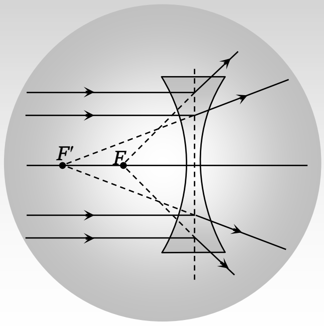


Assignment

Refraction of light at plane surface

Basic Level

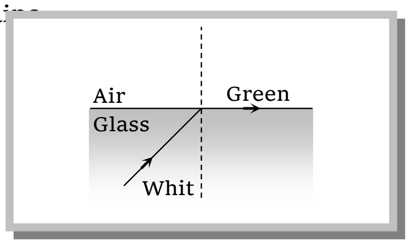
1 When a light ray incident from air to glass and reflected, angle of incidence is 57°. What will be the incident angle for reflection again when incident from water to glass

(a) $\theta < 57^o$ (b) $\theta > 57^o$ (c) $\theta = 57^o$ (d) Can't be determined

2 When light travels from glass to air, the incident angle is θ_1 and the refracted angle is θ_2. The true relation is **[Orissa**

(a) $\theta_1 = \theta_2$ (b) $\theta_1 < \theta_2$ (c) $\theta_1 \geq \theta_2$ (d) Not predictable

3 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

4 A beam of light composed of red and green ray is incident obliquely at a point on the face of rectangular glass slab. When coming out on the opposite parallel face, the red and green ray emerge from

(a) Two points propagating in two different non-parallel directions

(b) Two points propagating in two different parallel directions

(c) One point propagating in two different directions

(d) One point propagating in the same directions

5 When light waves suffer reflection at the interface between air and glass, the change of phase of the reflected wave is equal to

[J & K CET 2004]

(a) Zero (b) $\pi/2$ (c) π (d) 2π

6 A plane glass slab is kept over various coloured letters, the letter which appears least raised is

(a) Blue (b) Violet (c) Green (d) Red

7 Monochromatic light is refracted from air into the glass of refractive index μ. The ratio of the wavelength of incident and refracted waves is

(a) $1:\mu$ (b) $1:\mu^2$ (c) $\mu:1$ (d) $1:1$

8 When light travels from one medium to the other of which the refractive index is different, then which of the following will change

[MP PMT 1986; AMU (Engg.) 2001; BVP 2003]

(a) Frequency, wavelength and velocity (b) Frequency and wavelength

(c) Frequency and velocity (d) Wavelength and velocity

9 A microscope is focussed on a coin lying at the bottom of a beaker. The microscope is now raised up by 1 *cm*. To what depth should the water be poured into the beaker so that coin is again in focus ? (Refractive index of water is 4/3) **[BHU 2003]**

(a) 1 *cm* (b) $\frac{4}{3}$ *cm* (c) 3 *cm* (d) 4 *cm*

10 A diver at a depth of 12 *m* in water $(\mu = 4/3)$ sees the sky in a cone of semi-vertical angle

[KCET (Engg.) 1999; Pb. PMT 2002; MP PMT 1995, 2003]

(a) $\sin^{-1}(4/3)$ (b) $\tan^{-1}(4/3)$ (c) $\sin^{-1}(3/4)$ (d) 90^o

11 A point source of light is placed 4 *m* below the surface of water of refractive index 5/3. The minimum diameter of a disc which should be placed over the source on the surface of water to cut-off all light coming out of water is **[CBSE PMT 1994; JIPMER 2001, 2002]**

(a) 2 *m* (b) 6 *m* (c) 4 *m* (d) 3 *m*

12 The time required to pass the light through a glass slab of 2 *mm* thick is $(\mu_{\text{glass}} = 1.5)$

[Similar to (BHU 1998; Pb. PMT 1999, 2001; MH CET 2000; MP PET 2001); AFMC 1997; MH CET 2002]

(a) $10^{-5} s$ (b) $10^{-11} s$ (c) $10^{-9} s$ (d) $10^{-13} s$

13 The refractive index of water is 1.33. The direction in which a man under water should look to see the setting sun is **[Kerala PET 2002]**

(a) 49° to the horizontal (b) 90° with the vertical (c) 49° to the vertical (d) Along the horizontal

14 Why sun has elliptical shape on the time when rising and sun setting

(a) Refraction (b) Reflection (c) Scattering (d) Dispersion

15 Which of the following statement is true **[Orissa JEE 2002]**

(a) Velocity of light is constant in all media (b) Velocity of light in vacuum is maximum

(c) Velocity of light is same in all reference frames (d) Laws of nature have identical form in all reference frames

16 When a ray of light enters a glass slab from air, then

[Similar to (MP PMT 1994; MP PET 1996); RPMT 2000; MP PMT 2002; CBSE PMT 2002]

(a) It's wavelength decreases (b) It's wavelength increases

(c) It's frequency decreases (d) Neither its wavelength nor its frequency changes

17 A ray of light is incident on a transparent glass slab of refractive index 1.62. The reflected and the refracted rays are mutually perpendicular. The angle of incidence is

(a) 58.3° (b) 50° (c) 35° (d) 30°

18 Light travels through a glass plate of thickness t and having refractive index *n*. If *c* is the velocity of light in vacuum, the time taken by the light to travel this thickness of glass is **[NCERT 1976; MP PET 1994; CBSE PMT 1996; KCET**

(a) $\frac{t}{nc}$ (b) tnc (c) $\frac{nt}{c}$ (d) $\frac{tc}{n}$

19 When a light wave goes from air into water, the quantity that remains unchanged is its

[MNR 1985, 95; KCET 1993; CPMT 1990, 97; MP PET 1991; AMU 1995; AFMC 1993, 98; RPET 1996; RPMT 1999; BHU 2000; DCE 2001]

(a) Speed (b) Amplitude (c) Frequency (d) Wavelength

20 Ray optics is valid, when characteristic dimensions are **[CBSE PMT 1994; CPMT 2001]**

(a) Of the same order as the wavelength of light (b) Much smaller than the wavelength of light

(c) Of the order of one millimetre (d) Much larger than the wavelength of light

21 An under water swimmer is at a depth of 12 *m* below the surface of water. A bird is at a height of 18 *m* from the surface of water, directly above his eyes. For the swimmer the bird appears to be at a distance from the surface of water equal to (Refractive Index of water is 4/3)

(a) 24 *m* (b) 12 *m* (c) 18 *m* (d) 9 *m*

22 Consider the following statements

Assertion (*A*) : The frequencies of incident, reflected and refracted beam of monochromatic light incident from one medium to another are same

Reason (*R*) : The incident, reflected and refracted rays are coplanar

Of these statements **[EAMCET (Engg.) 2000]**

(a) Both *A* and *R* are true and the *R* is a correct explanation of the *A*

(b) Both *A* and *R* are true but the *R* is not a correct explanation of the *A*

(c) *A* is true but the *R* is false

(d) Both *A* and *R* are false

(e) *A* is false but the *R* is true

23 The refractive indices of glass and water *w.r.t.* air are 3/2 and 4/3 respectively. The refractive index of glass *w.r.t.* water will be

[MNR 1990; JIPMER 1997, 2000; MP PET 2000]

(a) 8/9 (b) 9/8 (c) 7/6 (d) None of these

24 Each quarter of a vessel of depth *H* is filled with liquids of the refractive indices n_1, n_2, n_3 and n_4 from the bottom respectively. The apparent depth of the vessel when looked normally is

(a) $\frac{H(n_1+n_2+n_3+n_4)}{4}$ (b) $\frac{H\left(\frac{1}{n_1}+\frac{1}{n_2}+\frac{1}{n_3}+\frac{1}{n_4}\right)}{4}$

(c) $\frac{(n_1+n_2+n_3+n_4)}{4H}$ (d) $\frac{H\left(\frac{1}{n_1}+\frac{1}{n_2}+\frac{1}{n_3}+\frac{1}{n_4}\right)}{2}$

25 How does refractive index (μ) of a material vary with respect to wavelength (λ)? A and B are constants

(a) $\mu = A + \frac{B}{\lambda^2}$ (b) $\mu = A + B\lambda^2$ (c) $\mu = A + \frac{B}{\lambda}$ (d) $\mu = A + B\lambda$

26 Light of wavelength is 7200 *A* in air has a wavelength in glass $(\mu = 1.5)$ equal to (when the refractive index of glass is 1.5)

[MP PAT 1996; DCE 1999]

(a) 7200 Å (b) 4800 Å (c) 10800 Å (d) 7201.5 Å

27 The distance travelled by light in glass (refractive index = 1.5) in a nanosecond will be

(a) 45 *cm* (b) 40 *cm* (c) 30 *cm* (d) 20 *cm*

28 A mark at the bottom of a liquid appears to rise by 0.1 *m*. The depth of the liquid is 1 *m* . The refractive index of the liquid is

[CPMT 1999]

(a) 1.33 (b) $\frac{9}{10}$ (c) $\frac{10}{9}$ (d) 1.5

29 The splitting of white light into several colours on passing through a glass prism is due to

(a) Refraction (b) Reflection (c) Interference (d) Diffraction

30 Absolute refractive indices of glass and water are $\frac{3}{2}$ and $\frac{4}{3}$. The ratio of velocity of light in glass and water will be **[UPSEAT 1999]**

(a) 4 : 3 (b) 8 : 7 (c) 8 : 9 (d) 3 : 4

31 The ratio of thickness of plates of two transparent mediums *A* and *B* is 6 : 4. If light takes equal time in passing through them, then refractive index of *B* with respect to *A* will be

(a) 1.4 (b) 1.5 (c) 1.75 (d) 1.33

32 A tank is filled with benzene to a height of 120 *mm*. The apparent depth of a needle lying at a bottom of the tank is measured by a microscope to be 80 *mm*. The refractive index of benzene is

(a) 1.5 (b) 2.5 (c) 3.5 (d) 4.5

33 Consider the following statements

Assertion (*A*) : The speed of light in a rarer medium is greater than that in a denser medium

Reason (*R*) : One light year equals to 9.5×10^{12} *km*

Of these statements **[AIIMS 1999]**

(a) Both *A* and *R* are true and the *R* is a correct explanation of the *A*

(b) Both *A* and *R* are true but the *R* is not a correct explanation of the *A*

(c) *A* is true but the *R* is false

(d) Both *A* and *R* are false

(e) *A* is false but the *R* is true

34 Velocity of light in air is $3 \times 10^8 m/s$ and refractive index of water is 1.33. The time taken by light to travel a distance of 500 *m* in water is

(a) 1.25 μs (b) 2.22 μs (c) 12.5 μs (d) 22.6 μs

35 A ray of light is incident on the surface of separation of a medium with the velocity of light at an angle 45^o and is refracted in the medium at an angle 30^o. What will be the velocity of light in the medium

(a) $1.96 \times 10^8 m/s$ (b) $2.12 \times 10^8 m/s$ (c) $3.18 \times 10^8 m/s$ (d) $3.33 \times 10^8 m/s$

36 Refractive index of glass is 3/2 and refractive index of water is 4/3. If the speed of light in glass is $2.00 \times 10^8 m/s$, the speed in water will be **[MP PMT 1994; RPMT 1997]**

(a) $2.67 \times 10^8 m/s$ (b) $2.25 \times 10^8 m/s$ (c) $1.78 \times 10^8 m/s$ (d) $1.50 \times 10^8 m/s$

37 Which of the following is a correct relation **[MP PET 1997]**

(a) ${}_a\mu_r = {}_a\mu_w \times {}_r\mu_w$ (b) ${}_a\mu_r \times {}_r\mu_w = {}_w\mu_a$ (c) ${}_a\mu_r \times {}_r\mu_a = 0$ (d) ${}_a\mu_r / {}_w\mu_r = {}_a\mu_w$

38 The bottom of a container filled with liquid appear slightly raised because of **[RPMT 1997]**

(a) Refraction (b) Interference (c) Diffraction (d) Reflection

39 Electromagnetic radiation of frequency *n*, wavelength λ, travelling with velocity *v* in air, enters a glass slab of refractive index μ. The frequency, wavelength and velocity of light in the glass slab will be respectively

(a) $\frac{n}{\mu}, \frac{\lambda}{\mu}, \frac{v}{\mu}$ (b) $n, \frac{\lambda}{\mu}, \frac{v}{\mu}$ (c) $n, \lambda, \frac{v}{\mu}$ (d) $\frac{n}{\mu}, \frac{\lambda}{\mu}, v$

40 If ε_0 and μ_0 are respectively, the electric permittivity and the magnetic permeability of free space, ε and μ the corresponding quantities in a medium, the refractive index of the medium is

(a) $\sqrt{\frac{\mu\varepsilon}{\mu_0\varepsilon_0}}$ (b) $\frac{\mu\varepsilon}{\mu_0\varepsilon_0}$ (c) $\sqrt{\frac{\mu_0\varepsilon_0}{\mu\varepsilon}}$ (d) $\sqrt{\frac{\mu\mu_0}{\varepsilon\varepsilon_0}}$

41 To an observer on the earth the stars appear to twinkle. This can be ascribed to **[CPMT 1972, 74; AFMC 1995]**

(a) The fact that stars do not emit light continuously (b) Frequent absorption of star light by their own atmosphere

