# PHYSICS

# BOOKS - MARVEL PHYSICS (HINGLISH)

# REFRACTION OF LIGHT

## Mcqs

**1.** The frequency of light in air is $5 \times 10^{14}$ Hz . What will be the frequency of light when it travels in the water ?

A. $5 \times 10^{14}$ Hz

B. $10^{15}$ Hz

C. $2.5 \times 10^{12}$ Hz

D. $2.5 \times 10^{14}$ Hz

**Answer: A**

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**2.** If $V_g$, $V_w$ and $V_d$ represent the velocities of light in glass , water and diamond respectively , then

A. $V_g < V_d < V_w$

B. $V_w > V_g > V_d$

C. $V_d > V_g > V_w$

D. $V_w < V_g < V_d$

**Answer: B**

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**3.** The wavelength of light from a given sources is 6000 Å . The wavelength of this

light when it travels through a medium of refractive index 1.5 is

A. 3000 Å

B. 4000 Å

C. 5000 Å

D. 6500 Å

**Answer: B**

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**4.** A beam of monochromatic blue light of wavelength 4200 Å in air , travels in water of refractive index $\frac{4}{3}$ . What is the its wavelength in water ?

    A. 4200 Å

    B. 5600 Å

    C. 3150 Å

    D. 3850 Å

**Answer: C**



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**5.** A ray of light travelling inside a rectangular glass block of refractive index $\sqrt{2}$ is incident on the glass-air surface at an angle of incidence of $45°$. The refractive index of air is one. Under these conditions the ray will

    A. will be absorbed

    B. will travel in air without any deviation

    C. will emerge into air with an angle of refraction equal to $90°$

D. will suffer total internal reflection

**Answer: C**

**6.** A ray of light incident normally on a glass slab of refractive index 3/2, travels a distance of 6 cm in glass in time t. What will be the distance travelled by the ray in the same time (t) if it travels in air ?

A. 3 cm

B. 6 cm

C. 9 cm

D. $3\sqrt{3}$ cm

**Answer: C**

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**7.** The speed of light in dense flint glass is 3/5 of its speed in air. The refractive index of dense flint glass is

A. 1.5

B. 1.75

C. 1.666

D. 1.1

**Answer: C**

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**8.** Ray optics is valid when characteristic dimensions are

A. of the same order as that of the

wavelength of light

B. much smaller than the wavelength of

light

C. much larger than the wavelength of

light

D. of the order of $10^{-6}$ m

**Answer: C**

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**9.** Refractive indices of water an glass are $4/3$ and $3/2$ respectively. A ray of light travelling in water is incident on the water glass interface at $30°$. Calculate the angle of refraction.

A. $\sin^{-1}\left(\dfrac{3}{4}\right)$

B. $\sin^{-1}\left(\dfrac{2}{3}\right)$

C. $\sin^{-1}\left(\dfrac{4}{9}\right)$

D. $\sin^{-1}\left(\dfrac{8}{9}\right)$

**Answer: C**

**10.** A beam of monochromatic light is refacted from vacuum into a medium of refracticve index 1.5 The wavelength of refracted light will be

A. depend on the intensity of refracted light

B. be the same as in vacuum

C. be longer than that in vacuum

D. be smaller than that in vacuum

**Answer: D**

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**11.** A ray of light is travelling from medium A to medium B . The refractive index of the medium B does not depend upon

A. nature of the medium

B. wavelength of the light used

C. nature of the medium A

D. angle of incidence

Answer: D

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**12.** Time taken by sunlight to pass through a window of thickness $4mm$ whose refraactive index is $\dfrac{3}{2}$, is

A. $2 \times 10^{-4}$ s

B. $2 \times 10^{-8}s$

C. $2 \times 10^{-11}$ s

D. $2 \times 10^{11}s$

**Answer: C**

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**13.** Light travels through a glass plate of thickness t and refractive index $\mu$. If c is the speed of light in vacuum, the time taken by light to travel this thickness of glass is

A. $\dfrac{ct}{n}$

B. ntc

C. $\dfrac{nt}{c}$

D. $\dfrac{t}{nc}$

**Answer: C**

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**14.** The frequency of a light wave in a material

is $4 \times 10^{14}$ Hz and wavelength is 5000 Å .

What is the refractive index of the material ?

A. 1.40

B. 1.50

C. 1.6

D. 1.33

**Answer: B**

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15. The index of refraction of diamond is 2.0, velocity of light in diamond in cm/second is approximately

A. $6 \times 10^{10}$

B. $3 \times 10^{10}$

C. $2 \times 10^{10}$

D. $1.5 \times 10^{10}$

**Answer: D**

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**16.** If $_x\mu_y$ represents the refractive index when

a ray of light goes from medium x to medium y

, then the product $_2\mu_1 \times _3\mu_2 \times _4\mu_3$ is equal to

A. $_2\mu_1$

B. $\dfrac{1}{_1\mu_4}$

C. $_3\mu_2$

D. $_4\mu_2$

**Answer: B**

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**17.** The refractive index of glass is $\dfrac{3}{2}$ and the refractive index of water is $\dfrac{4}{3}$ . The speed of

light in glass is $2.00 \times 10^8 ms^{-1}$. What is the speed of light in water in $ms^{-1}$?

A. $1.50 \times 10^8$

B. $2.25 \times 10^8$

C. $1.78 \times 10^8$

D. $2.67 \times 10^8$

**Answer: B**

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**18.** The velocity of light in glass whose refractive index w.r.t, air is $1.5$ is $2 \times 10^8 m/s$. In a certain liquid, the velocity of light is found to be $2.5 \times 10^8 m/s$. The refractive index of the liquid w.r.t. air is

   A. $0.64$

   B. $1.20$

   C. $0.80$

   D. $1.44$

**Answer: B**

**19.** Light entering air to glass $(\mu = 1.5)$ boundary is partly reflected and partly refracted. If the incident and reflected rays are at right angles to each other, the angle of refraction r is given by

A. $\sin^{-1}\left(\dfrac{\sqrt{2}}{3}\right)$

B. $\sin^{-1}\left(\dfrac{2}{\sqrt{3}}\right)$

C. $\sin^{-1}\left(\dfrac{1}{\sqrt{3}}\right)$

D. $\sin^{-1}\left(\sqrt{\dfrac{2}{3}}\right)$

**Answer: A**

**20.** The R.I. of the glass w.r.t. glycerine is $\left(\dfrac{1.5}{1.4}\right)$ . What is the speed of light in glycerine , if the speed of light in glass is $2 \times 10^8$ m/s ?

