1. Derive the other Fresnel's equations for polarization perpendicular to the place of incidence.

2. Calculate (i) the angle for total internal reflection, (ii) Brewster's angle, for air-glass (or glass-air as the case may be) interface. The refractive index of the glass is $3/2$. What is the angle at which the reflected and the transmitted beams have the same intensities?

3. Suppose you have a plane-wave beam of light and a good supply of optical elements, such as, glass plates, polarizers, half-wave and quarter-wave plates, photo-detectors. Design experimental protocols to establish the incident beam to be (i) linearly polarized, (ii) right circularly polarized, (iii) left circularly polarized, (iv) unpolarized.

4. A right circularly polarized light is normally incident at a boundary and gets reflected. Is the reflected beam right circularly polarized or left circularly polarized?

5. A double-slit diffraction pattern is formed using mercury green light at 546.1 nm. Each slit has a width of 0.1 mm. The pattern reveals that the fourth-order interference maxima are missing from the pattern. What is the slit separation? What is the irradiance of the first three orders of interference fringes, relative to the zeroth-order maximum?

6. In Young's double slit experiment, the source is red light of wavelength 7×10^{-7} m. When a thin glass of refractive index 1.5 at this wavelength is put in the path of one of the interfering beams, the central bright fringe shifts by 10^{-3} m to the position previously occupied by the 5^{th} bright fringe. Find the thickness of the plate in μm?