PHYSICS-I (10B11PH111), TUTORIAL SHEET – 4 (2011-12)

1. If a door to an adjoining room is slightly open, why is that you can hear sounds from the room but cannot see much of what is happening in the room?

2. Light of wavelength 580 nm is incident on a slit having a width of 0.300 nm. The viewing screen is 2.00 m from the slit. Find the positions of the first dark fringes and the width of the central bright fringe.

3. Find the ratio of the intensities of the first and second secondary maxima to that of the central maximum for the single-slit Fraunhofer diffraction pattern. In single slit diffraction if the width of the slit is made equal to the wavelength of light ($\lambda$), what will be the variation of intensity on the screen?

4. A lens of focal length 100 cm forms Fraunhofer diffraction pattern of a single slit of width 0.04 cm in its focal plane. The incident light contains two wavelengths $\lambda_1$ and $\lambda_2$. It is found that third minimum corresponding to $\lambda_1$ and fifth minimum corresponding to $\lambda_2$ occur at the same point 0.3 cm from the central maximum. Calculate $\lambda_1$ and $\lambda_2$.

5. In the spectrum of double slit diffraction pattern why some points on the screen which are expected to be bright, appear dark?

6. In a double slit Fraunhofer diffraction pattern, the screen is placed 170 cm away from the slits. The width of the slits is 0.08 mm and they are 0.4 mm apart. Calculate the wavelength of light if the fringe width is 0.25 cm. Calculate the missing orders also.

7. Consider a set of two slits each of width $b = 5 \times 10^{-2}$ cm and separated by a distance $d = 0.1$ cm, illuminated by a monochromatic light of wavelength $6.328 \times 10^{-5}$ cm. If a screen is placed at a distance 10 cm, Calculate the positions of the minima inside the first diffraction minimum.

8. In the diffraction pattern from double slit formed by lens of focal length 100 cm distance between two minima above the central maximum is 0.40 cm and the fourth order maximum is missing. Compute the width of a slit and distance of separation between two slits for a wavelength of light 5000 Å.