A. $1.75 \times 10^8 m/s$

B. $2.142 \times 10^8 m/s$

C. $2.25 \times 10^8 m/s$

D. $1.95 \times 10^8 m/s$

**Answer: B**

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**21.** A ray of light of frequency $5 \times 10^{14}$ Hz is passed through a liquid . The wavelength of light measured inside the liquid is found to be 450 nm . Calculate (i) wavelength of light in

vacuum (ii) refractive index of liquid (iii) velocity of light in the liquid . Take velocity of light in vacuum as $3 \times 10^8 ms^{-1}$

A. 1.5

B. 1.33

C. 1.25

D. 1.8

**Answer: B**

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**22.** A ray of light is incident on a medium at an angle i. It is found that the reflected ray is at right angles to the refracted ray . The refractive index of the medium is given by

A. $\sin i$

B. $\cos i$

C. $\tan i$

D. $\cosec i$

Answer: C

**23.** A wave of light having frequency $4 \times 10^{14}$ Hz. And speed of light $3 \times 10^8$ m/s enters glass of R.I. 1.5. Change in wavelength is

A. $2.5 \times 10^{-6}$ m

B. $2.5 \times 10^{-7}$ m

C. $2.5 \times 10^{-8}$ m

D. $2.5 \times 10^{-9}$ m

**Answer: B**

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**24.** The velocity of light in glass whose refractive index w.r.t, air is $1.5$ is $2 \times 10^8 m/s$. In a certain liquid, the velocity of light is found to be $2.5 \times 10^8 m/s$. The refractive index of the liquid w.r.t. air is

A. 0.8

B. 0.9

C. 1.2

D. 1.33

**Answer: C**

**25.** The wave number of two waves are $2.5 \times 10^6$ / metre and $2 \times 10^6$ / metre . What is the difference between their wavelength ?

A. 5000 Å

B. 4000 Å

C. 2000 Å

D. 1000 Å

**26.** The optical path of a monochromatic light is the same if it travels through 4 cm of glass or 4.5 cm of water . If the refractive index of galss is 1.5, then the refractive index of water is

A. 1.2

B. 1.33

C. 1.42

D. 1.46

**Answer: B**

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**27.** A ray of light is incident on a galss slab making on angle of $30°$ with the surface . If the angle of refraction in glass is $33°$, the angle of deviation of the ray during its passage through the galss slab is

A. $30^\circ$

B. $27^\circ$

C. $40^\circ$

D. $20^\circ$

**Answer: B**

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**28.** Light of certain colour has 2000 waves per millimetre in air . What will be the wavelength

of this light in a medium of refractive index 1.25 ?

A. 1000 Å

B. 2000 Å

C. 3000 Å

D. 4000 Å

Answer: D

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**29.** The light travels a distance of 500 m in water . It is given that $\mu$ for water is $\dfrac{4}{3}$ and the velocity of light in vacuum is $3 \times 10^{10}$ cm/s .

What is the equivalent optical path ?

    A. 566.66 m

    B. 666.66 m

    C. 586 .45 m

    D. 576.66 m

**Answer: B**

**30.** A ray of light is Incident on a glass plate at $60°$. The reflected and refracted rays are found to be mutually perpe:ndiwlar. The refractive index of the glass is

A. $\dfrac{\sqrt{3}}{2}$

B. $\dfrac{1}{2}$

C. $\dfrac{1}{\sqrt{3}}$

D. $\sqrt{3}$

**Answer: D**

**31.** The optical path of a monochromatic light is the same if it goes through 2.00 cm of glass or 2.25 cm of water. If the refractive index of water is 1.33, what is the refractive index of glass?

    A. $2.25 \times 10^8$ m/s

    B. $1.5 \times 10^8$ m/s

C. $2 \times 10^8$ m/s

D. $1.75 \times 10^8$ m/s

**Answer: C**

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**32.** An object is immersed in a fluid. In order that the object becomes invisible, it should

A. absorb all light falling on it

B. have a refractive index one

C. behave like a perfect reflector

D. have a refractive index exactly equal to

that of the surrounding liquid

**Answer: D**

33. The refractive index of glass w.t.r. a medium is $\dfrac{4}{3}$ . If $v_m - v_g = 6.25 \times 10^7$ m/s. then the velocity oflight in the medim will be

A. $2.5 \times 10^8$ m/s

B. $2.25 \times 10^8$ m/s

C. $1.875 \times 10^8$ m/ s

D. $1.5 \times 10^8$ m/s

**Answer: A**

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**34.** Electromagnetic waves of frequency $6 \times 10^{12}$ Hz are travelling through free space .

In which region of the e.m. spectrum , the waves will lie ?

A. Ultraviolet region

B. X-ray region

C. Infrared region

D. Visible region

Answer: C

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**35.** Monochromatic light to wavelength 6000Å travels through glass of refractive index $\frac{3}{2}$. The distance travelled by the wavefront 1 picosecond is

    A. 100 $\mu m$

    B. 200$\mu m$

    C. 300$\mu m$

    D. 400$\mu m$

**Answer: B**

**36.** An electromagnetic wave , whose wave normal makes an angle of $45°$ with the vertical , travelling in air strikes a horizontal liquid surface . While travelling through the liquid it gets deviated through $15°$ . What is the speed of the e.m. wave in the liquid , if the speed of electromagnetic wave in air is $3 \times 10^8$ m/s ?

A. $1.5 \times 10^8$ m/s

B. $2.1 \times 10^8$ m/s

C. $2.5 \times 10^8$ m/s

D. $\dfrac{\sqrt{2}}{3} \times 10^8$ m/s

**Answer: B**

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**37.** A water film is formed on a glass block . A light ray is incident on water film from air at an angle $60°$ . What is the angle of incidence on the glass block ?

(Refractive index of glass = 1.5 , Refractive index of water = 4/3)

A. $\sin^{-1}\left(\dfrac{2}{\sqrt{3}}\right)$

B. $\sin^{-1}\left(\dfrac{8}{\sqrt{3}}\right)$

C. $\sin^{-1}\left(\dfrac{\sqrt{3}}{4}\right)$

D. $\sin^{-1}\left(\dfrac{3\sqrt{3}}{8}\right)$

**Answer: D**

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**38.** The number of waves in a glass slab of thickness 4 cm is the same as in a water column of height 5 cm ,when the same monochromatic ray of light travels through them .what is the refractive index of water if the refractive index of glass is $\dfrac{5}{3}$ ?