(c) Frequent absorption of star light by the earth's atmosphere (d) The refractive index fluctuations on the earth's atmosphere

42 At sun rise or sunset, the sun looks more red than at mid-day because

(a) The sun is hottest at these times (b) Of the scattering of light

(c) Of the effects of refraction (d) Of the effects of diffraction

43 If $\hat{i}$ denotes a unit vector along incident light ray, $m\hat{r}$ a unit vector along refracted ray into a medium of refractive index μ and $\hat{n}$ unit vector normal to boundary of medium directed towards incident medium, then law of refraction is **[EAMCET (Engg.) 1995]**

(a) $\hat{i}.\hat{n} = \mu(\hat{r}.\hat{n})$ (b) $\hat{i}\times\hat{n} = \mu(\hat{n}\times\hat{r})$ (c) $\hat{i}\times\hat{n} = \mu(\hat{r}\times\hat{n})$ (d) $\mu(\hat{i}\times\hat{n}) = \hat{r}\times\hat{n}$

44 A vessel of depth 2*d cm* is half filled with a liquid of refractive index μ_1 and the upper half with a liquid of refractive index μ_2. The apparent depth of the vessel seen perpendicularly is

(a) $d\left(\frac{\mu_1\mu_2}{\mu_1+\mu_2}\right)$ (b) $d\left(\frac{1}{\mu_1}+\frac{1}{\mu_2}\right)$ (c) $2d\left(\frac{1}{\mu_1}+\frac{1}{\mu_2}\right)$ (d) $2d\left(\frac{1}{\mu_1\mu_2}\right)$

45 The refractive index of a piece of transparent quartz is the greatest for

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

46 On heating a liquid, the refractive index generally **[KCET 1994]**

(a) Decreases (b) Increases or decreases depending on the rate of heating

(c) Does not change (d) Increases

47 At what angle does the diver in water see the setting sun, when the refractive index of water is 1.33

(a) 0^o (b) 41^o (c) 90^o (d) 60^o

48 A beam of light propagating in medium A with index of refraction $n(A)$ passes across an interface into medium B with index of refraction $n(B)$. The angle of incidence is greater than the angle of refraction : $v(A)$ and $v(B)$ denotes the speed of light in A and B. Then which of the following is true?

(a) $v(A) > v(B)$ and $n(A) > n(B)$ (b) $v(A) > v(B)$ and $n(A) < n(B)$ (c) $v(A) < v(B)$ and $n(A) > n(B)$ (d) $v(A) < v(B)$ and $n(A) < n(B)$

49 The wavelength of light diminishes μ times ($\mu = 1.33$ for water) in a medium. A diver from inside water looks at an object whose natural colour is green. He sees the object as **[CPMT 1990]**

(a) Green (b) Blue (c) Yellow (d) Red

50 If ${}_i\mu_j$ represents refractive index when a light ray goes from medium *i* to medium *j*, then the product ${}_2\mu_1 \times {}_3\mu_2 \times {}_4\mu_3$ is equal to

[CBSE PMT 1990]

(a) ${}_3\mu_1$ (b) ${}_3\mu_2$ (c) $\frac{1}{{}_1\mu_4}$ (d) ${}_4\mu_2$

51 Velocity of light in glass whose refractive index with respect to air is 1.5 is $2 \times 10^8 m/s$ and in certain liquid the velocity of light found to be $2.50 \times 10^8 m/s$. The refractive index of the liquid with respect to air is **[CPMT 19**

(a) 0.64 (b) 0.80 (c) 1.20 (d) 1.44

52 A beam of light is converging towards a point I on a screen. A plane parallel plate of glass whose thickness in the direction of the beam = t, refractive index = μ, is introduced in the path of the beam. The convergence point is shifted by **[MNR 1987]**

(a) $t\left(1-\frac{1}{\mu}\right)$ away (b) $t\left(1+\frac{1}{\mu}\right)$ away (c) $t\left(1-\frac{1}{\mu}\right)$ nearer (d) $t\left(1+\frac{1}{\mu}\right)$ nearer

53 Immiscible transparent liquids *A, B, C, D* and *E* are placed in a rectangular container of glass with the liquids-making layers according to their densities. The refractive index of the liquids are shown in the adjoining diagram. The container is illuminated from the side and a small piece of glass having refractive index 1.61 is gently dropped into the liquid layer. The glass piece as i e visible in

A	1.51
B	1.53
C	1.61
D	1.52
E	1.65

(a) Liquid *A* and *B* only

(b) Liquid C only

(c) Liquid *D* and *E* only

(d) Liquid *A, B, D* and *E*

54 Light takes 8 *minutes* 20 *seconds* to reach from sun on the earth. If the whole atmosphere is filled with water, the light will take the time $({}_a\mu_w = 4/3)$

(a) 8 *minutes* 20 *seconds* (b) 8 *minutes* (c) 6 *minutes* 11 *seconds* (d) 11 *minutes* 6 *seconds*

55 V_1 is velocity of light in first medium, V_2 is velocity of light in second medium, then refractive index of second medium with respect to first medium is

(a) V_1/V_2 (b) V_2/V_1 (c) $\sqrt{V_1/V_2}$ (d) $\sqrt{V_2/V_1}$

56 Velocity of light in water, glass and vacuum have the values V_w, V_g and V_c respectively. Which of the following relations is true

(a) $V_w = V_g = V_c$ (b) $V_w > V_g$ but $V_w < V_c$ (c) $V_w = V_g$ but $V_w < V_g$ (d) $V_c = V_w$ and $V_w < V_g$

57 A rectangular block of glass is placed on a printed page lying on a horizontal surface. Then the minimum value of refractive index of glass for which the letters on the page are not visible from any of the vertical faces of the block is

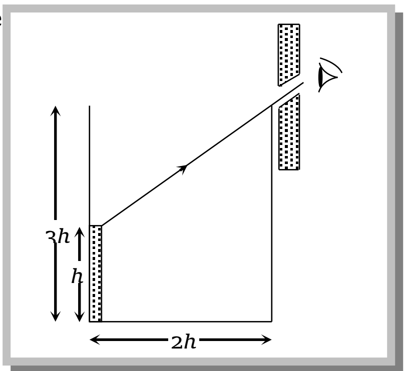
(a) Equal to $\sqrt{2}$ (b) More than $\sqrt{2}$ (c) Less than $\sqrt{2}$ (d) > = < $\sqrt{2}$

Advance Level

58 The optical path of a monochromatic light is same if it goes through 4.0 *cm* of glass or 4.5 *cm* of water. If the refractive index of glass is 1.53, the refractive index of the water is

(a) 1.30 (b) 1.36 (c) 1.42 (d) 1.46

59 An observer can see through a pin–hole the top end of a thin rod of height *h*, placed as shown in the figure. The beaker height is 3*h* and its radius *h*. When the beaker is filled with a liquid up to a height 2*h*, he can see the lower end of the rod. Then the refractive index of the



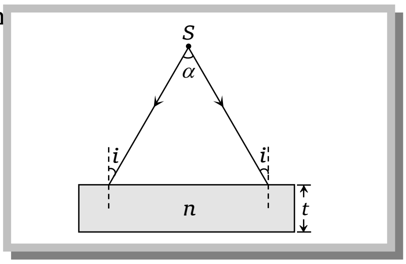
(a) $\frac{5}{2}$

(b) $\sqrt{\left(\frac{5}{2}\right)}$

(c) $\sqrt{\left(\frac{3}{2}\right)}$

(d) $\frac{3}{2}$

60 A diverging beam of light from a point source S having divergence angle α, falls symmetrically on a glass slab as shown. The angles of incidence of the two extreme rays are equal. If the thickness of the glass slab is t and the refractive index n, then the divergence angle of the em



(a) Zero

(b) α

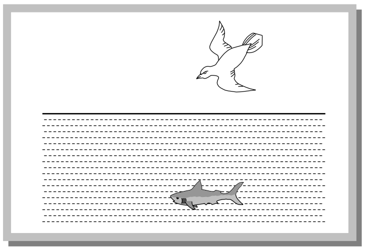
(c) $\sin^{-1}(1/n)$

(d) $2\sin^{-1}(1/n)$

61 How much water should be filled in a container 21 *cm* in height, so that it appears half filled when viewed from the top of the container (given that ${}_a\mu_w = 4/3$)

(a) 8.0 *cm* (b) 10.5 *cm* (c) 12.0 *cm* (d) None of these

62 A fish is vertically below a flying bird moving vertically down towards water surface. The bird will appear to the fish to be



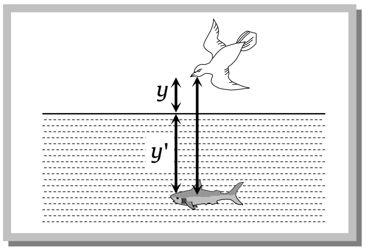
(a) Moving faster than its real speed and also away from the real distance

(b) Moving slower than its real speed and also nearer than its real distance

(c) Moving faster than its real speed and nearer than its real distance

(d) Moving slower than its real speed and away from the real distance

63 A fish rising vertically up towards the surface of water with speed 3 ms^{-1} observes a bird diving vertically down towards it with speed 9 ms^{-1}. The actual velocity of bird is



(a) 4.5 ms^{-1}

(b) 5. ms^{-1}

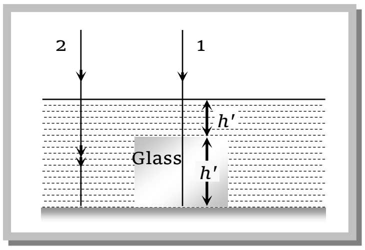
(c) 3.0 ms^{-1}

(d) 3.4 ms^{-1}

64 A stationary swimmer S_1 inside a liquid of refractive index μ_1, is at a distance d from a fixed point P inside the liquid. A rectangular block of width t and refractive index μ_2 ($\mu_2 < \mu_1$) is now placed between S and P, S will observe P to be at a distance

(a) $d - t\left(\frac{\mu_1}{\mu_2} - 1\right)$ (b) $d - t\left(1 - \frac{\mu_2}{\mu_1}\right)$ (c) $d + t\left(1 - \frac{\mu_2}{\mu_1}\right)$ (d) $d + t\left(\frac{\mu_1}{\mu_2} - 1\right)$

65 Two beams of light are incident normally on water ($\mu = 4/3$). If the beam 1 passes through a glass ($\mu = 3/2$) slab of height h as shown in the figure, the time difference for both the beams for reaching the bottom is



(a) Zero

(b) $\frac{h'}{6C}$

(c) $\frac{6h}{C}$

(d) $\frac{h}{6C}$

66 A beaker containing liquid is placed on a table, underneath a microscope which can be moved along a vertical scale. The microscope is focussed, through the liquid onto a mark on the table when the reading on the scale is a. It is next focussed on the upper surface of the liquid and the reading is b. More liquid is added and the observations are repeated, the corresponding readings are c and d. The refractive index of the liquid is

(a) $\frac{d-b}{d-c-b+a}$ (b) $\frac{b-d}{d-c-b+a}$ (c) $\frac{d-c-b+a}{d-b}$ (d) $\frac{d-b}{a+b-c-d}$

Total Internal Reflection

Basic Level

67 The critical angle for diamond (refractive index = 2) is **[MP PET 2003]**

(a) About 20^o (b) 60^o (c) 45^o (d) 30^o

68 The critical angle for total internal reflections, from a medium to vacuum is 30^o .Then velocity of light in the medium is

[CPMT 1972; MH CET 2000; KCET (Engg./Med.) 2000; BCECE 2003]

(a) $1.5\times10^8 m/s$ (b) $2\times10^8 m/s$ (c) $3\times10^8 m/s$ (d) $6\times10^8 m/s$

69 Consider telecommunication through optical fibres. Which of the following statements is not true

(a) Optical fibres may have homogeneous core with a suitable cladding

(b) Optical fibres can be graded refractive index

(c) Optical fibres are subject to electromagnetic interference from outside

(d) Optical fibres have extremely low transmission loss

70 Light wave enters from medium 1 to medium 2. Its velocity in 2nd medium is double from 1st. For total internal reflection the angle of incidence must be greater than

(a) 30° (b) 60° (c) 45° (d) 90°

71 Critical angle of light passing from glass to air is minimum for

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

72 Optical fibres are related with

(a) Communication (b) Light (c) Computer (d) None of these

73 Relation between critical angles of water and glass is **[CBSE PMT 2000; CPMT 2001]**

(a) $C_w > C_g$ (b) $C_w < C_g$ (c) $C_w = C_g$ (d) $C_w = C_g = 0$

74 If critical angle for a material to air is 30°, the refractive index of the material will be

(a) 1.0 (b) 1.5 (c) 2.0 (d) 2.5

75 The phenomenon utilized in an optical fibre is **[KCET 1994; AMU 1995; DCE 1999, 2001; CBSE PMT 2001]**

(a) Refraction (b) Interference (c) Polarization (d) Total internal reflection

76 The reason for shining of air bubble in water is **[MP PET 1997; KCET (Engg./Med.) 1999]**

(a) Diffraction of light (b) Dispersion of light (c) Scattering of light (d) Total internal reflection

77 With respect to air critical angle in a medium for light of red colour $[\lambda_1]$ is θ. Other facts remaining same, critical angle for light of yellow colour $[\lambda_2]$ will be

