**Numerical in Interference, diffraction and polarization**

1. **A glass plate has thickness t = 4 x 10-4 mm and refractive index = 1.5. If it is illuminated normally by white light, what wavelengths will be intensified in reflected beam in visible spectrum? [Hint : 2μtcosr = (2n+1)λ/2] Ans: 4000 Ǻ**
2. **A soap film of 5000 Ǻ thickness is viewed at an angle of 35o to the normal. Find the wavelengths in the visible light which will be absent in the reflected light. The refractive index of the film is 1.333. [Hint: 2μtcosr = nλ] Ans: 4011 and 6016 Ǻ**
3. **In Newton’s ring experiment diameter of 15th ring was found to be 0.59 cm and that of 5th ring was 0.336 cm. If radius of curvature of a plano convex lens is 100 cm, calculate wavelength of light used. What happens to ring if air film is replaced with liquid of refractive index 1.5. [Hint: Dm2-Dn2/4(m-n)R, μ = Dm2/Dm’2] Ans: 5880 Ǻ**
4. **In Newton’s ring experiment diameter of 10th dark ring due to wavelength 6000 Ǻ in air is 0.5 cm. Find the radius of curvature of the lens [Dm2 = 4mλR]**
5. **Yellow light of wavelength 5893 Ǻ strikes a film of oil on water at an angle 30o. An 8th dark band is seen. Compute the thickness of the oil film if the refractive index of the oil is 1.44.**

**Ans: 1.75 μm**

1. **White light is incident on a transparent film of refractive index 1.33 and thickness 1.6 μm at an angle of 45o. When the reflected light is examined, a dark band corresponding to 500 nm is seen. Find the order of band. Ans: 7**
2. **In Newton’s rings are formed with sodium light in an experiment. What is the order of dark ring, which has double the diameter of the 4th dark ring? Ans: 16**
3. **Light of wavelength 5500 Ǻ falls normally on a slit of width 22 x 10-5 cm. Calculate the angular position of the first two minima on either side of the central maximum.**

**[Hint: esinθ = mλ, m=1,2] Ans: 14o29’, 30o**

1. **Calculate the possible order of spectra with a plane transmission grating having 18000 lines/inch when light of wavelength 4500 Ǻ is used. [λ = sinθ/Nn] Ans: 3**
2. **A transmission grating has 8000 rulings per cm. The first order principal maximum due to a monochromatic source of light occurs at an angle of 30o. Determine the wavelength of light. [λ = sinθ/Nn]**
3. **Consider a positive crystal with refractive indices for e-ray 1.31 and for o-ray 1.309. What should be the minimum thickness of that crystal that it can act as a quarter wave plate for light of wavelength 6000 Ǻ . [Hint: d = λ/4(μe-μo)] Ans:**
4. **Ice is a positive crystal with indices of refraction of 1.309 and 1.310. What should be the minimum thickness of the ice so that it can act as quarter wave plate for light of wavelength 6000 Ǻ**
5. **Light of intensity *Io* is incident on a polarizer. What is the intensity of the resultant beam if (i) incident light is unpolarized? (ii) incident light is plane polarized with its electric field making an angle of 30o with the axis of the polarizer? [Malus’ law] Ans: ¾ *Io***
6. **Sun light is reflected from a calm lake. The reflected light is 100 % polarized at a certain instant. What is the angle between the sun and the horizon at that instant? The refractive index of water 1.33. [Brewster’s law] Ans: 53.06o**