A. 1.25

B. 1.5

C. 1.33

D. 1.75

**Answer: C**

**39.** An endoscope is employed by a physician to view the internal parts of body organ. It is based on the principle of

A. Reflection

B. Refraction

C. Total Internal Reflection

D. Dispersion

**Answer: C**

**40.** In an optical fibre ,the refractive index of the core material is

    A. equal to R.I of the cladding material

    B. less than that of the cladding material

    C. more than that of the cladding material

D. negligible as compared to that of the cladding material .

**Answer: C**

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**41.** In an optical fibre ,the refractive indices of the core and the cladding are given by $n_1$ and $n_2$ respectively . Light can travel through the optical fibre if

A. $n_1 = n_2$

B. $n_1 < n_2$

C. $n_1 > n_2$

D. $n_1 = \dfrac{n_2}{3}$

**Answer: C**

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42. The optical fibres are made from

A. semiconductors

B. good conductors

C. insulators

D. ferromagnetic materials

**Answer: C**

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**43.** A diver in a lake wants to signal his distress to a person sitting on the edge of the lake flashing his waterproof torch. He should direct the beam

A. Vertically upwards

B. Horizontal

C. At an angle to the vertical which is slightly more than the critical angle

D. At an angle to the vertical which is slightly less than the critical angle

**Answer: D**

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**44.** Light travels in two media A and B with speeds $1.8 \times 10^8 ms^{-1}$ and $2.4 \times 10^8 ms^{-1}$ respectively. Then the critical angle between them is

A. $\sin^{-1}\left(\dfrac{2}{3}\right)$

B. $\tan^{-1}\left(\dfrac{3}{4}\right)$

C. $\sin^{-1}\left(\dfrac{3}{4}\right)$

D. $\sin^{-1}\left(\dfrac{1}{2}\right)$

Answer: C

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45. Wavelength of given light waves in air and in a medium are 6000 Å and 4000 Å respectively . The critical angle for the medium is given by

A. $\sin^{-1}\left(\dfrac{3}{4}\right)$

B. $\sin^{-1}\left(\dfrac{2}{3}\right)$

C. $\tan^{-1}\left(\dfrac{2}{3}\right)$

D. $\tan^{-1}\left(\dfrac{3}{4}\right)$

**Answer: B**

**46.** The critical angle of a medium with respect to air is $45°$. The refractive index of medium is

A. $\dfrac{\sqrt{3}}{2}$

B. $\dfrac{2}{\sqrt{3}}$

C. $\dfrac{1}{\sqrt{2}}$

D. $\sqrt{2}$

**Answer: D**

**47.** If refractive index of glass is 1.50 and of water is 1.33, then criticle angle is

A. $\sin^{-1}\left(\sqrt{\dfrac{8}{9}}\right)$

B. $\sin^{-1}\left(\dfrac{8}{9}\right)$

C. $\sin^{-1}\left(\dfrac{5}{7}\right)$

D. $\sin^{-1}\left(\dfrac{2}{3}\right)$

**Answer: B**

**48.** If the critical angle for total internal reflection from a medium to vacuum is $30°$, the velocity of light in the medium is

A. $2 \times 10^8$ m /s

B. $1.5 \times 10^8$ m/s

C. $\dfrac{3}{4} \times 10^8$ m/s

D. $\dfrac{2}{5} \times 10^8$ m/s

**Answer: B**

**49.** A ray of light travelling inside a rectangular glass block of refractive index $\sqrt{2}$ is incident on the glass–air surface at an angle of incidence of $45°$. The refractive index of air is 1. Under these conditions the ray

    A. be reflected back into glass

    B. be absorbed

C. emerge into air with an angle of refraction equal to $90°$

D. emerge into air without any deviation

**Answer: C**

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50. When the surface of a lake is calm , a fish submerged in water will see the entire outside world within an inverted cone whose vertex is situated at the eye of the fish . What is the

vertex angle of the cone ?

$$\left( {}_a n_w = \frac{4}{3} \right) \text{ and } \sin 49° = 0.75$$

A. $110°$

B. $98°$

C. $48°$

D. $68°$

**Answer: B**

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**51.** The refractive index of water is 4 / 3 and that of glass is 5/3. What will be the critical angle for the ray of light entering water from the glass

A. $\sin^{-1}\left(\dfrac{2}{3}\right)$

B. $\sin^{-1}\left(\dfrac{3}{5}\right)$

C. $\sin^{-1}\left(\dfrac{3}{4}\right)$

D. $\sin^{-1}\left(\dfrac{4}{5}\right)$

Answer: D

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**52.** The speed of light in medium A is $2.0 \times 10^8 m/\sec$ and that in medium B is $2.4 \times 10^8 m/\sec$. The critical angle of incidence for light tending to go from medium A to medium B is

A. $\sin^{-1}\left(\dfrac{5}{6}\right)$

B. $\sin^{-1}\left(\dfrac{5}{12}\right)$

C. $\sin^{-1}\left(\dfrac{2}{3}\right)$

D. $\sin^{-1}\left(\dfrac{3}{4}\right)$

**Answer: A**

**53.** The critical angle for light going from medium X into medium Y is $\theta$ . The speed of light in medium X is v. The speed of light in medium Y is

A. $v_A \tan\theta$

B. $\dfrac{v_A}{\tan\theta}$

C. $\dfrac{v_A}{\sin\theta}$

D. $v_A \sin \theta$

**Answer: C**

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**54.** A fish situated at a depth h below the surface of water in a lake ,can see the outside objects in air through a circular aperature of radius r . What is the radius of the aperture in terms of h and n ,where $n = {}_a n_w$? [${}_a n_w$ = R.I. of water w.r.t. air]

A. $r = h\sqrt{n^2 - 1}$

B. $r = \dfrac{h}{\sqrt{n^2 - 1}}$

C. $r = \dfrac{h}{n^2 - 1}$

D. $r = \dfrac{h}{\sqrt{n - 1}}$

**Answer: B**

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55. When a ray of light travels from medium A to medium B , its speed increases from

$2 \times 10^8$ m/s to $2.4 \times 10^8$ m/s . What is the sine of the critical angle for the two media ?

A. $\dfrac{6}{5}$

B. $\dfrac{5}{6}$

C. $\dfrac{3}{4}$

D. $\dfrac{4}{3}$

**Answer: B**

**56.** For an optical fibre ,the ratio of the refractive index of the core to the refractive index of the cladding is 1.25 . What is the critical angle at the core cladding interface ?

A. $51° 5'$

B. $52° 12'$

C. $53° 8'$

D. $54° 5'$

Answer: C

**57.** A ray of light travels from an optically denser to rarer medium. The critical angle of the two media is C. The maximum possible deviation of the ray will be

A. $90°$

B. $\sqrt{90° + C}$

C. $90° - C$

D. $90° - 2C$

**Answer: C**

**58.** A fish looking up through the water sees the outside world contained in a circular horizon. If the refractive index of water is $\dfrac{4}{3}$ and the fish is 12 cm below the surface, the radius of this circle is cm is

A. $4\sqrt{5}$

B. $36\sqrt{5}$

C. $\dfrac{36}{\sqrt{7}}$

D. $36\sqrt{7}$

**Answer: C**

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**59.** The refractive index of water is $4/3$. Determine the angle of the cone within which the entire outside view will be confined for a fish under water.

