

DPP – 11 (Geometrical Optics)

Video Solution on Website:-

<https://physicsaholics.com/home/courseDetails/67>

Video Solution on YouTube:-

<https://youtu.be/gM7hEjMau50>

Written Solution on Website:-

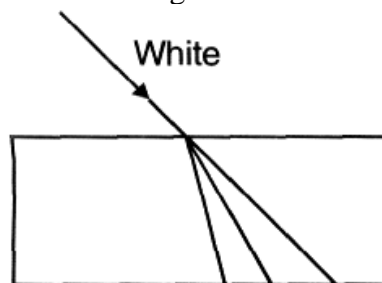
<https://physicsaholics.com/note/notesDetails/68>

COMPREHENSION (Q.1 to Q.3)

A glass prism with a refracting angle of 60° has a refractive index 1.52 for red and 1.6 for violet light. A parallel beam of white light is incident on one face at an angle of incidence, which gives minimum deviation for red light. Find :

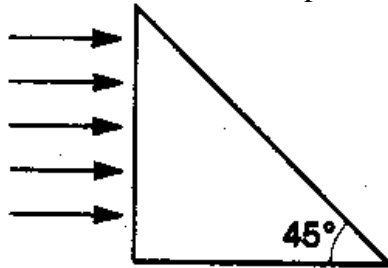
[Use: $\sin(50^\circ) = 0.760$; $\sin(31.6^\circ) = 0.520$; $\sin(28.4^\circ) = 0.475$; $\sin(56^\circ) = 0.832$; $\pi = 22/7$]

- Q 1. The angle of incidence at the prism is :
 (a) 30° (b) 40° (c) 50° (d) 60°
- Q 2. The angular width of the spectrum is :
 (a) 6° (b) 4.8° (c) 9.6° (d) 12°
- Q 3. The length of the spectrum if it is focused on a screen by a lens of focal length 100 cm is :
 (a) $\frac{10\pi}{3} \text{ cm}$ (b) $\frac{10\pi}{3} \text{ m}$ (c) $\frac{5\pi}{3} \text{ cm}$ (d) $\frac{5\pi}{3} \text{ m}$
- Q 4. The dispersive powers of two materials are 0.30 & 0.28. They are used to construct two lenses which are kept in contact to eliminate chromatic aberration (that means the $f_v = f_r$, the focal length of combination is same for red and violet) If the focal length (for mean color) of the lens made of the material of dispersive power 0.30 is 10 cm, then the focal length (for mean color) of the lens of other material is :
 (a) $28/3 \text{ cm}$ (b) $-0.28/3 \text{ m}$
 (c) $0.75/7 \text{ m}$ (d) none of these
- Q 5. A white light is incident on a glass slab. Maximum lateral displacement is for

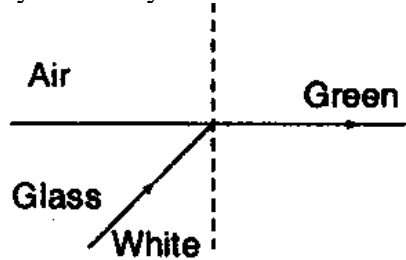


- (a) Red (b) Violet (c) Green (d) Yellow

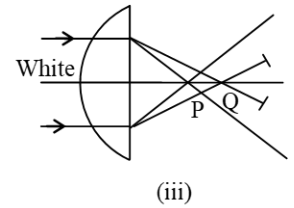
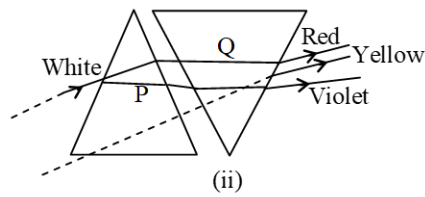
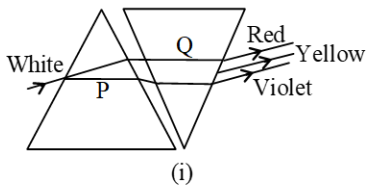
- Q 6. A beam of light consisting of red, green and blue colours is incident on a right-angled prism. The refractive indices of the material of the prism for the red, green and blue wavelengths are 1.39, 1.44 and 1.47 respectively. The prism will:



- (a) separate the red colour from the green and blue colours
 (b) separate the blue colour from the red and green colours
 (c) separate all the three colours from one another
 (d) not separate even partially any colour from the other two colours
- Q 7. White light is incident on the interface of glass and air as shown in the figure. If green light is just totally internally reflected then the emerging ray in air contains:

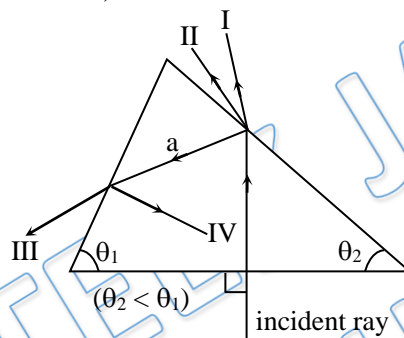


- (a) yellow, orange, red
 (b) violet, indigo, blue
 (c) all colours
 (d) all colours except green
- Q 8. A thin prism P_1 of angle 4° , and made from a glass of refractive index 1.54, is combined with another thin prism P_2 made from a glass of refractive index 1.72, to produce dispersion without deviation. The angle of P_2 is
 (a) 5.33° (b) 4° (c) 3° (d) 2.6°
- Q 9. When lights of different colours move through water, they must have different
 (a) wavelengths (b) frequencies (c) velocities (d) amplitudes
- Q 10. The dispersive powers of flint glass and crown glass are 0.053 and 0.034 respectively and their mean refractive indices are 1.68 and 1.53 for white light. Calculate the angle of the flint glass prism required to form an achromatic combination with a crown glass prism of refracting angle 4°
 (a) 2° (b) 4° (c) 5° (d) 6°
- Q 11.



- (a) Figure (i) shows deviation without dispersion
 (b) Figure (ii) is for showing dispersion without deviation
 (c) In figure (i) prism P is of flint glass and Q of crown glass (if these two are the only options and $m_{\text{flint}} > m_{\text{crown}}$)
 (d) In figure (iii) a transverse screen at P would show violet at centre, red outside

Q 12. A white light ray is incident on a glass prism, and it create four refracted rays I, II, III and IV. Match (one to one) the refracted rays with the colours given (a & IV are rays due to total internal reflection)



Column - I
(Ray)

- (A) I
 (B) II
 (C) III
 (D) IV

Column-II
(Colour)

- (P) Red
 (Q) Green
 (R) Yellow
 (S) Blue



Answer Key

Q.1 c	Q.2 a	Q.3 a	Q.4 b	Q.5 b
Q.6 a	Q.7 a	Q.8 c	Q.9 a, b, c	Q.10 a
Q.11 a, b, d	Q.12 (A) P; (B) R; (C) Q; (D) S			

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