

**Tutorial Sheet-2**  
**15B11PH111 Physics-1 (2020-21)**

**Assignment 1: Discuss the formation of interference fringes due to a thin wedge-shaped film seen by normally reflected sodium light. What will happen if white light is substituted in place of the sodium light?**

1. A square piece of cellophane film with refractive index 1.5 has a wedge section so that its thickness at two opposite sides is  $t_1$  and  $t_2$ . If by using the light of wavelength  $\lambda = 6000 \text{ \AA}$ , the number of fringes appearing in the film is 12, calculate the difference  $t_2 - t_1$ . [CO2]
2. Interference pattern in reflected light for normal incidence on a wedge shaped air film is seen using bichromatic ( $\lambda_1 = 5896 \text{ \AA}$ ,  $\lambda_2 = 5890 \text{ \AA}$ ) source of light. The angle of wedge is  $0.25^\circ$  of arc. Find out the minimum distance from the edge of the wedge at which the maximum due to each wavelength coincides. [CO3]
3. A surface of refractive index 1.52 is to be coated with a film of refractive index 1.38 to minimize the reflection. Determine the minimum thickness of film for normal incidence of light of wavelength  $5500 \text{ \AA}$ . [CO1]
4. In Newton's rings experiment (NRE) diameter of 8<sup>th</sup> ring is 0.40 cm and 3<sup>rd</sup> ring is 0.20 cm. Radius of curvature of the lens is 100 cm. Calculate the wavelength of light used. [CO1]
5. The Newton's rings by reflection are formed between two biconvex lenses having equal radii of curvature 100 cm. Calculate the difference between the radius of 5<sup>th</sup> and 15<sup>th</sup> dark rings if the monochromatic light of wavelength  $5400 \text{ \AA}$  is used in the experiment. [CO2]
6. In the Michelson interferometer arrangement, if one of the mirrors is moved by a distance 0.08 mm, 250 fringes cross the field of view. Calculate the wavelength of light used. [CO3]
7. Calculate the distance between successive positions of the movable mirror of the Michelson's interferometer giving best /distinct fringes in the case of a sodium source having lines  $\lambda_1 = 5890 \text{ \AA}$ ,  $\lambda_2 = 5896 \text{ \AA}$ . [CO4]