A. $35.5^\circ$
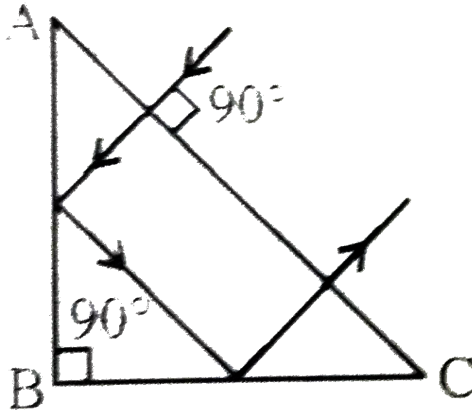
B. $40^\circ$

C. $43.5^\circ$

D. $48.6^\circ$

**Answer: D**

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**60.** A ray falls on a prism ABC (AB = BC) and travels as shown in the figure . The minimum refractive index of the prism material should

be



A. $4/3$

B. $\sqrt{2}$

C. $1.5$

D. $\sqrt{3}$

**Answer: B**

61. Glass has refractive index $\mu$ with respect to air and the critical angle for a ray of light going from glass to air is $\theta$. If a ray of light is incident from air on the glass with angle of incidence $\theta$, the corresponding angle of refraction is

   A. $90°$

   B. $\sin^{-1}\left(\dfrac{1}{\mu^2}\right)$

   C. $\sin^{-1}\left(\dfrac{1}{\mu}\right)$

D. $\sin^{-1}\left(\dfrac{1}{\sqrt{\mu}}\right)$

**Answer: B**

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**62.** A ray of light travelling from glass to air is incident at $50°$ from the glass air boundary . What is the angle of deviation if the critical angle is $42°$ ?

A. $0°$

B. $60^\circ$

C. $80^\circ$

D. $\sin^{-1}\left[\dfrac{\sin 50^\circ}{1.5}\right] - 50$

**Answer: C**

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63. Light takes $t_1$ second to travel a distance x cm in vacuum and the same light takes $t_2$ second to travel 10x cm in medium. The critical angle for the corresponding medium is

A. $\sin^{-1}\left(\dfrac{10t_1}{t_2}\right)$

B. $\sin^{-1}\left(\dfrac{t_1}{10t_2}\right)$

C. $\sin^{-1}\left(\dfrac{t_1}{10t_2}\right)$
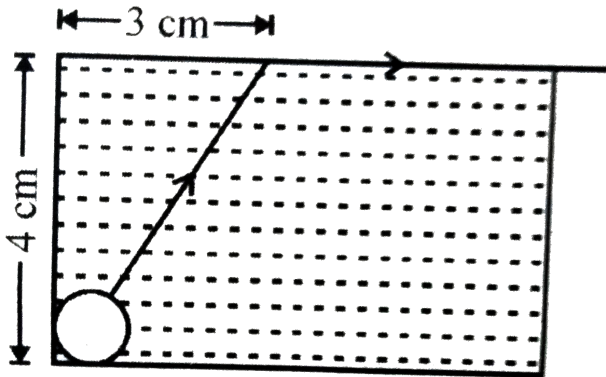
D. $\sin^{-1}\left(\dfrac{10t_2}{t_1}\right)$

**Answer: A**

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**64.** A small coin is resting on the bottom of a beaker filled with a liquid . A ray of light from the coin travels upto the surface of the liquid

and moves along its surface as shown in the

figure .



How fast is the light travelling in the liquid ?

A. $1.8 \times 10^8$ m/s

B. $2.4 \times 10^8$ m/s

C. $3.0 \times 10^8$ m/s

D. $1.2 \times 10^8$ m/s

**Answer: A**

65. A ray of light from a denser medium strikes a rarer medium at angle of incidence $i$. The refrected and the refracted rays make an angle of $90°$ with each other. The angles of reflection and refraction are r and $r'$ respectively. The critical angle is

(i) $\sin^{-1}(\tan r)$

(ii) $\sin^{-1}(\tan i)$

(iii) $\sin^{-1}(\tan r)$

(iv) $\tan^{-1}(\tan i)$

    A. $\sin^{-1}(\tan r)$

    B. $\tan^{-1}(\sin i)$

    C. $\sin^{-1}(\cot r)$

    D. $\sin^{-1}(\tan r')$

**Answer: A**

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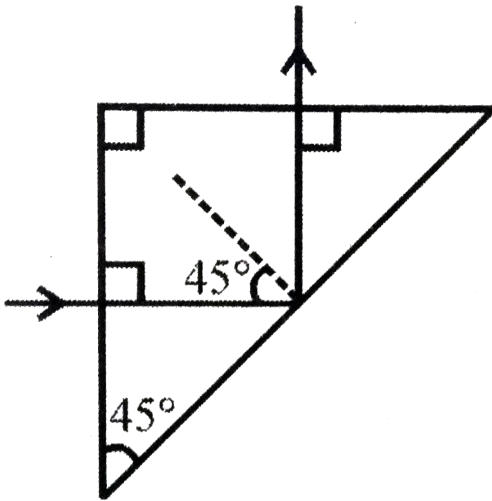**66.** Critical angle is minimum when a light ray passes from

    A. air to glass

    B. glass to air

    C. glass to water

    D. water to glass

**Answer: B**

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**67.** A light ray is incident perpendicular to one face of a $90°$ prism and is totally internally reflected at the glass-air interface . If the angle of reflection is $45°$ , then the refractive index n is



A. $n < \sqrt{2}$

B. $n > \dfrac{1}{\sqrt{2}}$

C. $n > \sqrt{2}$

D. $n < \dfrac{1}{\sqrt{2}}$

**Answer: C**

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**68.** The critical angle is maximum when light travels from

A. water to air

B. air to water

C. glass to air

D. glass to water

**Answer: D**

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69. A ray of light incident at angle of $40°$ , on a glass slab , is deviated through $15°$ , while passing through glass . What is the critical angle for the glass air surface ?
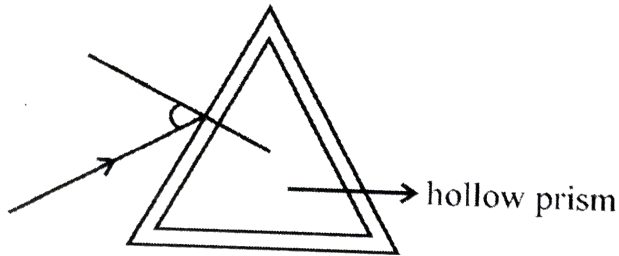
A. $32°$