(a) θ (b) More than θ (c) Less than θ (d) $\frac{\theta\lambda_1}{\lambda_2}$

78 The angle of polarisation for any medium is 60°, what will be critical angle for this **[UPSEAT 1999]**

(a) $\sin^{-1}\sqrt{3}$ (b) $\tan^{-1}\sqrt{3}$ (c) $\cos^{-1}\sqrt{3}$ (d) $\sin^{-1}\frac{1}{\sqrt{3}}$

79 The velocity of light in a medium is half its velocity in air. If ray of light emerges from such a medium into air, the angle of incidence, at which it will be totally internally reflected, is

(a) 15° (b) 30° (c) 45° (d) 60°

80 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) $\sin^{-1}\frac{4}{5}$ (b) $\sin^{-1}\frac{5}{4}$ (c) $\sin^{-1}\frac{1}{2}$ (d) $\sin^{-1}\frac{2}{1}$

81 For total internal reflection to take place, the angle of incidence i and the refractive index μ of the medium must satisfy the inequality

[MP PET 1994]

(a) $\frac{1}{\sin i} < \mu$ (b) $\frac{1}{\sin i} > \mu$ (c) $\sin i < \mu$ (d) $\sin i > \mu$

82 When a ray of light emerges from a block of glass, the critical angle is

(a) Equal to the angle of reflection

(b) The angle between the refracted ray and the normal

(c) The angle of incidence for which the refracted ray travels along the glass-air boundary

(d) The angle of incidence

83 For which of the following pairs the critical angle is smallest

(a) Water to air (b) Glass to water (c) Glass to air (d) Glass to glass

84 The critical angle for light going from a medium in which wavelength is 4000 $\mathring{A}$ to a medium in which its wavelength is 6000 $\mathring{A}$ is

[CPMT 1993]

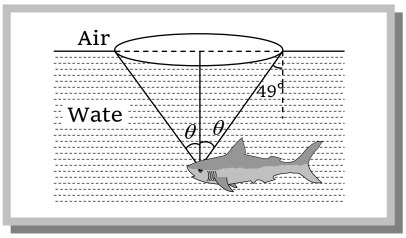
(a) 30^o (b) 45^o (c) 60^o (d) $\sin^{-1}(2/3)$

85 When a light ray approaches a glass-air interface from the glass side at the critical angle, the angle of refraction is **[MP PAT 1990]**

(a) 0^o (b) 45^o

(c) 90^o (d) Equal to the angle of incidence

86 A fish is a little away below the surface of a lake. If the critical angle is 49^o then the fish could see things above the water surface within an angular range of θ^o where **[MP PMT 1986]**



(a) $\theta = 49^o$

(b) $\theta = 90^o$

(c) $\theta = 98^o$

(d) $\theta = 24\frac{1^o}{2}$

87 A diver in a swimming pool wants to signal his distress to a person lying on the edge of the pool by flashing his water proof flash light

[NCERT 1972]

(a) He must direct the beam vertically upwards

(b) He has to direct the beam horizontally

(c) He has to direct the beam at an angle to the vertically which is slightly less than the critical angle of incidence for total internal reflection

(d) He has to direct the beam at an angle to the vertical which is slightly more than the critical angle of incidence for the total internal reflection

88 A film of air is enclosed between a pair of thin microscope slides and the combination is then inserted in water. A ray of white light is projected through water and the light reflected by the film of air sandwiched between the two slides is received on a screen. If the angle of incidence of the ray on the film is gradually decreased from 90^o, the reflected light **[NCERT 1972]**

(a) Will turn red and then vanish (b) Will remain white and then vanish

(c) Will remain white at all angles of incidence (d) Will turn blue and then vanish

89 The critical angle for a medium is 60^o. The refractive index of the medium **[MP PMT 2004]**

(a) $2/\sqrt{3}$ (b) $\sqrt{2}/3$ (c) $\sqrt{3}$ (d) $\sqrt{3}/2$

90 A ray of light propagates from glass (refractive index = 3/2) to water (refractive index = 4/3). The value of the critical angle

[JIPMER 1999; UPSEAT 2001; MP PMT 2000, 2003]

(a) $\sin^{-1}(1/2)$ (b) $\sin^{-1}\left(\frac{\sqrt{8}}{9}\right)$ (c) $\sin^{-1}(8/9)$ (d) $\sin^{-1}(5/7)$

91 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^o. The refractive index of air is 1. Under these conditions the ray

(a) Will emerge into the air without any deviation

(b) Will be reflected back into the glass

(c) Will be absorbed

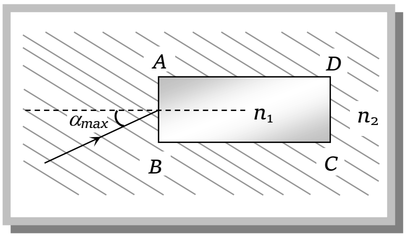
(d) Will emerge into the air with an angle of refraction equal to 90^o

Advance Level

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

(a) $\left(\frac{\pi}{2} - C\right)$ (b) $2C$ (c) $\pi - 2C$ (d) $\pi - C$

93 A rectangular glass slab $ABCD$, of refractive index n_1, is immersed in water of refractive index n_2 ($n_1 > n_2$). A ray of light in incident at the surface AB of the slab as shown. The maximum value of the angle of incidence α_{max}, such that the ray comes out only from the other surface CD is given by



(a) $\sin^{-1}\left[\frac{n_1}{n_2}\cos\left(\sin^{-1}\frac{n_2}{n_1}\right)\right]$

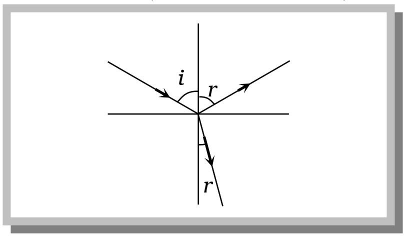
(b) $\sin^{-1}\left[n_1\cos\left(\sin^{-1}\frac{1}{n_2}\right)\right]$

(c) $\sin^{-1}\left(\frac{n_1}{n_2}\right)$

(d) $\sin^{-1}\left(\frac{n_2}{n_1}\right)$

94 A ray of light is incident at an angle i from denser to rare medium. The reflected and the refracted rays are mutually perpendicular. The angle of reflection and the angle of refraction are respectively r and r', then the critical angle will be

[IIT-JEE 1983; MP PET 1995; CBSE PMT 1996; MP PMT 1985, 99]



(a) $\sin^{-1}(\sin r)$

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

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

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

95 A ray of light travelling in a transparent medium falls on a surface separating the medium from air at an angle of incidence of 45^o. The ray undergoes total internal reflection. If n is the refractive index of the medium with respect to air, select the possible value (s) of n from the following

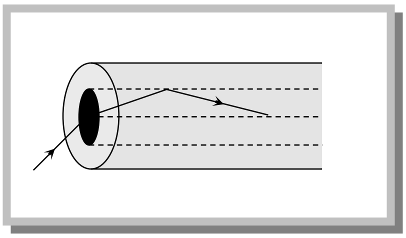
(a) 1.3 (b) 1.4 (c) 1.5 (d) 1.6

96 Light enters at an angle of incidence in a transparent rod of refractive index n. For what value of the refractive index of the material of the rod the light once entered into it will not leave it through its lateral face whatsoever be the value of angle of incidence

[CBSE PMT 1998]

(a) $n > \sqrt{2}$ (b) $n = 1$ (c) $n = 1.1$ (d) $n = 1.3$

97 An optical fibre consists of core of μ_1 surrounded by a cladding of $\mu_2 < \mu_1$. A beam of light enters from air at an angle α with axis of fibre. The highest α for which ray can be travelled through fibre is



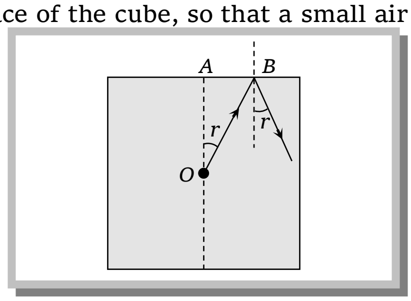
(a) $\cos^{-1}\sqrt{\mu_2^2 - \mu_1^2}$

(b) $\sin^{-1}\sqrt{\mu_2^2 - \mu_1^2}$

(c) $\tan^{-1}\sqrt{\mu_1^2 - \mu_2^2}$

(d) $\sec^{-1}\sqrt{\mu_1^2 - \mu_2^2}$

98 A 2.5 cm cube is constructed of a material whose refractive index is 1.65. Calculate the least radius of an opaque circular disc, which must be placed centrally over each face of the cube, so that a small air bubble at its centre shall be invisible from an external point



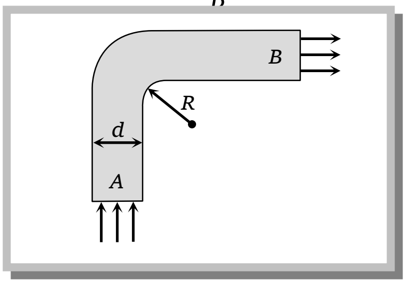
(a) 0.95 cm

(b) 0.59 *cm*

(c) 1.25 *cm*

(d) 0.75 *cm*

99 A rod of glass (μ = 1.5) and of square cross section is bent into the shape shown in the figure. A parallel beam of light falls on the plane flat surface *A* as shown in the figure. If *d* is the width of a side and *R* is the radius of circular arc then for what maximum value of $\frac{d}{R}$ light entering the glass slab through surface *A* emerges from the glass through *B*



(a) 1.5

(b) 0.5

(c) 1.3

(d) None of these

Refraction of light at spherical surface

Basic Level

100 A plano-convex lens of refractive index 1.5 and radius of curvature 30 *cm* is silvered at the curved surface. Now this lens has been used to form the image of an object. At what distance from this lens an object be placed in order to have a real image of the size of the object

(a) 20 *cm* (b) 30 *cm* (c) 60 *cm* (d) 80 *cm*

101 At what distance from a convex lens of focal length 30 *cm*, an object should be placed so that the size of the image be 1/2th of the object

(a) 30 *cm* (b) 60 *cm* (c) 15 *cm* (d) 90 *cm*

102 A beam of parallel rays is brought to a focus by a plano-convex lens. A thin concave lens of the same focal length is joined to the first lens. The effect of this is

(a) The focal point shifts away from the lens by a small distance (b) The focus remains undisturbed

(c) The focus shifts to infinity (d) The focal point shifts towards the lens by a small distance

103 When light rays from the sun fall on a convex lens along a direction parallel to its axis

(a) Focal length for all colours is the same (b) Focal length for violet colour is the shortest

(c) Focal length for yellow colour is the longest (d) Focal length for red colour is the shortest

104 A double convex lens $(R_1 = R_2 = 10 cm)$ having focal length equal to the focal length of a concave mirror. The radius of curvature of the concave mirror is

(a) 10 *cm* (b) 20 *cm* (c) 40 *cm* (d) 15 *cm*

105 The image of an object is formed on a screen using a lens. If the lower half portion of the lens is covered

(a) The whole image will disappear (b) The upper half of the image will disappear

(c) Brightness of the whole image will be reduced (d) The lower half of the image will disappear

106 In order to obtain a real image of magnification 2 bring a converging lens of focal length 20 *cm*, where should be an object be placed

[AFMC 2004]

(a) 50 *cm* (b) 30 *cm* (c) – 50 *cm* (d) – 30 *cm*

107 An object is placed at a distance of 20 *cm* from a convex lens of focal length 10 *cm*. The image is formed on the other side of the lens at a distance **[CPMT 1971; RPET 2003]**

(a) 20 *cm* (b) 10 *cm* (c) 40 *cm* (d) 30 *cm*

108 Two lenses of power 6*D* and – 2*D* are combined to form a single lens. The focal length of this lens will be

[Similar to (MP PET 1990; MNR 1987; MH CET (Med.) 2001; UPSEAT 2000); MP PET 2003]

(a) $\frac{3}{2}m$ (b) $\frac{1}{4}m$ (c) 4 *m* (d) $\frac{1}{8}m$

109 A convex lens of focal length 12 *cm* is made of glass of $\mu = \frac{3}{2}$. What will be its focal length when immersed in liquid of $\mu = \frac{5}{4}$

[MP PMT 1995, 2003]

(a) 6 *cm* (b) 12 *cm* (c) 24 *cm* (d) 30 *cm*

110 A biconvex lens with equal radii curvature has refractive index 1.6 and focal length 10 *cm*. Its radius of curvature will be

[MP PET 2003]

(a) 20 *cm* (b) 16 *cm* (c) 10 *cm* (d) 12 *cm*

111 The chromatic aberration in lenses becomes due to **[CPMT 2003]**

(a) Disimilarity of main axis of rays (b) Disimilarty of radii of curvature

(c) Variation of focal length of lenses with wavelength (d) None of these

112 A plano convex lens is made of glass of refractive index 1.5. The radius of curvature of its convex surface is *R*. Its focal length is

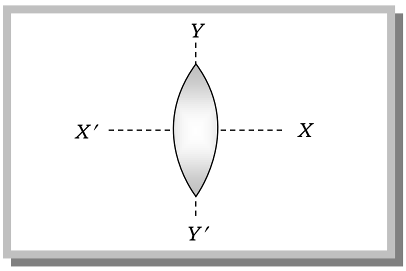
[RPET 2003]

