CLASS : XII
PHYSICS ASSIGNMENT

Unit VI : OPTICS

(A) RAY OPTICS

1. Draw a ray diagram showing refraction of light through a prism for angle of minimum deviation.
2. What is the focal length of a plane mirror.
3. State new Cartesian sign convention.
4. Draw ray diagram showing dispersion of white light through a prism.
5. If you are driving a car, what type of mirror would you prefer to use for observing traffic at your back?
6. Monochromatic light of wavelength 58.9nm is incident from air on a water surface. What are the values of , speed & frequency of
    (a) Reflected light
    (b) refracted light Given $\mu = 1.33$

> Ans : (a) 589nm , 3×10^8 m/s , $= 5.09 \times 10^{14}$ Hz
>   (b) 444nm , 2.26×10^8 m/s , $= 5.09 \times 10^{14}$ Hz

7. A convex lens made up of material of refractive index μ_1 is immersed in a medium of refractive index μ_2. Trace path of a parallel beam of light passing through the lens when
    (a) $\mu_1 = \mu_2$
    (b) $\mu_1 < \mu_2$
8. Derive the relation between the critical angle & the refractive index of the medium.
9. State two conditions for producing total internal reflection. Does the critical angle depend on wavelength of light.
10. Draw a ray diagram for totally reflecting prism for a point object when it bends rays by 90°.
11. Name factors on which the deviation produced by a prism depends.
12. A plane mirror is turned through 20°. By what angle will reflected ray turn?
13. Two lenses of focal length f_1 & f_2 are kept in contact. What is the focal length of combination.
14. The radius of curvature of each surface of convex lens of refractive index 1.5 is 40cm. Calculate its Power.
    (Ans. 2.5 D)
15. A sunshine recorder globe of 30cm diameter is made of glass (μ=1.5). A ray enters the globe parallel to the axis. Find the position from the centre of the sphere where the ray crosses the axis
    Ans.   2.25 cm from centre
16. A lens of focal length 0.2m & made of glass (n=1.5) is immersed in water (n=1.33) Find change in focal length of the lens
    (Ans.   0.58m)
17. Can a lens be used in a medium of which it is made?
18. Radius of curvature of either face of a convex lens is equal to its focal length. Find refractive index?
    (Ans. $\mu = 1.5$)

(B) OPTICAL INSTRUMENTS

19. Draw ray diagram for a simple microscope.
20. Define   (i)   Linear magnification
                      (ii)   Angular magnification
21. What is the length of a telescope in normal adjustment.

22. **Draw a labelled ray diagram for the compound microscope. Write expression for its magnifying power.**

23. **How will the resolving power of a compound microscope be affected when frequency of light used to illuminate the object is increased.**

24. **Draw a labelled diagram of an astronomical telescope forming the final image at near point.**

25. **Using the data given below, state which two of the given lenses will you prefer to construct**
    (a)   telescope
    (b)   microscope.
    Also state which lens will you use as objective & as eye piece in each case.

Lenses	Power	Aperture
L1	6D	2cm
L2	3D	8cm
L3	10D	1cm

(C) WAVE OPTICS

26. **State Huygens's Principle.**

27. **A monochromatic beam of light traveling in vacuum enters a medium of refractive index μ. What is the relation between the wavelength of incident light ' ' and that of refracted light 'λ_r'.**

28. **A thin film of oil spread on the surface of water appears coloured why?**

29. **Using Huygens's principle, deduce the Laws of reflection.**

30. **Give the S1 unit of refractive index.**

31. **What happens to phase of a wave when reflection of wave takes place at a denser surface.**

32. **Two coherent sources of light have an intensity ratio of 100 : 64. What is their amplitude ratio?**

33. **What in the relation between path difference and phase difference?**

34. **What is the effect on width of interference fringes in Young's double slit experiment when**
    (a) Distance between screen & slit is doubled
    (b) The source is replaced by another source of shorter wavelength.
    (c) Separation between the slits is halved.

35. **Draw intensity distribution graph for diffraction due to a single slit.**

36. **What is Brewster's Law.**

37. **Two polarizing sheets have their polarizing directions parallel so that the intensity of transmitted light is maximum. Through what angle must either sheet be turned if the intensity is to drop by one half?**

38. **The velocity of light in air is 3×10^8 m/s & that in liquid is 2.2×10^8 m/s. Find the polarizing angle of incidence.**

39. **For two coherent sources of light of intensity ratio   , prove that**

$$\frac{I\ max - I\ min}{I\ max + I\ min} = \frac{2\ \sqrt{\ }}{1 +}$$

40. **What is ratio of fringe widths for bright & dark fringes in Young's double slit experiement.**

41. **Write uses of Polaroids.**

42. **What is Fresnel's distance? Write an expression for it.**

43. **What is the shape of wave front for a point source?**

44. **Why is diffraction of sound waves easier to observe than diffraction of light waves?**

45. **Distinguish between interference & diffraction.**