B. $35°$

C. $38°$

D. $41°$

**Answer: D**


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**70.** A beam of white light is incident on a

hollow glass prism having very thin glass walls

. Then ,


hollow prism

A. in the emergent beam we get a

spectrum , where the deviation of violet

is maximum and that of the red is

minimum

B. in the spectrum obtained in the

emergent beam , the deviation of the

red is maximum and that of the violet is minimum

C. no spectrum is obtained in the emergent beam

D. in the spectrum obtained in the emergent beam all colours are deviated away from the base

**Answer: C**

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**71.** The refractive angles of two crown glass prisms are $10°$ and $20°$ respectively . What is the ratio of their dispersive the material of the same prism then

    A. $1:2$

    B. $2:1$

    C. $1:1$

    D. $1:4$

**Answer: C**

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**72.** If D is the deviation of a normally falling light beam on a thin prism of anlge A and $\omega$ is the dispersive power of the same prism then

    A. $\delta$ is independent of refractive index

    B. $\omega$ is independent of refractive index

    C. $\omega$ is independent of A

    D. $\delta$ is independent of A

**Answer: C**

**73.** When a monochromatic ray of light is passed through an equilatorial glass prism , it is found that the refracted ray in glass is parallel to the base of the prism . If $i$ and $e$ denote the angles of incidence and emergence respectively then

    A. $i > e$

    B. $i < e$

    C. $i = e$

D. $i + e = 90°$

**Answer: C**

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**74.** A ray of light is incident on one face of a prism at an angle of $50°$ with the normal . The ray is deviated by the prism through $42°$ . What is the angle of the prism , if the angle of emergence is $51°$ ?

A. $56°$
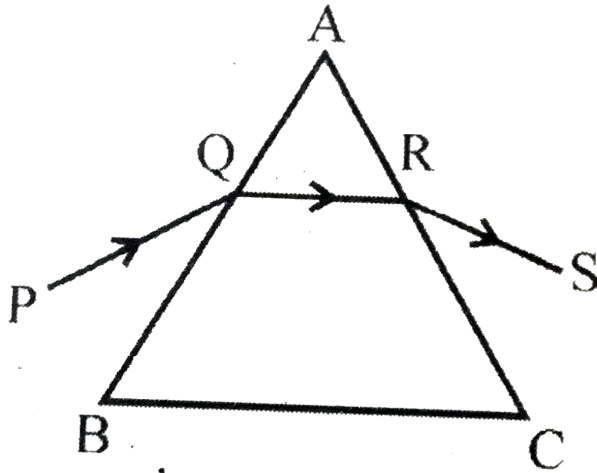
B. $57°$

C. $58°$

D. $59°$

**Answer: D**

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75. A monochromatic ray of light is incident on an equilateral glass prism placed on a horizontal table . Which of the following is

true ?



A. PQ is horizontal

B. QR is horizontal

C. RS is horizontal

D. Either PR or RS is horizontal

Answer: B

**76.** A beam of monochromatic light is incident at an angle of $55°$ on one face of an equilateral prism . The angle of deviation is $\delta$ and the angle of emergence is $46°$ . If the angle of minimum deviation $(\delta_m)$ for the same prism is $45°$ , then

A. $\delta = \delta_m$

B. $\delta > \delta_m$

C. $\delta < \delta_m$

D. $\delta = \dfrac{2}{3}\delta_m$

**Answer: C**

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**77.** A ray of light is incident at an angle of $50°$ on one face of an equilateral prism . What is the angle ,which the emergent ray makes with the second face of the prism , if the deviation produced by the prism is $42°$ ?

A. $48°$

B. $38°$

C. $58°$

D. $42°$

**Answer: B**

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**78.** Two beam of red and violet colors are made to pass separately through a prism (angle of the prism is $60°$). In the position of minimum deviation, the angle of refraction will be

A. $30°$ for both the colours

B. greater for the violet colour

C. greater for the red colour

D. equal but not $30°$ for both the colours

Answer: A

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**79.** A prism of refractive angle $60°$ and refractive index 1.5 is kept in water of refractive index 1.33 . What is the angle of

minimum deviation for a monochromatic ray of light in water ?

(Given $\sin 34° = 0.56$)

A. $4°$

B. $8°$

C. $16°$

D. $120°$

**Answer: B**

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**80.** A ray of light passes through an equilateral glass prism in such a manner that the angle of incidence is equal to the angle of emergence and each of these angles is equal to $3/4$ of the angle of the prism. The angle of deviation is

A. $45°$

B. $39°$

C. $30°$

D. $20°$

**Answer: C**

**81.** The refractive index of a glass is 1.520 for red light and 1.525 for blue light. Let $D_1$ and $D_2$ be angles of minimum deviation for red and blue light respectively in a prism of this glass. Then,

A. $D_1 = D_2$

B. $D_1 < D_2$

C. $D_1 > D_2$

D. $D_1$ can be greater than or less than $D_2$ depending upon the refractive angle of the prism

**Answer: B**

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**82.** A thin prism $P_1$ with angle $4 degree$ and made from glass of refractive index 1.54 is combined with another thin prism $P_2$ made

from glass of refractive index 1.72 to produce dispersion without deviation. The angle of the prism $P_2$ is

A. $4°$

B. $3°$

C. $2.5°$

D. $5.5°$

**Answer: B**

**83.** Angle of prism is $A$ and its one surface is silvered. Light rays falling at an angle of incidence $2A$ on first surface return back through the same path after suffering reflection at second silvered surface. Refraction index of the material of prism is

A. $2 \sin A$

B. $2 \cos A$

C. $2 \tan A$

D. $2 \sin \dfrac{A}{2}$

**Answer: B**

**84.** A ray is ihncident at an angle of incidence ii

on one surface of a prism of small angle A and

emerge normally from opposite surface. If the

refractive index of the material of prism is $\mu$.

the angel of incidance I is nearly equal to

A. $\dfrac{A}{\mu}$

B. $A\mu$

C. $\dfrac{A\mu}{2}$

D. $\dfrac{A}{2\mu}$

**Answer: B**

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85. A glass prism A deviates the red and blue rays through $10°$ and $12°$ respectively . A second prism (B) deviates them through $8°$ and $10°$ respectively . What is the ratio of their dispersive powers ?

A. $4:5$

B. $9:11$

C. $11:9$

D. $9:13$

**Answer: B**

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**86.** A ray of light passing through an equilateral traingular glass prism from air undergoes minimum deviation when angle of

incidence is $3/4$ th of the angle of prism. Calculate the speed of light in the prism.

A. $2.5 \times 10^8$ m/s

B. $1.75 \times 10^8$ m/s

C. $2.12 \times 10^8$ m/s

D. $2 \times 10^8$ m/s

**Answer: C**

**87.** A ray of light suffers minimum deviation, while passing through a prism of refractive index 1.5 and refracting angle $60°$. Calculate the angle of deviation and angle in incidence.