(a) *R* / 2 (b) *R* (c) 2*R* (d) 1.5 *R*

113 When the convergent nature of a convex lens will be less as compared with air **[AFMC 2003]**

(a) In water (b) In oil (c) In both (d) None of these

114 An equiconvex lens is cut into two halves along (i) *XOX*′ and (ii) *YOY*′ as shown in the figure. Let *f*, *f*′, *f*″ be the focal lengths of the complete lens of each half in case (i) and of each half in case (ii) respectively



Choose the correct statement from the following **[CBSE PMT 2003]**

(a) $f' = 2f,\ f'' = f$ (b) $f' = f,\ f'' = f$ (c) $f' = 2f,\ f'' = 2f$ (d) $f' = f,\ f'' = 2f$

115 If in a plano-convex lens, the radius of curvature of the convex surface is 10 *cm* and the focal length of the lens is 30 *cm,* then the refractive index of the material of lens will be **[CPMT 1986; MNR 1988; UPSEAT 2000; MP PMT 2002]**

(a) 1.5 (b) 1.66 (c) 1.33 (d) 3

116 A convex lens of focal length *f* produces an image $\frac{1}{n}$ times then that of the size of the object. The distance of the object from the lens is **[BHU 1997; JIPMER 2001, 2002]**

(a) nf (b) $\frac{f}{n}$ (c) $(n+1)f$ (d) $(n-1)f$

117 If two +5 diopter lenses are mounted at some distance apart, the equivalent power will always be negative if the distance is

[UPSEAT 2002]

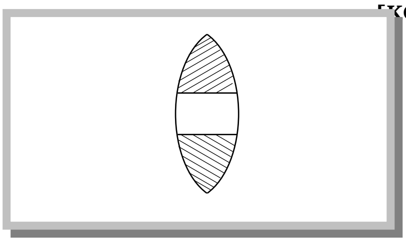
(a) Greater then 40 *cm* (b) Equal to 40 *cm* (c) Equal to 10 *cm* (d) Less then 10 *cm*

118 A convex lens produces a real image *m* times the size of the object. What will be the distance of the object from the lens

[JIPMER 2002]

(a) $\left(\frac{m+1}{m}\right)f$ (b) $(m-1)f$ (c) $\left(\frac{m-1}{m}\right)f$ (d) $\frac{m+1}{f}$

119 A convex lens is made up of three different materials as shown in the figure. For a point object placed on its axis, the number of images formed are **[KCET (Engg./Med.) 2002]**



(a) 1

(b) 5

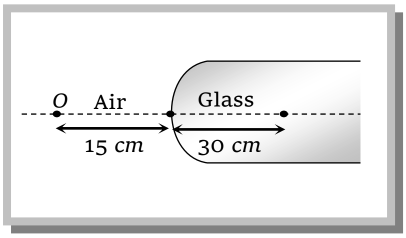
(c) 4

(d) 3

120 An equiconvex lens of refractive index 1.6 has power 4*D* in air. Its power in water is **[AMU (Med.) 2002]**

(a) 1.5 *D* (b) 2.0 *D* (c) 1.3 *D* (d) 3.2 *D*

121 A point object *O* is placed in front of a glass rod having spherical end of radius of curvature 30 *cm*. The image would be formed at **[Orissa JEE 2002]**



(a) 30 *cm* left

(b) Infinity

(c) 1 *cm* to the right

(d) 18 *cm* to the left

122 An object is placed 12 *cm* to the left of a converging lens of focal length 8 *cm*. Another converging lens of 6 *cm* focal length is placed at a distance of 30 *cm* to the right of the first lens. The second lens will produce **[KCET (Engg./M**

(a) No image (b) A virtual enlarged image (c) A real enlarged image (d) A real smaller image

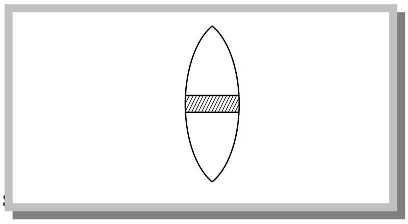
123 An air bubble in sphere having 4 *cm* diameter appears 1 *cm* from surface nearest to eye when looked along diameter. If ${}_a\mu_g = 1.5$, the distance of bubble from refracting surface is **[CPMT 2002]**

(a) 1.2 *cm* (b) 3.2 *cm* (c) 2.8 *cm* (d) 1.6 *cm*

124 A plano-convex lens (f = 20 *cm*) is silvered at plane surface. Now it's focal length will be **[BHU 1995 DPMT 2001]**

(a) 20 *cm* (b) 40 *cm* (c) 30 *cm* (d) 10 *cm*

125 If the central portion of a convex lens is wrapped in black paper as shown in the figure **[Manipal MEE 1995; KCET (Engg**



(a) No image will be formed by the remaining portion of the lens

(b) The full image will be formed but it will be less bright

(c) The central portion of the image will be missing

(d) There will be two images each produced by one of the exposed portion

126 An object has image thrice of its original size when kept at 8 *cm* and 16 *cm* from a convex lens. Focal length of the lens is

[UPSEAT 2001]

(a) 8 *cm* (b) 16 *cm* (c) Between 8 *cm* and 16 *cm* (d) Less then 8 *cm*

127 A convex lens forms a real image of an object for its two different positions on a screen. If height of the image in both the cases be 8 *cm* and 2 *cm*, then height of the object is **[KCET (Engg./Med.) 2000, 2001]**

(a) 16 *cm* (b) 8 *cm* (c) 4 *cm* (d) 2 *cm*

128 The radius curvature of a thin plano-convex lens is 10 *cm* (of curved surface) and the refractive index is 1.5. If the plane surface is silvered, then the focal length will be **[CBSE PMT 2000]**

(a) 15 *cm* (b) 20 *cm* (c) 5 *cm* (d) 10 *cm*

129 A convex lens of focal length 40 *cm* is an contact with a concave lens of focal length 25 *cm*. The power of combination is

[IIT-JEE 1982; AFMC 1997; CBSE PMT 2000]

(a) – 1.5 *D* (b) – 6.5 *D* (c) + 6.5 *D* (d) + 6.67 *D*

130 A double convex thin lens made of glass (refractive index $\mu = 1.5$) has both radii of curvature of magnitude 20 *cm*. Incident light rays parallel to the axis of the lens will converge at a distance L such that **[MNR 1991; MP PET 1996; U**

(a) L = 20 (b) L = 10 (c) L = 40 (d) L = 20/3

131 An achromatic combination of lenses is formed by joining **[BHU 1995; Pb. PMT 2000]**

(a) 2 convex lenses (b) 2 concave lenses

(c) 1 convex lens and 1 concave lens (d) Convex lens and plane mirror

132 An equiconvex lens of glass of focal length 0.1 *metre* is cut along a plane perpendicular to principle axis into two equal parts. The ratio of focal length of new lenses formed is **[MP PET 1999; DPMT 2000]**

(a) 1 : 1 (b) 1 : 2 (c) 2 : 1 (d) 2 : $\frac{1}{2}$

133 A convex lens of focal length 0.5 *m* and concave lens of focal length 1 *m* are combined. The power of the resulting lens will be

[Similar to (CPMT 1973, 89; BVP 2003); CPMT 1999; JIPMER 2000]

(a) 1 *D* (b) – 1 *D* (c) 0.5 *D* (d) – 0.5 *D*

134 Two thin lenses of focal lengths f_1 and f_2 are in contact and coaxial. The combination is equivalent to a single lens of power

[MP PET 1996; MP PMT/PET 1998; DCE 2000]

(a) $f_1 + f_2$ (b) $\frac{f_1 f_2}{f_1 + f_2}$ (c) $\frac{1}{2}(f_1 + f_2)$ (d) $\frac{f_1 + f_2}{f_1 f_2}$

135 A candle placed 25 *cm* from a lens, forms an image on a screen placed 75 *cm* on the other end of the lens. The focal length and type of the lens should be **[KCET (Med.) 2000]**

(a) + 18.75 *cm* and convex lens (b) – 18.75 *cm* and concave lens

(c) + 20.25 *cm* and convex lens (d) – 20.25 *cm* and concave lens

136 We combined a convex lens of focal length f_1 and concave lens of focal lengths f_2 and their combined focal length was *F*. The combination of these lenses will behave like a concave lens if **[KCET (Med.) 2000]**

(a) $f_1 > f_2$ (b) $f_1 < f_2$ (c) $f_1 = f_2$ (d) $f_1 \le f_2$

137 A double convex thin lens made of glass of refractive index 1.6 has radii of curvature 15 *cm* each. The focal length of this lens when immersed in a liquid of refractive index 1.63 is **[UPSEAT 2000]**

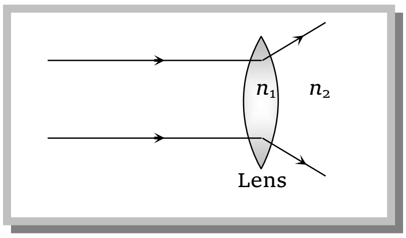
(a) – 407 *cm* (b) 250 *cm* (c) 125 *cm* (d) 25 *cm*

138 Chromatic aberration of lens be corrected by **[AFMC 2000]**

(a) Reducing its aperature (b) Proper polishing of its two surfaces

(c) Suitably combining it with another lens (d) Providing different suitable curvature to its two surfaces

139 The relation between n_1 and n_2, if behaviour of light rays is as shown in figure is **[KCET (Engg./Med.) 2000]**



(a) $n_1 >> n_2$

(b) $n_2 > n_1$

(c) $n_1 > n_2$

(d) $n_1 = n_2$

140 The focal length of a lens is 10 *cm* and its refractive index is 1.5. If the radius of curvature of one surface is 7.5 *cm*, the radius of curvature of the second surface will be **[MP PMT 2000]**

(a) 7.5 *cm* (b) 15.0 *cm* (c) 75 *cm* (d) 5.0 *cm*

141 The object distance *u*, the image distance *v* and the magnification *m* in a lens follow certain linear relations. These are **[Roorkee 2000]**

(a) $\frac{1}{u}$ versus $\frac{1}{v}$ (b) *m* versus *u* (c) *u* versus *v* (d) *m* versus *v*

142 A lens of power +2 diopters is placed in contact with a lens of power – 1 diopter. The combination will behave like

[MNR 1986; UPSEAT 2000]

(a) A convergent lens of focal length 50 *cm* (b) A divergent lens of focal length 100 *cm*

(c) A convergent lens of focal length 100 *cm* (d) A convergent lens of focal length 200 *cm*

143 The plane faces of two identical plano-convex lenses each having focal length of 40 *cms* are pressed against each other to form a usual convex lens. The distance from this lens, at which an object must be placed to obtain a real, inverted image with magnification one is **[NCERT 1980; CPMT 1981, 91; MP PMT 1999; UPSEAT 1999]**

(a) 80 *cm* (b) 40 *cm* (c) 20 *cm* (d) 162 *cm*

144 A lens of refractive index n is put in a liquid of refractive index n' of focal length of lens in air is f, its focal length in liquid will be

[MP PET 1999]

(a) $-\frac{fn'(n-1)}{n'-n}$ (b) $-\frac{f(n'-n)}{n'(n-1)}$ (c) $-\frac{n'(n-1)}{f(n'-n)}$ (d) $\frac{fn'n}{n-n'}$

145 An object of height 1.5 *cm* is placed on the axis of a convex lens of focal length 25 *cm*. A real image is formed at a distance of 75 *cm* from the lens. The size of the image will be **[MP PET 1999]**

(a) 4.5 *cm* (b) 3.0 *cm* (c) 0.75 *cm* (d) 0.5 *cm*

146 A symmetric double convex lens is cut in two equal parts by a plane perpendicular to the principal axis. If the power of the original lens was 4*D*, the power of a cut lens will be **[MP PMT 1999]**

(a) 2 *D* (b) 3 *D* (c) 4 *D* (d) 5 *D*

147 A convex lens is used to form real image of an object on a screen. It is observed that even when the positions of the object and that screen are fixed there are two positions of the lens to form real images. If the heights of the images are 4 *cm* and 9 *cm* respectively, the height of the object is **[AMU (Med.) 1999]**

(a) 2.25 *cm* (b) 6.00 *cm* (c) 6.50 *cm* (d) 36.00 *cm*

148 The shortest distance between an object and its real image produced by a converging lens of focal length 20 *cm* is **[JIPMER 1999]**

(a) 20 *cm* (b) 40 *cm* (c) 60 *cm* (d) 80 *cm*

149 A double convex lens of glass of $\mu = 1.5$ has radius of curvature of each of its surface is 0.2 *m*. The power of the lens is

[JIPMER 1999]

(a) + 10 *D* (b) – 10 *D* (c) – 5 *D* (d) +5 *D*

150 A lens of focal power 0.5 *D* is **[JIPMER 1999]**

(a) A convex lens of focal length 0.5 *m* (b) A concave lens of focal length 0.5 *m*

(c) A convex lens of focal length 2 *m* (d) A concave lens of focal length 2 *m*

151 A plano convex lens is made of refractive index 1.6. The radius of curvature of the curved surface is 60 *cm*. The focal length of the lens is **[CBSE PMT 1999]**

