

**School of Physics and Materials Science**  
**Thapar Institute of Engineering & Technology, Patiala**  
**Applied Physics (UPH 004)**  
**TUTORIAL # 5: INTERFERENCE**

1. Two beams are forming an interference fringe pattern.
  - (a) If their amplitudes are in the ratio of 3/1, what is the visibility?
  - (b) What ratio of amplitudes produces a visibility of 0.5?
2. What is the minimum thickness of the parallel film (refractive index =1.4) in which interference of green component (wavelength 530 nm) of the normally incident light can take place by reflection?
3. A beam of white light (assuming a continuous spectrum from 400 to 700 nm) is incident at an angle of  $45^\circ$  on two parallel glass plates separated by an air film 0.001 cm thick. The reflected light is admitted into a prism spectroscope. How many dark “lines” are seen across the entire spectrum?
4. A soap film (of refractive index = 1.33) is formed using a rectangular wire frame and held in a vertical plane. When illuminated by laser light of wavelength 632.8 nm, one sees a series of localized interference fringes that measure 15 per cm. Explain their formation and calculate the angle of wedge.
5. A thin film of  $\text{MgF}_2$  (refractive index = 1.38) is deposited on a glass so that it is antireflecting at a wavelength of 580 nm under normal incidence. What wavelength is minimally reflected when the light is incident at  $45^\circ$ ?
6. If the diameters of 10<sup>th</sup> and 15<sup>th</sup> dark rings of a Newton’s ring pattern are found to be 6.0 mm and 8.0 mm respectively, find the diameter of the 5<sup>th</sup> dark ring. Plane glass plate and plano convex lens combination is used to produce interference pattern due to reflected beams.
7. Newton’s rings are formed in the air film enclosed between a plano-convex lens (of radius of curvature = 50cm) and a plane glass plate by reflection. Diameters of 4<sup>th</sup> and 20<sup>th</sup> bright rings are respectively 0.203 cm and 0.484 cm. Show that the lens and the plate are not exactly in contact. Also, find wavelength of the light used.
8. The diameter of m<sup>th</sup> dark ring in Newton’s ring experiment changes from 3mm to 2.5mm when the air film is replaced by a liquid. Find the refractive index of the liquid.