A. $35.5°$

B. $40.8°$

C. $48.6°$

D. $53.5°$

**Answer: C**

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**88.** In an equilateral triangular prism , the angle of minimum deviation for monochromatic ray of light is $38°$ . What is corresponding angle of incidence ?

A. $35°$

B. $40°$

C. $49°$

D. $52°$

**Answer: C**

**89.** A ray of light suffers minimum deviation when incident on an equilateral prism of refractive index $\sqrt{2}$ . What is the angle of incidence ?

A. $30°$

B. $45°$

C. $60°$

D. $90°$

**90.** A ray is ihncident at an angle of incidence ii on one surface of a prism of small angle A and emerge normally from opposite surface. If the refractive index of the material of prism is $\mu$. the angel of incidance I is nearly equal to

A. nA

B. $\dfrac{n}{A}$

C. $\dfrac{2A}{n}$

D. $\dfrac{A}{2n}$

**Answer: A**

**91.** The refracting angle of the prism is $60^\circ$ .What is the angle of incidence for minimum deviation? The refractive index of material of prism is $\sqrt{2}$.

A. $60^\circ$

B. $45^\circ$

C. $30^\circ$

D. $40^\circ$

**Answer: B**

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**92.** The angle of minimum deviation produced by a $60^\circ$ prism is $40^\circ$. Calculate the refractive index of the material of the prism.

A. 1.512

B. 1.522

C. 1.532

D. 1.632

**Answer: C**

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**93.** A thin glass prism has a refracting angle $6°$ . The refractive indices of the material of the prism for red and violet colours are 1.56

and 1.6 respectively . What is the angular

dispersion ?

A. $0.15°$

B. $0.20°$

C. $0.24°$

D. $0.32°$

**Answer: C**

**94.** Prism X deviates red ray through $10°$ and violet ray through $16°$ , while the prism Y deviates red ray through $8°$ and violet ray through $14°$ , respectively . If $\omega_X$ and $\omega_Y$ are the dispersive powers of X and Y , then

A. $\omega_X = \omega_Y$

B. $\omega_X > \omega_Y$

C. $\omega_X < \omega_Y$

D. $\omega_X = 1.1(\omega_Y)$

**Answer: C**

**95.** The angle of a crown glass prism of refractive index 1.52 is $6°$ . What should be the angle of a flint glass prism of refractive index 1.65 , so that the two prisms produce a direct vision prism ?

A. $3.5°$

B. $4.8°$

C. $5.4°$

D. $2.5°$

Answer: B

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**96.** It is required to form an achromatic combination of two prisms of dispersive powers 0.04 and 0.06 respectively . If the first prism has a refracting angle of $10°$ and mean refractive index of $1.52$ , what must be the

refracting angle of the second prism , if its mean refractive index is 1.56 ?

A. $5.5°$

B. $4.8°$

C. $6.2°$

D. $7.4°$

Answer: C

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**97.** The refractive angle of a prism is $60°$.
What is the angle of minimum deviation, if the
refractive index of the material of the prism is
$\sqrt{2}$ ?

A. $30°$

B. $35°$

C. $40°$

D. $20°$

**Answer: A**

**98.** A monochromatic ray of light is incident at an angle of $50°$ on one of the refracting surfaces of an equilateral prism . What is the refractive index of the material of the prism , if the angle of emergence is also $50°$ ?

$[\sin 50° = 0.767]$

A. 1.46

B. 1.532

C. 1.57

D. 1.62

**Answer: B**

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**99.** When an equilateral prism is placed in the position of minimum deviation , the incident ray makes an angle of $37°$ with the refracting surface . What is the material of the prism , if the angle of $37°$ with the refracting surface . What is the angle of minimum deviation ?

A. $42°$

B. $44°$

C. $46°$

D. $48°$

**Answer: C**

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**100.** A ray of light suffers minimum deviation while passing through a prism of refracting

angle A . If the angle of incidence $i$ = Refractive angle and n =$\sqrt{3}$ , find the angle of the prism .

A. $45°$

B. $50°$

C. $55°$

D. $60°$

**Answer: D**

**101.** A ray of light passes from vacuum into a medium of refractive index n . If the angle of incidence is twice the angle of refraction , then the relation between the angle of incidence and the refractive index is

A. $n = 2\sin\left(\dfrac{i}{2}\right)$

B. $n = 2\cos\left(\dfrac{i}{2}\right)$

C. $n = 2\tan\left(\dfrac{i}{2}\right)$

D. $n = \dfrac{1}{2}\left[\cos\left(\dfrac{i}{2}\right)\right]$

**Answer: B**

**102.** A thin prism having a refractive index 1.634 for a ray of certain colour is to be prepared so as to give a deviation of $3°$ for that colour . What is the angle of the prism ?

A. $3.5°$

B. $4.73°$

C. $2.8°$

D. $5.6°$

**Answer: B**

**103.** The refractive indices of crown glass for red , yellow and blue rays are 1.527, 1.530 and 1.535 respectively . What is the dispersive power of crown glass for red and blue rays .

   A. 0.012

   B. 0.015

   C. 0.018

D. 0.020

**Answer: B**

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**104.** A thin glass prism has a refracting angle

of $6°$ . The angle of incidence is very small .

What is the deviation produced by the prism ,

if the prism is kept in water ?

$[_an_g = 1.5, \ _an_w = 1.33]$

A. $0.6°$

B. $0.192°$

C. $0.75°$

D. $0.8°$

**Answer: C**

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**105.** The refractive index of the mean ray in a spectrum is 1.620 . A ray of light passes through a prism whose refracting angle is $10°$

and the dispersive power is $0.031$ . What is the

dispersion produced by the prism ?

A. $0.182°$

B. $0.192°$

C. $0.175°$

D. $0.162°$

**Answer: B**

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**106.** A thin prism produces an angular dispersion of 24. If the refracting angle of the prism is $3°$ , and the refractive index of the material of the prism for red colour is 1.55 . What is the refractive index of its material for violet light ?

A. 1.55

B. 1.61

C. 1.683

D. 1.653

**Answer: C**

**107.** A ray is ihncident at an angle of incidence ii on one surface of a prism of small angle A and emerge normally from opposite surface. If the refractive index of the material of prism is $\mu$. the angel of incidance I is nearly equal to

A. $\mu A$

B. $\dfrac{\mu A}{2}$

C. $\dfrac{A}{\mu}$

D. $\dfrac{A}{2\mu}$

**Answer: A**

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**108.** The refracting angle of a prism is A and refractive index of the material of prism is $\cot(A/2)$ . The angle of minimum deviation will be

A. $180° - A$

B. $90° - 2A$

C. $180° - 2A$

D. $90° - \dfrac{3}{2}A$

**Answer: C**

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**109.** For a prism of refracting angle $60°$ , it is found that for two angles of incidence $48°$

and $52°$ , the angle of deviation is the same .