(a) 50 *cm* (b) 100 *cm* (c) 200 *cm* (d) 400 *cm*

152 A concave lens of focal length 20 *cm* placed in contact with a plane mirror acts as a **[SCRA 1998]**

(a) Convex mirror of focal length 10 *cm* (b) Concave mirror of focal length 40 *cm*

(c) Concave mirror of focal length 60 *cm* (d) Concave mirror of focal length 10 *cm*

153 The plane surface of a plano-convex lens of focal length f is silvered. It will behave as **[MP PMT/PET 1998]**

(a) Plane mirror (b) Convex mirror of focal length 2f

(c) Concave mirror of focal length $f / 2$ (d) None of the above

154 A converging lens is used to form an image on a screen. When upper half of the lens is covered by an opaque screen

[IIT-JEE 1986; MP PET 1996; BHU 1998]

(a) Half the image will disappear (b) Complete image will be formed of same intensity

(c) Half image will be formed of same intensity (d) Complete image will be formed of decreased intensity

155 A double convex lens of focal length 20 *cm* is made of glass of refractive index 3 / 2. When placed completely in water $({}_a\mu_w = 4/3)$, its focal length will be **[CBSE PMT 1990; MP PMT/PET 1998]**

(a) 80 *cm* (b) 15 *cm* (c) 17.7 *cm* (d) 22.5 *cm*

156 A thin double convex lens has radii of curvature each of magnitude 40 *cm* and is made of glass with refractive index 1.65. Its focal length is nearly **[MP PMT 1997]**

(a) 20 *cm* (b) 31 *cm* (c) 35 *cm* (d) 50 *cm*

157 A achromatic combination is made with a lens of focal length *f* and dispersive power ω with a lens having dispersive power of 2ω. The focal length of second will be **[RPET 1997]**

(a) 2*f* (b) $f/2$ (c) – $f/2$ (d) – 2*f*

158 Two lenses having $f_1 : f_2 = 2:3$ has combination to make no dispersion. Find the ratio of dispersive power of glasses used

[RPMT 1997]

(a) 2 : 3 (b) 3 : 2 (c) 4 : 9 (d) 9 : 4

159 The focal length of a converging lens is measured for violet, green and red coulours. It is respectively f_v, f_g, f_r. We will find

[CBSE PMT 1997]

(a) $f_v = f_r$ (b) $f_v > f_r$ (c) $f_v < f_r$ (d) $f_g > f_r$

160 A concave and convex lens have the same focal length of 20 *cm* and are put into contact to form a lens combination. The combination is used to view an object of 5 *cm* length kept at 20 *cm* from the lens combination. As compared to the object, the image will be **[CPMT 1986; RPMT 1997]**

(a) Magnified and inverted (b) Reduced and erect

(c) Of the same size as the object and erect (d) Of the same size as the object but inverted

161 Which of the following form (*s*) a virtual and erect image for all positions of the object **[IIT-JEE 1996]**

(a) Convex lens (b) Concave lens (c) Convex mirror (d) Concave mirror

162 f_v and f_r are the focal lengths of a convex lens for violet and red light respectively and F_v and F_r are the focal lengths of a concave lens for violet and red light respectively, then keeping the sign of focal length in view we must have **[NCERT 1980; CBSE PMT 1996]**

(a) $f_v < f_r$ and $F_v > F_r$ (b) $f_v < f_r$ and $F_v < F_r$ (c) $f_v > f_r$ and $F_v > F_r$ (d) $f_v > f_r$ and $F_v < F_r$

163 If a lens is cut into two pieces perpendicular to the principal axis and only one part is used, the intensity of the image **[CPMT 1996]**

(a) Remains same (b) $\frac{1}{2}$ times (c) 2 times (d) Infinite

164 Two thin lenses whose powers are + 2*D* and – 4*D* respectively combine, then the power of combination is **[AFMC 1998;**

(a) – 2*D* (b) +2*D* (c) – 4*D* (d) + 4*D*

165 A lens is placed between a source of light and a wall. It forms images of area A_1 and A_2 on the wall for its two different positions. The area of the source or light is **[CBSE PMT 1995]**

(a) $\frac{A_1 + A_2}{2}$ (b) $\left[\frac{1}{A_1} + \frac{1}{A_2}\right]^{-1}$ (c) $\sqrt{A_1 A_2}$ (d) $\left[\frac{\sqrt{A_1} + \sqrt{A_2}}{2}\right]^2$

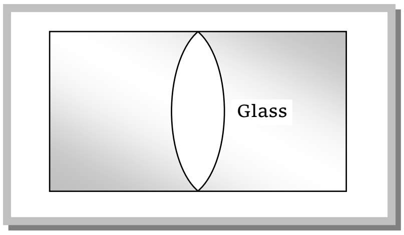
166 The focal length of convex lens 30 *cm* and the size of image is quarter of the object, then the object distance is **[AFMC**

(a) 90 *cm* (b) 60 *cm* (c) 30 *cm* (d) 40 *cm*

167 A convex lens forms a real image of a point object placed on its principal axis. If the upper half of the lens is painted black, the image will **[MP PET 1995]**

(a) Be shifted downwards (b) Be shifted upwards (c) Not be shifted (d) Shift on the principal axis

168 In the figure an air lens of radii of curvature 10 *cm* ($R_1 = R_2 = 10 cm$) is cut in a cylinder of glass $(\mu = 1.5)$. The focal length and the nature of the lens is **[MP PET 1995]**



(a) 15 *cm,* concave

(b) 15 *cm,* convex

(c) ∞, neither concave nor convex

(d) 0, concave

169 A lens (focal length 50 *cm*) forms the image of a distant object which subtends an angle of 1 *milliradian* at the lens. What is the size of the image **[MP PMT 1995]**

(a) 5 *mm* (b) 1 *mm* (c) 0.5 *mm* (d) 0.1 *mm*

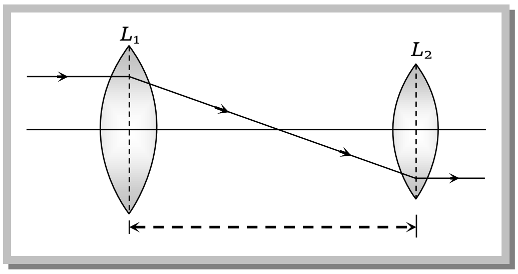
170 A diminished image of an object is to be obtained on a screen 1 *m* from it. This can be achieved by approximately placing

[IIT-JEE 1995]

(a) A convex mirror of suitable focal length (b) A concave mirror of suitable focal length

(c) A convex lens of focal length less then 0.25 *m* (d) A concave lens of suitable focal length

171 In the adjoining diagram, distance between two lenses will be (F_1 and F_2 are focal lengths of two lenses)**[CPMT 1995]**



(a) F_1

(b) F_2

(c) $F_1 + F_2$

(d) $F_1 - F_2$

172 A biconvex lens forms a real image of an object placed perpendicular to its principal axis. Suppose the radii of curvature of the lens tend to infinity. Then the image would **[MP PET 1994]**

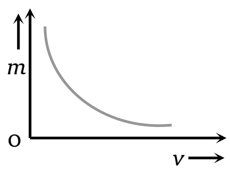
(a) Disappear (b) Remain as real image still

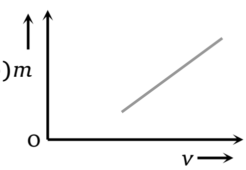
(c) Be virtual and of the same size as the object (d) Suffer from aberrations

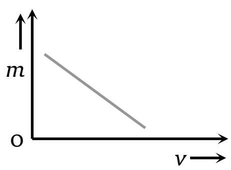
173 The radius of curvature of convex surface of a thin plano-convex lens is 15 *cm* and refractive index of its material is 1.6. The power of the lens will be **[MP PMT 1994]**

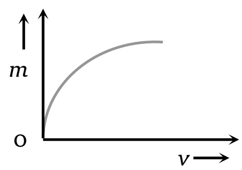
(a) + 1*D* (b) – 2*D* (c) + 3*D* (d) + 4*D*

174 The graph between the lateral magnification (*m*) produced by a lens and the distance of the image (*v*) is given by **[MP PMT 1994]**

(a) 

(b) 

(c) 

(d) 

175 An object is placed first at infinity and then at 20 *cm* from the object side focal plane of the convex lens. The two images thus formed are 5 *cm* apart. The focal length of the lens is **[SCRA 1994]**

(a) 5 *cm* (b) 10 *cm* (c) 15 *cm* (d) 20 *cm*

176 A parallel beam of light falling on a glass sphere of radius 3.6 *cm* and refractive index 1.4 will come to a focus **[CPMT 1**

(a) Inside the sphere (b) At the surface of the sphere (c) Outside the sphere (d)

177 In displacement method the lengths of images in two positions of lens between object and screen are 9 *cm* and 4 *cm* respectively. The length of object must be **[CPMT 1993]**

(a) 6.25 *cm* (b) 3 / 2 *cm* (c) 6 *cm* (d) 36 *cm*

178 A thin convex lens of refractive index 1.5 has a focal length of 15 *cm* in air. When the lens is placed in liquid of refractive index 4 / 3, its focal length will be **[CPMT 1974, 77; MP PMT 1992]**

(a) 15 *cm* (b) 10 *cm* (c) 30 *cm* (d) 60 *cm*

179 An object is placed 9 *cm* from a magnifying lens of focal length 24 *cm*. What is the magnitude of magnification **[MP PET**

(a) 1.2 (b) 1.6 (c) 2.0 (d) 2.4

180 A parallel beam of white light falls on a convex lens. Images of blue, yellow and red light are formed on other side of the lens at a distance of 0.20 *m*, 0.205 *m* and 0.214 *m* respectively. The dispersive power of the material of the lens will be **[MP PMT 1991]**

(a) 619 / 1000 (b) 9 / 200 (c) 14 / 205 (d) 5 / 214

181 An object is placed at a distance of f / 2 from a convex lens. The image will be **[CPMT 1974, 89]**

(a) At one of the foci, virtual and double its size (b) At 3f / 2, real and inverted

(c) At 2f, virtual and erect (d) None of these

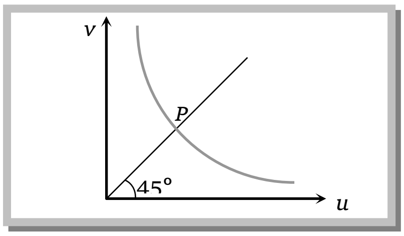
182 A convex lens and a concave lens of 10 *cm* focal length combine, the combination lens behaves as **[CPMT 1988]**

(a) Convex lens (b) Concave lens (c) As a slab of glass (d) As convex mirror

183 Magnification produced by a concave lens is always **[IIT-JEE 1987]**

(a) Less then one (b) More then one (c) One (d) Less or more then one

184 The graph shows variation of v with change in u. Points plotted above the point P on the curve are for values of v **[CPMT 1987]**



(a) Smaller then f

(b) Smaller then 2f

(c) Larger then 2f

(d) Larger than f

185 Two lenses are placed in contact with each other and the focal length of combination is 80 *cm*. If the focal length of one is 20 *cm*, then the power of the other will be **[NCERT 1981]**

(a) 1.66 D (b) 4.00 D (c) – 1.00 D (d) – 3.75 D

186 Sixteen thin convex lenses focal lengths f, 2f, 4f, 8f....... are placed in contact with each other. The combination will behave as a convex lens of focal length approximately **[BHU 1980]**

(a) 136 f (b) 39 f (c) 2 f (d) f / 2

187 A lens behaves as a converging lens in air and a diverging lens in water. The refractive index of the material is

[CPMT 1991; NCERT 1979]

(a) Equal to unity (b) Equal to 1.33 (c) Between unity and 1.33 (d) Greater than 1.33

188 For getting enlarged and real image by a convex lens of focal length 15 *cm,* the object is to be placed at a distance of ..... from the optical centre

(a) Between 0 and 15 *cm* (b) Between 15 and 30 *cm* (c) Between 30 and 45 *cm* (d) Between 45 and 60 *cm*

Advance Level

189 A thin plano-convex lens acts like a concave mirror of focal length 0.2 *m* when silvered form its plane surface. The refractive index of the material of the lens is 1.5. The radius of curvature of the convex surface of the lens will be **[KCET 2004]**

(a) 0.4 *m* (b) 0.2 *m* (c) 0.1 *m* (d) 0.75 *m*

190 The size of the image of an object, which is at infinity, as formed by a convex lens of focal length 30 *cm* is 2 *cm*. If a concave lens of focal length 20 *cm* is placed between the convex lens and the image at a distance of 26 *cm* from the convex lens, calculate the new size of the image **[IIT-JEE (Screening) 2003]**

(a) 1.25 *cm* (b) 2.5 *cm* (c) 1.05 *cm* (d) 2 *cm*

191 A hollow double concave lens is made of very thin transparent material. It can be filled with air or either of two liquids L_1 and L_2 having refractive indices n_1 and n_2 respectively $(n_2 > n_1 > 1)$. The lens will diverge a parallel beam of light if it is filled with

[IIT-JEE (Screening) 2000]

