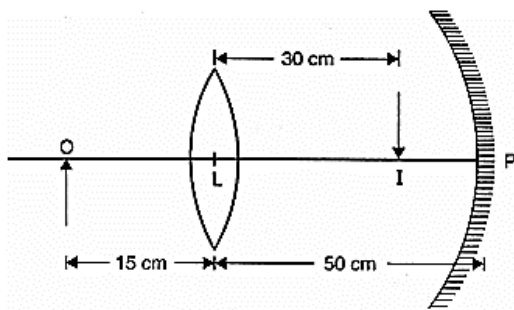
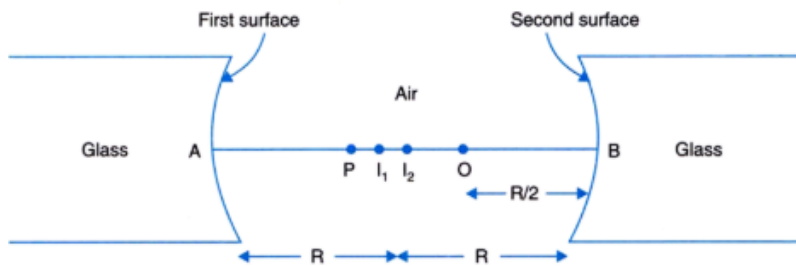




## Class 12 - Physics



7. At what angle should a ray of light be incident on the face of a prism of refracting angle  $60^\circ$  so that it just suffers total internal reflection at the other face? The refractive index of the material of the prism is 1.524 [3]
8. Two concave glass refracting surfaces, each with radius of curvature  $R = 35$  cm and refractive index  $\mu = 1.5$ , are placed facing each other in air as shown in figure. A point object O is placed at a distance of  $R/2$  from one of the surfaces as shown. Find the separation between the images of O formed by each refracting surface. [3]



9. Find the two possible positions of an object kept in front of a lens of  $+5.0$  D, so that the image formed in both cases is four times magnified. [3]
10. **Read the source given below and answer the following questions:** [5]

A prism is a portion of a transparent medium bounded by two plane faces inclined to each other at a suitable angle. A ray of light suffers two refractions on passing through a prism and hence deviates through a certain angle from its original path. The angle of deviation of a prism is,  $\delta = (\mu - 1)A$ , through which a ray deviates on passing through a thin prism of small refracting angle  $A$ .

If  $\mu$  is refractive index of the material of the prism, then prism formula is,  $\mu = \frac{\sin(A+\delta_m)/2}{\sin A/2}$

i. For which colour, angle of deviation is minimum?

- Red
- Yellow
- Violet
- Blue

ii. When white light moves through vacuum

- all colours have same speed
- different colours have different speeds
- violet has more speed than red
- red has more speed than violet.

iii. The deviation through a prism is maximum when angle of incidence is

- $45^\circ$
- $70^\circ$
- $90^\circ$
- $60^\circ$

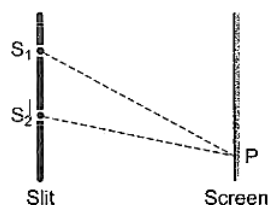
iv. What is the deviation produced by a prism of angle  $6^\circ$ ? (Refractive index of the material of the prism is 1.644).

- a.  $3.864^\circ$
- b.  $4.595^\circ$
- c.  $7.259^\circ$
- d.  $1.252^\circ$

v. A ray of light falling at an angle of  $50^\circ$  is refracted through a prism and suffers minimum deviation. If the angle of prism is  $60^\circ$ , then the angle of minimum deviation is

- a.  $45^\circ$
- b.  $75^\circ$
- c.  $50^\circ$
- d.  $40^\circ$

11. In a Young's double slit experimental arrangement shown here, if a mica sheet of thickness  $t$  and refractive index  $\mu$  is placed in front of the slit  $S_1$ , then the path difference ( $S_1P - S_2P$ ): [1]



- a) decreases by  $(\mu - 1)t$
- b) increases by  $\mu t$
- c) does not change
- d) increases by  $(\mu - 1)t$

12. The idea of secondary wavelets for the propagation of a wave was first given by: [1]

- a) Newton
- b) Maxwell
- c) Fresnel
- d) Huygens

13. The refractive index of glass with respect to water is 1.125. If the speed of light in water is  $2.25 \times 10^8 \text{ ms}^{-1}$  then calculate the speed of light in glass. [2]

14. A beam of light consisting of two wavelengths 600 nm and 500 nm is used in a Young's double slit experiment. The slit separation is 1.0 mm and the screen is kept 0.60 m away from the plane of the slits. Calculate: [3]

- a. the distance of the second bright fringe from the central maximum for wavelength 500 nm, and
- b. the least distance from the central maximum where the bright fringes due to both the wavelengths coincide.

15. White light is incident on a soap film at an angle of  $\sin^{-1} \frac{4}{5}$  and the reflected light on examination by the spectroscopy shows dark bands. The consecutive dark bands correspond to wavelengths  $6100 \text{ \AA}$  and  $6000 \text{ \AA}$ . If the refractive index of the film is  $\frac{4}{3}$ , calculate its thickness. [3]

16. **Assertion (A):** Coloured spectrum is seen when we look through a muslin cloth. [1]

**Reason (R):** It is due to the diffraction of white light on passing through fine slits.

- a) Both A and R are true and R is the correct explanation of A.
- b) Both A and R are true but R is not the correct explanation of A.
- c) A is true but R is false.
- d) A is false but R is true.

17. **Assertion (A):** To observe diffraction of light, the size of the obstacle/aperture should be of the order of  $10^{-7} \text{ m}$ . [1]

**Reason (R):**  $10^{-7}$  is the order of the wavelength of visible light.

- a) Both A and R are true and R is the correct explanation of A.      b) Both A and R are true but R is not the correct explanation of A.
- c) A is true but R is false.      d) A is false but R is true.

18. **Assertion (A):** We cannot get a diffraction patterns from a wide slit illuminated by monochromatic light. [1]  
**Reason (R):** In the diffraction pattern, all the bright bands are not of the same intensity.

- a) Both A and R are true and R is the correct explanation of A.      b) Both A and R are true but R is not the correct explanation of A.
- c) A is true but R is false.      d) A is false but R is true.

19. Sketch a graph between the frequency of incident radiations and stopping potential for a given photosensitive material. What information can be obtained from the value of intercept on the potential axis? [3]

A source of light of frequency greater than the threshold frequency is placed at a distance of 1 m from the cathode of a photo-cell. The stopping potential is found to be V. If the distance of the light source from the cathode is reduced, explain giving reasons, what change will you observe in the

- i. photoelectric current,
- ii. stopping potential?

20. Draw the graph showing the variation of photoelectric current with anode potential of a photocell for [3]
1. the same frequencies but different intensities  $I_3 > I_2 > I_1$  of incident radiation, and
  2. the same intensity but different frequencies  $\nu_1 > \nu_2 > \nu_3$  of incident radiation.