What is the angle of deviation ?

A. $38°$

B. $40°$

C. $42°$

D. $45°$

**Answer: B**

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**110.** A monochromatic ray of light strikes one face of a prism at an angle of $60°$ and the angle of refraction is $30°$ . The refracting angle of the prism is $60°$ . What is the angle of emergence ?

   A. $30°$

   B. $45°$

   C. $50°$

   D. $60°$

**Answer: D**

111. A ray of light is incident normally on one of the faces of a prism of apex angle 30 degree and refractive index sqrt2. The angle of deviation of the ray is...degrees.

A. $12.5°$

B. $22.5°$

C. $10°$

D. $15°$

Answer: D

**112.** The refractive index of the material of a prism is $\sqrt{2}$ and the angle of the prism is $30°$. One of the two refracting surfaces of the prism is made a mirror inwards, by silver coating. A beam of monochromatic light entering the prism from the other face will retrace its path (after reflection from the

silvered surface) if its angle of incidence on the prism is

A. $60^\circ$

B. $45^\circ$

C. $30^\circ$

D. $0^\circ$

**Answer: B**

**113.** The ratio of angle of minimum deviation of a prism in air and when dipped in water will be $\left( \mu_g = 3/2 \text{ and } \mu_w = 4/3 \right)$

A. $\delta_2 = 2\delta_1$

B. $\delta_2 = \dfrac{\delta_1}{2}$

C. $\delta_2 = \dfrac{\delta_1}{3}$

D. $\delta_2 = \dfrac{\delta_1}{4}$

**Answer: D**

**114.** A ray of light passing through a prism having refractive index $\sqrt{2}$ suffers minimum deviation. It is found that the angle of incidence is double the angle of refraction within the prism. What is the angle of prism?
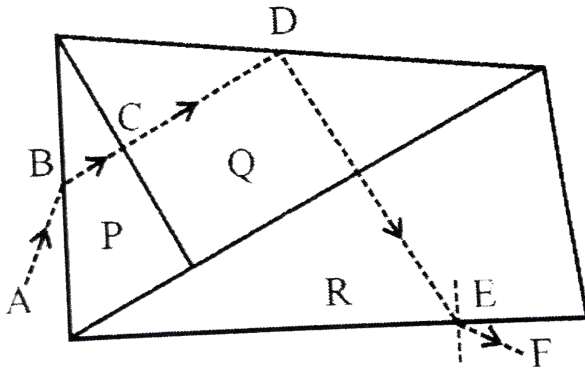
A. $45°$

B. $60°$

C. $90°$

D. $30°$

Answer: C

115. Three glass prisms P , Q and R of the same refractive index are placed in contact with each other as shown in the figure with no air gap between the prisms . A monochromatic ray of light AB passes through the prism assembly and emerges as EF . In which prism ,

it does not suffer minimum deviation ?



A. in P

B. in Q

C. in R

D. in all the three prisms

**Answer: C**

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**116.** A monochromatic ray of light is incident normally on one of the refracting surfaces of a prism . The emergent ray grazes the second refracting surface . What is the angle of the prism if the refractive index of the material of the prism is 1.6 ?

    A. $35°$

    B. $39°$

    C. $42°$

D. $44°$

**Answer: B**

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**117.** A student , who wanted to find the R.I. of the material of a prism , found the following . Angle of the prism = $60°$, Angle of minimum deviation = $40°$ , But while calculating the R.I. by mistake , he considered the refracting angle

as $50°$ . what is teh error in the value of the R.I. of the material of the prism ?

A. 0.12

B. 0.13

C. 0.14

D. 0.15

**Answer: C**

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**118.** The refracting angle of a prism is $60°$. It is found that for two different angles of incidence, the deviation produced by the prism is $40°$. If the difference between the two angle of incidence is $10°$. What are their values?

    A. $55°$, $45°$

    B. $60°$, $50°$

    C. $65°$, $55°$

    D. $58°$, $48°$

**Answer: A**

119. The dispersion produced by an equilateral prism of flint- glass is $2.16°$ and that produced by an equilateral prism of crown glass is $1.08°$ . What should be the angle of a crown glass , which will produce an achromatic combination with a flint-glass prism of refracting angle $30°$ ?

A. $45°$

B. $30°$

C. $60°$

D. $75°$

**Answer: C**

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**120.** In a direct vision spectrograph , there are

3 crown glass prisms and 2 flint glass prisms ,

each of refracting angle $24°$ . What should be

the angle of the crown glass prism , if the refractive index of crown glass for mean colour is 1.52 and that of flint-glass of 1.65 ?
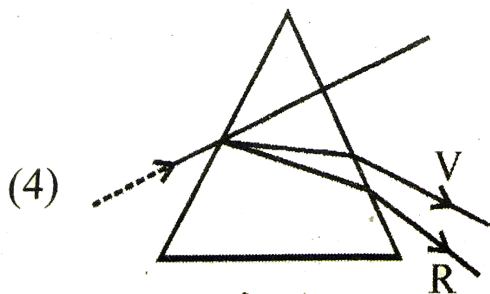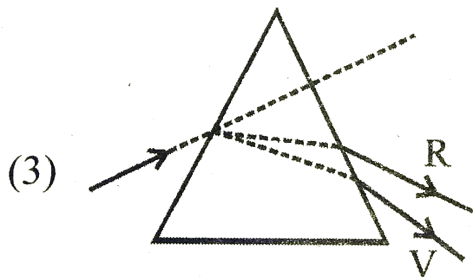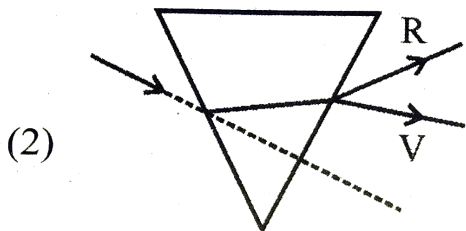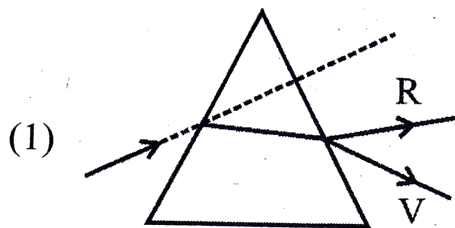
A. $18°$

B. $20°$

C. $22°$

D. $25°$

Answer: B

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**121.** Which one of the following diagrams shows correctly the dispersion of white light

by a prism ?