(a) Air and placed in air (b) Air and immersed in L_1 (c) L_1 and immersed in L_2 (d) L_2 and immersed in L_1

192 Two lenses, one convex and the other concave of same power are placed such that their principal axes coincide. If the separation between the lenses is *x*, then **[Roorkee 1999]**

(a) Real image is formed for *x* = 0 only (b) Real image is formed for all values of *x*

(c) Virtual image is formed for all value of *x* other than zero (d) System will behave like a glass plate for *x* = 0

193 The focal length of a convex lens of R.I. 1.5 is *f* when it is placed in air. When it is immersed in a liquid it behaves as a converging lens its focal length becomes *xf* (*x* > 1). The refractive index of the liquid **[Roorkee 1999]**

(a) > 3/2 (b) < (3/2) and > 1 (c) < 3/2 (d) All of these

194 A point object *O* is placed on the principal axis of a convex lens of focal length 20 *cm* at a distance of 40 *cm* to the left of it. The diameter of the lens is 10 *cm*. If the eye is placed 60 *cm* to the right of the lens at a distance *h* below the principal axis, then the maximum value of *h* to see the image will be **[MP PMT 1999]**

(a) 0 (b) 5 *cm* (c) 2.5 *cm* (d) 10 *cm*

195 A concave lens of glass, refractive index 1.5, has both surfaces of same radius of curvature *R*. On immersion in a medium of refractive index 1.75 it will behave as a **[IIT-JEE 1999]**

(a) Convergent lens of focal length 3.5 *R* (b) Convergent lens of focal length 3.0 *R*

(c) Divergent lens of focal length 3.5 *R* (d) Divergent lens of focal length 3.0 *R*

196 A plano-convex lens when silvered in the plane side behaves like a concave mirror of focal length 30 *cm*. However, when silvered on the convex side it behaves like concave mirror of focal length 10 *cm*. Then the refractive index of its material will be **[BHU 1997]**

(a) 3.0 (b) 2.0 (c) 2.5 (d) 1.5

197 A glass hemisphere of radius 0.04 *m* and *R.I.* of the material 1.6 is placed centrally over a cross mark on a paper (i) with the flat face (ii) with the curved face in contact with the paper. In each case the cross mark is viewed directly from above. The position of the images will be **[ISM Dhanbad 1994]**

(a) (i) 0.04 *m* from the flat face; (ii) 0.025 *m* from the flat face

(b) (i) At the same position of the cross mark; (ii) 0.025 *m* below the flat face

(c) (i) 0.025 *m* from the flat face; (ii) 0.04 *m* from the flat face

(d) For both (i) and (ii) 0.025 *m* from the highest point of the hemisphere

198 Diameter of a plano-convex lens is 6 *cm* and thickness at the centre is 3 *mm*. If the speed of light in the material of the lens is $2 \times 10^8 m/\sec$ the focal length of the lens is **[CPMT 1989]**

(a) 15 *cm* (b) 20 *cm* (c) 30 *cm* (d) 10 *cm*

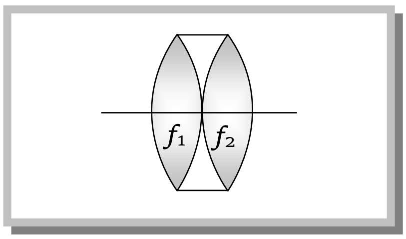
199 The angle subtended at the eye by the sun is $\frac{1^o}{2}$. The diameter of image of the sun formed by a convex lens of focal length 25 *cm* is

(a) 12.5 *cm* (b) 12.5 *mm* (c) $\frac{25}{36} mm$ (d) $\frac{25\pi}{36} mm$

200 A glass sphere of radius $r = 5 \times 10^{-2} m$ has a small bubble $2 \times 10^{-2} m$ from its centre. The bubble is viewed along a diameter of the sphere from the side on which it lies. Refractive index of glass is 1.5. Distance from surface at which the bubble will appear is

(a) 2.5 *cm* (b) 5.2 *cm* (c) – 5.2 *cm* (d) – 2.5 *cm*

201 Two thin equi-convex lenses of focal lengths 10 *cm* and 20 *cm* are placed inside a thin-walled glass box with curved sides, side by side, such that these are tightly fitted inside. The glass is then filled with water and used as a lens. Determine the position of an object so that an image twice the size of the object is formed due to this lens combination. $\mu_{glass} = 3/2$ and $\mu_{water} = 4/3$



(a) 10 *cm*. 15 *cm*

(b) 12 *cm*, 4 *cm*

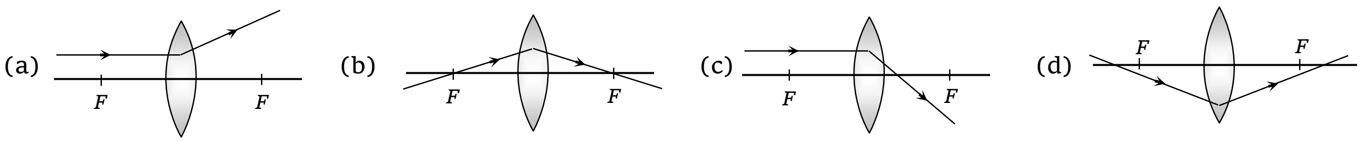
(c) 15 *cm*, 5 *cm*

(d) 8 *cm*, 3 *cm*

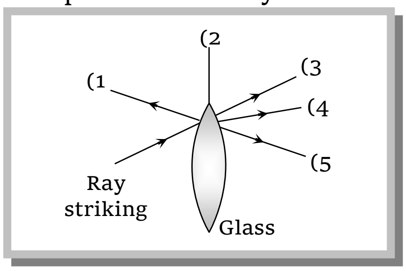
202 A thin lens of focal length *f* has aperture *a*. It forms an image of intensity *I*. Inner part of a lens upto diameter *d*/3 is painted black, the intensity of image will be

(a) *I* / 3 (b) *I* / 9 (c) 8*I* / 9 (d) *I*

203 In figure if points *F* represent the principal foci, which diagram illustrates the passage of a ray of light through a converging lens



204 A ray of light strikes a piece of glass shaped as shown in figure. Along which path does the ray continue



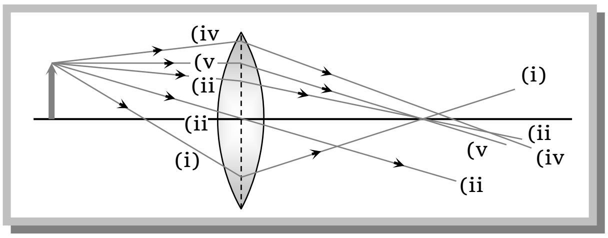
(a) 1

(b) 3

(c) 4

(d) 5

205 From shows five rays from an object passing through a converging lens. There of these rays are correctly drawn. The two rays, not drawn correctly, are



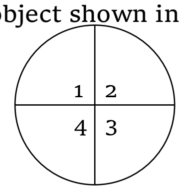
(a) (ii) and (iv)

(b) (I) and (iii)

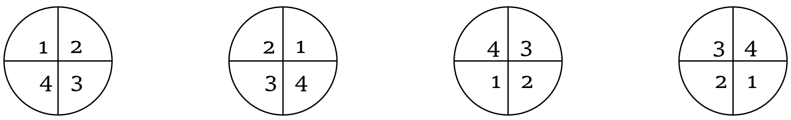
(c) (iii) and (iv)

(d) (i) and (iv)

206 A convex lens is used a real image of the object shown in the following figure

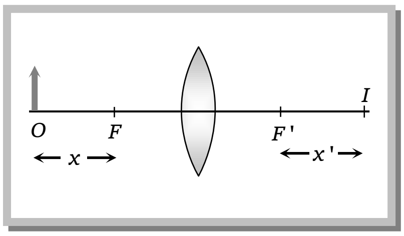


Then the real inverted images is as shown in the following figure



(a) a (b) b (c) c (d) d

207 An object is placed at a point distant x from the focus of a convex lens and its image is formed at I as shown in the figure. The distances x, x' satisfy the relation



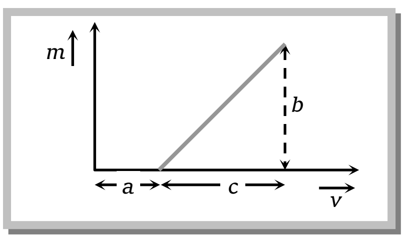
(a) $\frac{x + x'}{2} = f$

(b) $f = xx'$

(c) $x + x' \leq 2f$

(d) $x + x' \geq 2f$

208 The graph shows how the magnification m produced by a convex thin lens varies with image distance v. What was the focal length of the used



(a) $\frac{b}{c}$

(b) $\frac{b}{ca}$

(c) $\frac{bc}{a}$

(d) $\frac{c}{b}$

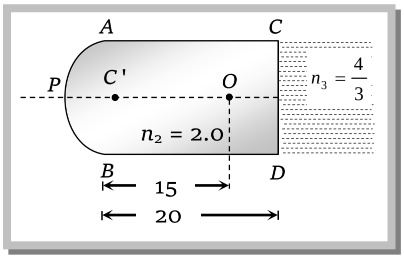
209 The distance between object and the screen is D. Real images of an object are formed on the screen for two positions of a lens separated by a distance d. The ratio between the sizes of two images will be

(a) D/d (b) D^2/d^2 (c) $(D-d)^2/(D+d)^2$ (d) $\sqrt{(D/d)}$

210 A convex lens of focal length f is placed some where in between an object and a screen. The distance between the object and the screen is x. If the numerical value of the magnification produced by the lens is m_1 the focal of the lens is

(a) $\frac{mx}{(m+1)^2}$ (b) $\frac{mx}{(m-1)^2}$ (c) $\frac{(m+1)^2}{m}x$ (d) $\frac{(m-1)^2}{m}x$

211 The slab of a material of refractive index 2 shown in figure has curved surface APB of radius of curvature 10 cm and a plane surface CD. On the left of APB is air and on the right of CD is water with refractive indices as given in figure. An object O is placed at a distance of 15 cm from pole P as shown. The distance of the final image of O from P, as viewed from the left is



(a) 20 cm

(b) 30 cm

(c) 40 cm

(d) 50 cm

212 An object is kept at a distance of 16 cm from a thin and the image formed is real. If the object is kept at a distance of 6 cm from the same lens the image formed is virtual. If the size of the images formed are equal, the focal length of the lens will be

(a) 15 cm (b) 17 cm (c) 21 cm (d) 11 cm

213 A concave lens forms the image of an object such that the distance between the object and image is 10 cm and the magnification produced is 1/4. The focal length of the lens will be

(a) 8.6 cm (b) 6.2 cm (c) 10 cm (d) 4.4 cm

214 A plano convex lens fits exactly into a plano concave lens. Their plane surface are parallel to each other. If the lenses are made of different materials of refractive indices μ_1 and μ_2 and R is the radius of curvature of the curved surface of the lenses, then focal length of the combination is

(a) $\frac{R}{\mu_1-\mu_2}$ (b) $\frac{2R}{\mu_1-\mu_2}$ (c) $\frac{R}{2(\mu_1-\mu_2)}$ (d) $\frac{R}{2-(\mu_1+\mu_2)}$

215 Optic axis of a thin equiconvex lens is the x-axis. The co-ordinates of a point object and its image are (– 40 cm, 1cm) and (50 cm, – 2 cm) respectively. Lens is located at

(a) $x=+20\ cm$ (b) $x=-30\ cm$ (c) $x=-10\ cm$ (d) Origin

216 Focal length of a thin convex lens is 30 cm. At a distance of 10 cm from the lens there is a plane refracting surface of refractive index 3/2. Where will the parallel rays incident on lens converge

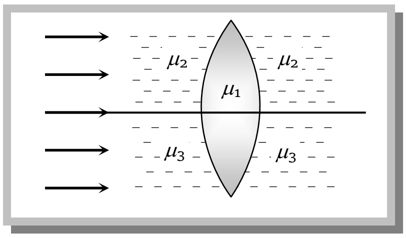
(a) At a distance of 27.5 cm from the lens (b) At a distance of 25 cm from the lens

(c) At a distance of 45 cm from the lens (d) At a distance of 40 cm from the lens

217 A ray incident at an angle of incidence 60° enters a glass sphere of refractive index $\mu=\sqrt{3}$. This ray is reflected and refracted at the further surface of the sphere. The angle between reflected and refracted rays at this surface is

(a) 90° (b) 60° (c) 70° (d) 40°

218 A double convex lens, lens made of a material of refractive index μ_1, is placed inside two liquids or refractive indices μ_2 and μ_3, as shown. $\mu_2 > \mu_1 > \mu_3$. A wide, parallel beam of light is incident on the lens from the left. The lens will give rise to



