Physics Questions

23. Light of wavelength 500 nm, falls from distant source, on a slit 0.50 mm wide. Find the distance between the two dark bands, on either side of the central bright band of the diffraction pattern observed on a screen placed 2m from the slit.
[AI 2004 C]
24. Assume that light of wavelength 6000Å is coming from a star. What is the limit of resolution of a telescope whose objective has a diameter of 100 inch.
[NCERT]
25. Calculate the resolving power of a telescope, assuming the diameter of the objective lens to be 6 cm and the wavelength of light used to be 540 nm.
[Delhi 2006 C]
26. A slit of width 'a' is illuminated by white light. For what value of 'a' is the first minima, for red light of $\lambda = 650$ nm, located at 30°? For what value of wavelength of light will the first diffraction maxima also fall at P?
[S.P. 2011]
27. Compare and contrast the pattern which is seen with two coherently illuminated narrow slits in Young's experiment with that seen for a coherently illuminated single slit producing diffraction.

28. Draw the diagram showing intensity distribution of light on the screen for diffraction of light at a single slit. How is the width of central maxima affected if (i) the width of the slit is doubled; (ii) the wavelength of the light used is increased? What happens to the width of the central maxima if the whole apparatus is immersed in water and why?
[Foreign 2009]

29. Two wavelengths of sodium light 590 nm and 596 nm are used, in turn, to study the diffraction taking place at a single slit of aperture 2×10^{-4} m. The distance between the slit and the screen is 1.5 m. Calculate the separation between the position of the first maxima of the diffraction pattern obtained in the two cases.
[Delhi 2013][HOTS]

30. Light of wavelength 550 nm is incident as parallel beam on a slit of width 0.1 mm. Find the angular width and the linear width of the principal maxima in the resulting diffraction pattern on a screen kept at a distance of 1.1 m from the slit, which of these width would not change if the screen were moved to a distance of 2.2 m from the slit?
[S.P. 2008]

31. The following table gives data about the single slit diffraction experiment:

Wavelength of light: λ, pλ
Half angular width of the principal maxima: θ, qθ
Find the ratio of the width of the slits used in the two cases. Would the ratio of the half angular width of the first secondary maxima, in the two cases, be also equal to q?
[S.P. 2013][HOTS]

32. Two convex lenses, of equal focal length, but of aperture A_1 and A_2 ($A_2 < A_1$) are used as the objective lenses in two astronomical telescopes having identical eyepieces. Compare the ratio of their (i) Resolving power (ii) Normal magnifying power (iii) intensity of images formed by them. Which one of the two telescope should be preferred? Why?
    [Delhi 2011][HOTS]
33. In Young's double slit experiment, the distance 'd' between the slits S_1 and S_2 is 1 mm. What should be the width of each slit so as to obtain 10 maxima of the double slit pattern within the central maxima of the single slit pattern?
    [NCERT]
34. Name the phenomenon which is responsible for bending of light around sharp corners of an obstacle. Under what conditions does this phenomenon take place? Give one application of this phenomenon in everyday life.
    [S.P. 2015]