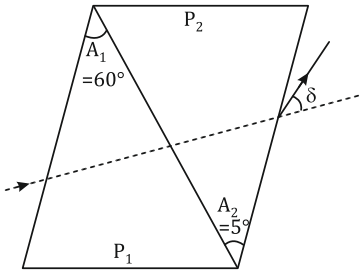
DPP 08

1. A thin prism of angle 6° and refractive index for yellow light (n_Y) is 1.5 is combined with another prism of angle 5° and $n_Y = 1.55$. The combination produces no dispersion. The net average deviation (δ) produced by the combination is $\left(\frac{1}{x}\right)^{\circ}$. The value of x is ___.



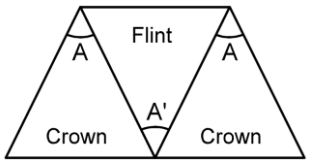
2. A deviation of 2° is produced in the yellow ray when prism of crown and flint glass are achromatically combined. Taking dispersive powers of crown and flint glass as 0.02 and 0.03 respectively. The refracting angles for crown glass prism will be ____ ° (in degree). (Round off to the nearest integer)

3. An object viewed from a near point distance of 25 cm, using a microscopic lens with magnification ' 6 ' gives an unresolved image. A resolved image is observed at infinite distance with a total magnification double the earlier using an eyepiece along with the given lens and a tube of length 0.6 m, if the focal length of the eyepiece is equal to _____cm.

4. A certain material has refractive indices 1.53, 1.60 and 1.68 for red, yellow and violet light respectively.
(a) Calculate the dispersive power.
(b) Find the angular dispersion produced by a thin prism of angle 6° made of this material.

5. A flint glass prism and a crown glass prism are to be combined in such a way that the deviation of the mean ray is zero. The refractive index of flint and crown glasses for the mean ray are 1.6 and 1.9 respectively. If the refracting angle of the flint prism is 6°, what would be the refracting angle of crown prism?

6. Three thin prisms are combined as shown in figure. The refractive indices of the crown glass for red, yellow and violet rays are μ_r, μ_y and μ_v respectively and those for the flint glass are μ_r', μ_y' and μ_v' respectively. Find the ratio A′ /A for which
(a) system produces deviation without dispersion (achromatic combination) and
(b) system produces dispersion without deviation (direct vision arrangement).



7. A small telescope has an objective lens of focal length 144 cm and an eye-piece of focal length 6.0 cm. What is the magnifying power of the telescope? What is the separation between the objective and the eye-piece?

8. An angular magnification (magnifying power) of 30 X is desired using an objective of focal length 1.25cm and an eye-piece of focal length 5 cm. How will you set up the compound microscope for normal adjustment (Final image at ∞)?

9. A simple microscope has a focal length of 5 cm. The magnification at the least distance of distinct vision is-

(A) 1 (B) 5 (C) 4 (D) 6

10. In a compound microscope, the intermediate image is -

(A) virtual, erect and magnified (B) real, erect and magnified

(C) real, inverted and magnified (D) virtual, erect and reduced

11. The convex lens is used in-

(A) Microscope (B) Telescope (C) Projector (D) All of the above

12. The magnifying power of a simple microscope can be increased if an eyepiece of:

(A) shorter focal length is used (B) longer focal length is used

(C) shorter diameter is used (D) longer diameter is used

13. A medium has $n_v = 1.56$, $n_r = 1.44$. Then its dispersive power is:

(A) 3/50 (B) 6/25 (C) 0.03 (D) none of these

14. A plane glass slab is placed over various coloured letters. The letter which appears to be raised the least is:

(A) violet (B) yellow (C) red (D) green

ANSWER KEY

1. 4 **2.** 12

3. 25 **4.** (a) 0.25 (b) 0.90°

5. 4° **6.** (a) $\frac{2(\mu_v-\mu_r)}{\mu_v'-\mu_r'}$ (b) $\frac{2(\mu_y-1)}{\mu_y'-1}$

7. 24; 150cm **8.** 13.75

9. (D) **10.** (C)

11. (D) **12.** (A)

13. (B) **14.** (C)