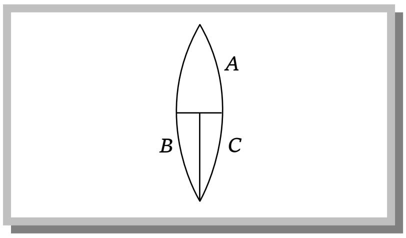
(a) A single convergent beam

(b) Two different convergent beams

(c) Two different divergent beams

(d) A convergent and a divergent beam

219 A thin, symmetric double-convex lens of power *P* is cut into three parts *A*, *B* and *C* as shown. The power of



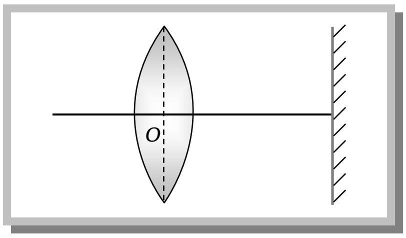
(a) *A* is *P*

(b) *A* is 2*P*

(c) *B* is $\frac{P}{2}$

(d) *B* is $\frac{P}{4}$

220 The distance between a convex lens and a plane mirror is 10 *cm*. The parallel rays incident on the convex lens after refraction from the mirror form image at the optical centre of the lens. Focal length of lens will be



(a) 10 *cm*

(b) 20 *cm*

(c) 30 *cm*

(d) Cannot be determined

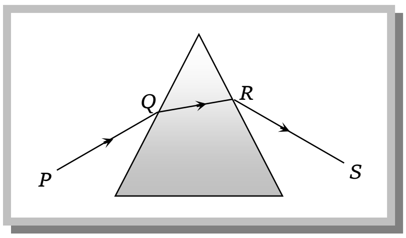
Prism Theory & Dispersion

Basic Level

221 If the angle of prism is 60° and the angle of minimum deviation is 40°, the angle of refraction will be **[MP PET/PMT 20**

(a) 30° (b) 60° (c) 100° (d) 120°

222 A ray of light is incident on an equilateral glass prism placed on a horizontal table. For minimum deviation which of the following is true **[IIT JEE 2004]**



(a) *PQ* is horizontal

(b) *QR* is horizontal

(c) *RS* is horizontal

(d) Either *PQ* or *RS* is horizontal

223 The refractive index of the material of prism is $\sqrt{2}$ and its refracting angle is 30°. One of the refracting surfaces of the prism is made a mirror inwards. A beam of monochromatic light entering the prism from the other face will retrace its path after reflection from the mirrored surface if its angle of incidence on the prism is **[CBSE PMT 2004]**

(a) 45^o (b) 60^o (c) 0 (d) 30^o

224 The refractive index of a particular material is 1.67 for blue light, 1.65 for yellow light and 1.63 for red light. The dispersive power of the material is **[KCET 2004]**

(a) 0.0615 (b) 0.024 (c) 0.031 (d) 1.60

225 Rainbow is formed due to **[KCET 2004]**

(a) Refraction (b) Dispersion and total internal reflection

(c) Total internal reflection (d) Scattering

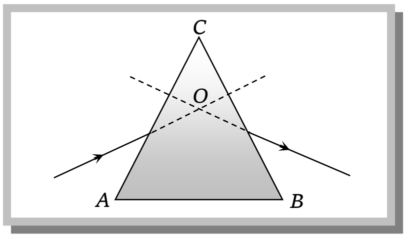
226 A monochromatic light is passed through a prism,.......... colour shows minimum deviation **[Orissa JEE 2004]**

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

227 The angle of a prism is 60^o and its refractive index is $\sqrt{2}$. The angle of minimum deviation suffered by a ray of light in passing through it is **[MP PET 2003]**

(a) About 20^o (b) 30^o (c) 60^o (d) 45^o

228 In the given figure, what is the angle of prism **[Orissa JEE 2003]**



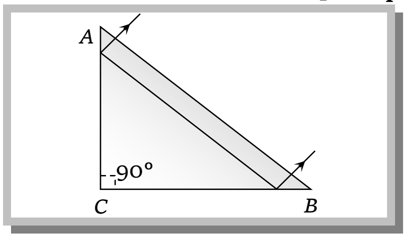
(a) A

(b) B

(c) C

(d) D

229 A ray of light incident normally on an isosceles right angled prism angled prism travels as shown in the figure. The least value of the refractive index of the prism must be **[Manipal MEE 1995; BHU 2003]**



(a) $\sqrt{2}$

(b) $\sqrt{3}$

(c) 1.5

(d) 2.0

230 The refractive index of a prism for a monochromatic wave is $\sqrt{2}$ and its refracting angle is 60^o for minimum deviation, the angle of incidence will be **[CPMT 1993; MNR 1998; MP PMT 1989, 92, 2002]**

(a) 30^o (b) 45^o (c) 60^o (d) 75^o

231 A ray of light passes through the equilateral prism such that angle of incidence is equal to the angle of emergence if the angle of incidence is 45^o. The angle of deviation will be **[Pb. PMT 2002]**

(a) 15^o (b) 75^o (c) 60^o (d) 30^o

232 The Cauchy's dispersion formula is **[AIIMS 2002]**

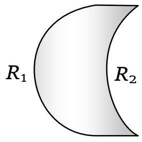
(a) $n = A + B\lambda^{-2} + C\lambda^{-4}$ (b) $n = A + B\lambda^{2} + C\lambda^{-4}$ (c) $n = A + B\lambda^{-2} + C\lambda^{4}$ (d) $n = A + B\lambda^{2} + C\lambda^{4}$

233 The angle of a prism is 30^o. The rays incident at 60^o at one refracting face suffer a deviation of 30^o. The angle of emergence is

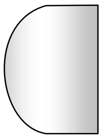
[MP PET 2002]

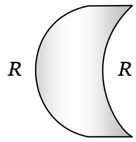
(a) 0^o (b) 30^o (c) 60^o (d) 90^o

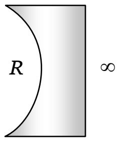
234 Which one of the following spherical lenses does not exhibit dispersion? The radii of curvature of the surfaces of the lenses are as given in the diagrams **[IIT-JEE (Screening) 2002]**

(a) 

$R_1 \neq R_2$

(b) 

(c) 

(d) 

235 Flint glass prism is joined by a crown glass prism to produce dispersion without deviation. The refractive indices of these for mean rays are 1.602 and 1.500 respectively. Angle of prism of flint prism is 10^o, then the angle of prism for crown prism will be

[Similar to (MP PMT 1999); DPMT 2001]

(a) $12^o2.4'$ (b) $12^o4'$ (c) 1.24^o (d) 12^o

236 The light ray is incidence at angle of 60^o on a prism of angle 45^o. When the light ray falls on the other surface at 90^o,the refractive index of the material of prism μ and the angle of deviation δ are given by **[DPMT 2001]**

(a) $\mu = \sqrt{2},\ \delta = 30^o$ (b) $\mu = 1.5,\ \delta = 15^o$ (c) $\mu = \frac{\sqrt{3}}{2},\ \delta = 30^o$ (d) $\mu = \sqrt{\frac{3}{2}},\ \delta = 15^o$

237 A thin prism P_1 with angle 4^o 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 prism P_2 is

[MP PMT 1991, 92; IIT-JEE 1990; MP PET 1995, 99; UPSEAT 2001]

(a) 2.6^o (b) 3^o (c) 4^o (d) 5.33^o

238 Angle of a prism is 30^o and its refractive index is $\sqrt{2}$ and one of the surface is silvered. At what angle of incidence. A ray should be incident on one surface so that after reflection from the silvered surface. It retraces its path **[MP PMT 1991; UPSEAT 2001]**

(a) 30^o (b) 60^o (c) 45^o (d) $\sin^{-1}\sqrt{1.5}$

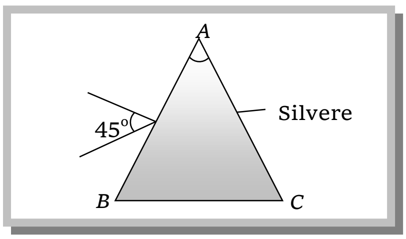
239 A prism *ABC* of angle 30^o has its face *AC* silvered. A ray of light incident at an angle of 45^o at the face *AB* retraces its path after refraction at face *AB* and reflection at face *AC*. The refractive index of the material of the prism is **[MP PMT 1992; EAMCET 2001]**

(a) 1.5

(b) $\frac{3}{\sqrt{2}}$

(c) $\sqrt{2}$

(d) $\frac{4}{3}$



240 A ray passes through a prism of angle 60^o in minimum deviation position and suffers a deviation of 30^o. What is the angle of incidence on the prism **[MP PMT 1995; Pb PMT 2001]**

(a) 30^o (b) 45^o (c) 60^o (d) 90^o

241 If the refractive angles of two prisms made of crown glass are 10^o and 20^o respectively, then the ratio of their colour deviation powers will be **[KCET (Engg./Med.) 1999; AFMC 2001]**

(a) 1 : 1 (b) 2 : 1 (c) 4 : 1 (d) 1 : 2

242 When a glass prism of refracting angle 60^o is immersed in a liquid its angle of minimum deviation is 30^o. The critical angle of glass with respect to the liquid medium is **[EAMCET 2001]**

(a) 42° (b) 45° (c) 50° (d) 52°

243 Three prisms 1, 2 and 3 have the prism angle $A = 60^o$, but their refractive indices are respectively 1.4, 1.5 and 1.6 if $\delta_1, \delta_2, \delta_3$ be their respective angles of deviation then **[MP PMT 2001]**

(a) $\delta_3 > \delta_2 > \delta_1$ (b) $\delta_1 > \delta_2 > \delta_3$ (c) $\delta_1 = \delta_2 = \delta_3$ (d) $\delta_2 > \delta_1 > \delta_3$

244 Which one of the following alternative is FALSE for a prism placed in a position of minimum deviation **[MP PET 2001]**

(a) $i_1 = i_2$ (b) $r_1 = r_2$ (c) $i_1 = r_1$ (d) All of these

245 In the visible region the dispersive powers and the mean angular deviations for crown and flint glass prisms are ω, ω' and d, d' respectively. The condition for getting deviation without dispersion when the two prisms are combined is **[EAMCET 2001]**

(a) $\sqrt{\omega d} + \sqrt{\omega' d'} = 0$ (b) $\omega' d + \omega d' = 0$ (c) $\omega d + \omega' d' = 0$ (d) $(\omega d)^2 + (\omega' d')^2 = 0$

246 When white light enters a prism, it gets split into its constituent colours. This is due to **[DCE 2000]**

(a) High density of prism material (b) Because μ is different for different λ

(c) Diffraction of light (d) Velocity changes for different frequencies

247 The dispersive powers of crown and flint glasses are 0.02 and 0.04 respectively. In an achromatic combination of lenses the focal length of flint glass lens is 40 *cm*. The focal length of crown glass lens will be **[DCE 2000]**

(a) – 20 *cm* (b) + 20 *cm* (c) – 10 *cm* (d) + 10 *cm*

248 Consider the following statements

Assertion (A) : The refractive index of a prism depends only on the kind of glass of which it is made of and the colour of light

Reason (R) : The refractive index of a prism depends upon the refracting angle of the prism and the angle of minimum deviation

Of these statements **[AIIMS 2000]**

(a) Both A and R are true and the R is a correct explanation of the A

(b) Both A and R are true but the R is not a correct explanation of the A

(c) A is true but the R is false

(d) Both A and R are false

(e) A is false but the R is true

249 When a ray of light is incident normally on one refracting surface of an equilateral prism (Refractive index of the material of the prism = 1.5) **[EAMCET (Med.) 2000]**

(a) Emerging ray is deviated by 30°

(b) Emerging ray is deviated by 45°

(c) Emerging ray just grazes the second refracting surface

(d) The ray undergoes total internal reflection at the second refracting surface

250 Under minimum deviation condition in a prism, if a ray is incident at an angle 30°, the angle between the emergent ray and the second refracting surface of the prism is **[EAMCET (Engg.) 2000]**

(a) 0° (b) 30° (c) 45° (d) 60°

251 The angle of prism is 5° and its refractive indices for red and violet colours are 1.5 and 1.6 respectively. The angular dispersion produced by the prism is **[MP PMT 2000]**

(a) 7.75° (b) 5° (c) 0.5° (d) 0.17°

252 A prism of refracting angle 60° is made with a material of refractive index μ. For a certain wavelength of light, the angle of minimum deviation is 30°. For this wavelength the value of refractive index of the material is **[CPMT 199**

(a) 1.231 (b) 1.820 (c) 1.503 (d) 1.414

253 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

[MNR 1988; MP PMT 1999; Roorkee 2000; UPSEAT 2000]

(a) 45° (b) 39° (c) 20° (d) 30°

254 A parallel beam of monochromatic light is incident at one surface of a equilateral prism. Angle of incidence is 55° and angle of emergence is 46°. The angle of minimum deviation will be **[DPMT 1999]**

(a) Less then 41° (b) Equal to 41° (c) More one 41° (d) None of the above

255 The refracting angle of a prism A is small. The correct statement for the dispersive power of a prism is that dispersive power

[MP PET 1999]

(a) Depends upon the material of the prism (b) Depends upon both material and angle of prism

(c) Depends only upon refracting angle of prism (d) Is same for all colors of white light

256 If a thin prism of glass is dipped into water then minimum deviation (with respect to air) of light produced by prism will be left $\left({}_w\mu_g = \frac{3}{2} \text{ and } {}_a\mu_w = \frac{4}{3}\right)$ **[UPSEAT 1999]**

(a) $\frac{1}{2}$ (b) $\frac{1}{4}$ (c) 2 (d) $\frac{1}{5}$

257 The refractive index of the material of the prism for violet colour is 1.69 and that for red is 1.65. If the refractive index for mean colour is 1.66, the dispersive power of the material of the prism **[JIPMER 1999]**