(1)

(2)

(3)

(4)

A. 1

B. 2

C. 3

D. 4

**Answer: C**

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122. In the following of primary and secondary rainbows , the number of total internal reflections are

A. 2 , 3

B. 1 , 3

C. 1, 2

D. 2, 1

Answer: C

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**123.** In the formation of a rainbow light from the sun on water droplets undergoes

A. only dispersion

B. only total internal reflection

C. interference

D. dispersion and total internal reflection

**Answer: D**

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**124.** The sky would appear red instead of blue if

A. atmospheric particles scatter blue light more than red light

B. atmospheric particles scatter all colours equally

C. atmospheric particles scatter red light more than blue light

D. the sun was much hotter

**Answer: C**

**125.** For an observer on the earth , the sky appears blue . What will be the colour of the sky , if the observer goes to the moon ?

    A. Red

    B. Blue

    C. Dark

    D. Green

**Answer: C**

**126.** In the formation of a rainbow , the following property of light is not considered .

A. reflection of light

B. refraction of light

C. dispersion of light

D. scattering of light

Answer: D

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**127.** Sun is visible a little before the actual sunrise and until a little after a actual sunset. This is due to

A. Reflection

B. Refraction

C. Total internal refraction

D. Dispersion

**Answer: B**

**128.** The sun looks reddish at the time of sunrise and sunset.

    A. Reflection of light

    B. refraction of light

    C. Scattering of light

    D. Total internal reflection

**Answer: C**

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**129.** Sir C.V. Raman was awarded Nobel Prize for his work connected with which of the following phenomenon of radiation

A. scattering of light

B. dispersion of light

C. reflection of light

D. refraction of light

Answer: A

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**130.** When a beam of monochromatic light is passed through benzene , the spectrum of scattered radiations contains lines whose wavelengths (and frequencies ) are longer or shorter than that of the incident light . This phenomenon is known as

A. Faraday effect

B. Rayleigh's effect

C. Raman effect

D. Comption effect

**Answer: C**

131. Raman effect is explained on the basis of

    A. Corpuscular theory of light

    B. Electromagnetic theory of light

    C. Quantum theory of light

    D. Wave theory of light

**Answer: C**

**132.** When sunlight is scattered by atmospheric atoms and molecules, the amount of scattering of light of wavelength 440 nm is A. The amount of scattering for the light of wavelength 660 nm is approximately

A. $\dfrac{4}{9}I$

B. $\dfrac{8}{27}I$

C. $\left(\dfrac{16}{81}\right)I$

D. $\left(\dfrac{81}{16}\right)I$

**Answer: C**

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**133.** Blue colour of water in sea is due to

    A. image of the blue sky in water

    B. refraction of sunlight

    C. scattering of sunlight by water molecules

D. interference of sunlight reflected from

the water surface

**Answer: C**

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**134.** Why is red colour selected for danger

signal lights?

A. it causes fear

B. it is as per international convention

C. it undergoes maximum scattering

D. it undergoes least scattering

Answer: D

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135. A screen is placed at a distance of 1m from a point of source of light . What will be the effect on the intensity (I) of light observed on the screen , if the screen is kept at 150 cm from the same point source ?

A. 1 increases by 50%

B. 1 decreases by 40 %

C. 1 decreases by 55.55%

D. 1 increases by 55.55%

**Answer: C**

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**136.** The rainbow is formed due to

A. dispersion alone

B. refraction alone

C. reflection alone

D. combined effect of dispersion , refraction and reflection

**Answer: D**

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Test Your Grasp

**1.** The refractive index of glass w.t.r. a medium is $\dfrac{4}{3}$ . If $v_m - v_g = 6.25 \times 10^7$ m/s. then the velocity oflight in the medim will be

    A. $2.5 \times 10^8$ m/s

    B. $2.25 \times 10^8$ m/s

    C. $1.875 \times 10^8$ m/ s

    D. $1.5 \times 10^8$ m/s

**Answer: A**

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**2.** A ray of light traveling in a tranparent medium falls on a surface separating the medidum from air at an angle of incidence of $45°$ . The ray undergoes total internal refrlection. If n is the refractive index of the medium with respect to air, select the possible value (s) of n from the following:

A. 1.3

B. 1.4

C. 1.35

D. 1.6

**Answer: D**

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**3.** Light takes $t_1$ second to travel a distance x cm in vacuum and the same light takes $t_2$ second to travel 10x cm in medium. The critical angle for the corresponding medium is

A. $\sin^{-1}\left(\dfrac{10t_1}{t_2}\right)$

B. $\sin^{-1}\left(\dfrac{t_1}{10t_2}\right)$

C. $\sin^{-1}\left(\dfrac{t_1}{10t_2}\right)$

D. $\sin^1\left(\dfrac{10t_2}{t_1}\right)$

**Answer: A**

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**4.** A ray of light suffers minimum deviation while passing through a prism of refracting angle A . If the angle of incidence $i$ = Refractive angle and n = $\sqrt{3}$ , find the angle of the prism .

A. $45°$

B. $50°$

C. $55°$

D. $60°$

**Answer: D**

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**5.** A ray of light passing through a prism having refractive index $\sqrt{2}$ suffers minimum deviation. It is found that the angle of

incidence is double the angle of refraction within the prism. What is the angle of prism?

A. $45°$

B. $60°$

C. $90°$

D. $30°$

Answer: C

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**6.** The angle of incidence for a ray of light at a refracting surface of a prism is $45°$. The angle of prism is $60°$. If the ray suffers minimum deviation through the prism, the angle of minimum deviation and refractive index of the material of the prism respectively, are :

A. $30°$, $\dfrac{1}{\sqrt{2}}$

B. $45°$, $\dfrac{1}{\sqrt{2}}$

C. $30°$, $\sqrt{2}$

D. $45°$, $\sqrt{2}$

**Answer: C**

**7.** An air bubble in a glass slab with refractive index 1.5 (near normal incidence) is $5cm$ deep when viewed from one surface and $3cm$ deep when viewed from the opposite face. The thickness (in $cm$) of the slab is

A. 12

B. 16

C. 8

D. 10

**Answer: A**

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**8.** A thin prism having refracting angle $10°$ is made of glass of refracting index 1.42. This prism is combined with another thin prism of glass of refractive index 1.7. This combination

produces dispersion without deviation. The refracting angle of second prism should be :

A. $4°$

B. $6°$

C. $8°$

D. $10°$

**Answer: B**

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**9.** If the scattering intensity of a liquid is 8 units at a wavelentth of 500 nm, then the scatering insensity at a wavelength of 400 nm will be approximately

A. 13 units

B. 16 units

C. 20 units

D. 24 units

**Answer: C**

**10.** A bulb is placed at a depth of $2\sqrt{7}cm$ in water and a floating opaque disc is placed over the bulb so that the bulb is not visible from the surface. What is the minimum diameter of the disc?

A. 6 m

B. 9 m

C. 12 m

D. 15 m

**Answer: C**

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