefly the process of recording of an object and reconstruction of an image by holography.
3. Distinguish between conventional photography and holography.
4. Discuss briefly the basic theory of holography.
5. Discuss about the various applications of holography.