(a) 0.66 (b) 0.06 (c) 0.65 (d) 0.69

258 The deviation caused red, yellow and violet colours for crown glass prism are 2.84°, 3.28° and 3.72° respectively. The dispersive power of prism material is **[KCET (Engg,) 1999]**

(a) 0.268 (b) 0.368 (c) 0.468 (d) 0.568

259 Dispersion of light is due to **[DCE 1999]**

(a) Wavelength (b) Intensity of light (c) Density of medium (d) None of these

260 If red light and violet light rays are of focal lengths f_R and f_V, then which of the following is true **[AFMC 1999]**

(a) $\lambda_R < \lambda_V$ (b) $\mu_R < \mu_V$ (c) $\mu_R > \mu_V$ (d) $\lambda_R \le \lambda_V$

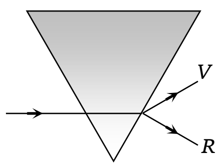
261 A thin prism P_1 of angle of prism 4° and refractive index 1.54 is combined with another thin prism P_2 of refractive index 1.72 for dispersion without deviation. The angle of prism of P_2 is **[MP PET 1999]**

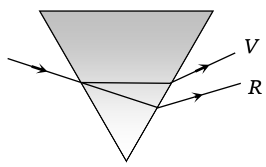
(a) 5.33° (b) 4° (c) 3° (d) 2.6°

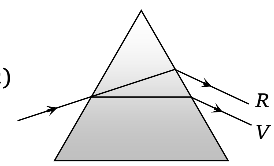
262 White light is passed through a prism whose angle is 5°. If the refractive indices for rays of red and blue colour are respectively 1.64 and 1.66 the angle of deviation between the two colours will be **[MP PET 1997]**

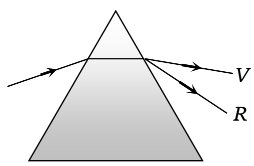
(a) 0.1 degree (b) 0.2 degree (c) 0.3 degree (d) 0.4 degree

263 Which of the following diagrams, shows correctly the dispersion of white light by a prism **[NSEP 1994; MP PET 1996]**

(a) 

(b) 

(c) 

(d) 

264 When light of wavelength λ is incident on an equilateral prism kept in its minimum deviation position, it is found that the angle of deviation equals the angle of the prism itself. The refractive index of the material of the prism for the wavelength λ is, then

[Haryana CEE 1996]

(a) $\sqrt{3}$ (b) $\frac{\sqrt{3}}{2}$ (c) 2 (d) $\sqrt{2}$

265 We use flint glass prism to disperse polychromatic light because light of different colours **[MP PET 1993]**

(a) Travel with same speed

(b) Travel with same speed but deviate differently due to the shape of the prism

(c) Have different anisotropic properties while travelling through the prism

(d) Travel with different speeds

266 Light rays from a source are incident on a glass prism of index of refraction μ and angle of prism α. At near normal incidence, the angle of deviation of the emerging rays is **[MP PMT 1993]**

(a) $(\mu-2)\alpha$ (b) $(\mu-1)\alpha$ (c) $(\mu+1)\alpha$ (d) $(\mu+2)\alpha$

267 The angle of minimum deviation measured with a prism is 30° and the angle of prism is 60°. The refractive index of prism material is

[MP PET 1990, 92]

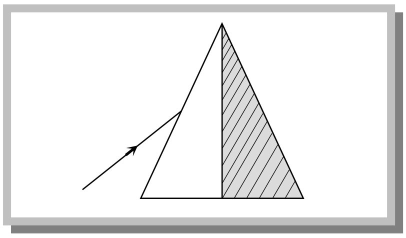
(a) $\sqrt{2}$ (b) 2 (c) 3/2 (d) 4/3

268 Dispersion can take place for **[MP PET 1992]**

(a) Transverse waves only but not for longitudinal waves (b) Longitudinal waves only but not for transverse waves

(c) Both transverse and longitudinal waves (d) Neither transverse nor longitudinal waves

269 A light ray is incident upon a prism in minimum deviation position and suffers a deviation of 34°. If the shaded half of the prism is knocked off, the ray will **[MP PMT 1992]**



(a) Suffer a deviation of 34°

(b) Suffer a deviation of 68°

(c) Suffer a deviation of 17°

(d) Not come out of the prism

270 A ray is incident at an angle of incidence i on one surface of a prism of small angle A and emerges normally from the opposite surface. If the refractive index of the material of the prism is μ, the angle of incidence i is nearly equal to **[CBSE PMT 1992]**

(a) A/μ (b) $A/2\mu$ (c) μA (d) $\mu A/2$

271 The minimum deviation produced by a hollow prism filled with a certain liquid is found to be 30°. The light ray is also found to be refracted at angle of 30°. The refractive index of the liquid is **[MP PET 1991]**

(a) $\sqrt{2}$ (b) $\sqrt{3}$ (c) $\sqrt{\frac{3}{2}}$ (d) $\frac{3}{2}$

272 The refractive indices of violet and red light are 1.54 and 1.52 respectively. If the angle of prism is 10°, then the angular dispersion is

[MP PMT 1990]

(a) 0.02 (b) 0.2 (c) 3.06 (d) 30.6

273 In a thin prism of glass (refractive index 1.5), which of the following relations between the angle of minimum deviations δ_m and angle of refraction r will be correct **[MP PMT 1990]**

(a) $\delta_m = r$ (b) $\delta_m = 1.5r$ (c) $\delta_m = 2r$ (d) $\delta_m = \frac{r}{2}$

274 A medium is said to be dispersive, if **[MP PMT 1990]**

(a) Light of different wavelengths propagate at different speeds

(b) Light of different wavelengths propagate at same speed but has different frequencies

(c) Light is gradually bent rather than sharply refracted at an interface between the medium and air

(d) Light is never totally internally reflected

275 A ray of light is incident at an angle of 60° on one face of a prism of angle 30°. The ray emerging out of the prism makes an angle of 30° with the incident ray. The emergent ray is **[EAMCET 1990; MP PMT 1990]**

(a) Normal to the face through which it emerges (b) Inclined at 30° to the face through which it emerges

(c) Inclined at 60° to the face through which it emerges (d) None of these

276 The respective angles of the flint and crown glass prisms are A' and A. They are to be used for dispersion without deviation, then the ratio of their angles A'/A will be **[MP PMT 1989]**

(a) $-\frac{(\mu_y - 1)}{(\mu_y' - 1)}$ (b) $\frac{(\mu_y' - 1)}{(\mu_y - 1)}$ (c) $(\mu_y' - 1)$ (d) $(\mu_y - 1)$

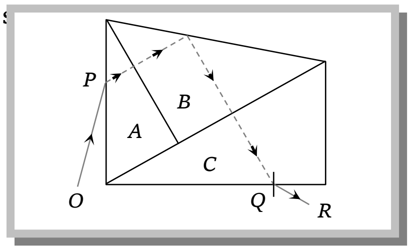
277 When white light passes through the achromatic combination of prisms, then what is observed **[MP PMT 1989]**

(a) Only deviation (b) Only dispersion (c) Deviation and dispersion (d) None of the above

278 The dispersion for a medium of wavelength λ is D, then the dispersion for the wavelength 2λ will be **[MP PET 1989]**

(a) $D/8$ (b) $D/4$ (c) $D/2$ (d) D

279 Three glass prisms *A, B* and *C* of same refractive index are placed in contact with each other as shown in figure with no air gap between the prisms. Monochromatic ray of light *OP* passes through the prism assembly and emerges as *QR*. The conditions of minimum deviation is s **[CPMT 1988]**



(a) *A* and *C*

(b) *B* and *C*

(c) *A* and *B*

(d) In all prisms *A, B* and *C*

280 Angle of minimum deviation for a prism of refractive index 1.5 is equal to the angle of prism. The angle of prism is (cos 41° = 0.75)

[MP PET/PMT 1988]

(a) 62° (b) 41° (c) 82° (d) 31°

281 A prism $(\mu = 1.5)$ has the refracting angle of 30°. The deviation of a monochromatic ray incident normally on its one surface will be (sin 48° 36' = 0.75) **[MP PET/PMT 1988]**

(a) 18° 36' (b) 20° 30' (c) 18° (d) 22° 1'

282 A prism of angle 60° produces a minimum deviation of 39° in a light of certain colour. The refractive index for the prism material is (sin 49.5° = 0.76) **[MP PET/PMT 1988]**

(a) 1.50 (b) 1.32 (c) 1.64 (d) 1.52

283 The critical angle between a equilateral prism and air is 42°. If the incident ray is perpendicular to the refracting surface, then

[MP PMT 1986]

(a) After deviation it will emerge from the second refracting surface

(b) It is totally reflected on the second surface and emerges out perpendicularly from third surface in air

(c) It is totally reflected from the second and third refracting surfaces and finally emerges out from the first surface

(d) It is totally reflected from all the three sides of prism and never emerges out

284 When light rays are incident on a prism at an angle of 45°, the minimum deviation is obtained. If refractive index of the material of prism is $\sqrt{2}$, then the angle of prism will be **[MP PMT 1986]**

(a) 30° (b) 40° (c) 50° (d) 60°

285 A convex lens, a glass slab, a glass prism and a solid sphere all are made of the same glass, the dispersive power will be **[CPMT 1986]**

(a) In the glass slab and prism (b) In the lens solid sphere (c) Only in prism (d)

286 A ray of monochromatic light is incident on one refracting face of a prism of angle 75°. It passes through the prism and is incident on the other face at the critical angle. If the refractive index of the material of the prism is $\sqrt{2}$. The angle of incidence on the first face of the prism is **[EAMCET 1983]**

(a) 30° (b) 45° (c) 60° (d) 0°

Advance Level

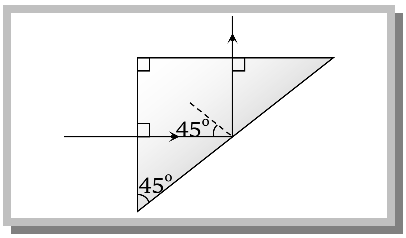
287 A light ray is incident perpendicular to one face of a 90° prism and is totally internally reflected at the glass air interface. If the angle of reflection is 45°,we conclude that the refractive index n **[AIEEE 2004]**

(a) $n < \frac{1}{\sqrt{2}}$

(b) $n > \sqrt{2}$

(c) $n > \frac{1}{\sqrt{2}}$

(d) $n < \sqrt{2}$

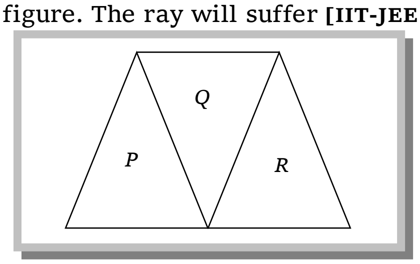


288 A prism of refractive index μ and angle A is placed in the minimum deviation position. If the angle of minimum deviation is A, then the value of A in terms of μ is **[EAMCET 2003]**

(a) $\sin^{-1}\left(\frac{\mu}{2}\right)$ (b) $\sin^{-1}\sqrt{\frac{\mu-1}{2}}$ (c) $2\cos^{-1}\left(\frac{\mu}{2}\right)$ (d) $\cos^{-1}\left(\frac{\mu}{2}\right)$

289 A given ray of light suffers minimum deviation in an equilateral prism P. Additional prisms Q and R of identical shape and material are now added to P as shown in the figure. The ray will suffer **[IIT-JEE (Screening) 2001; KCET 2003]**

(a) Greater deviation

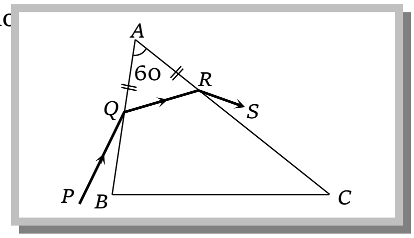


(b) Same deviation

(c) No deviation

(d) Total internal reflection

290 A ray PQ incident on the refracting face BA is refracted in the prism BAC as shown in the figure and emerges from the other refracting face AC as RS such that $AQ = AR$. If the angle of prism $A = 60^o$ and the refractive index of the material of prism is $\sqrt{3}$, then the angle of deviatic **[UPSEAT 2002]**



(a) 60^o

(b) 45^o

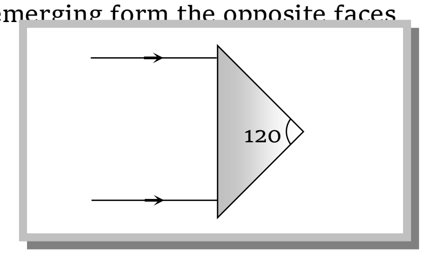
(c) 30^o

(d) None of these

291 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. Refractive index of the material of prism is **[AIIMS 1995]**

(a) $2\sin A$ (b) $2\cos A$ (c) $\frac{1}{2}\cos A$ (d) $\tan A$

292 An isosceles prism of angle 120^o has a refractive index of 1.44. Two parallel monochromatic rays enter the prism parallel to each other in air as shown. The rays emerging form the opposite faces **[IIT-JEE 1995]**



(a) Are parallel to each other

(b) Are diverging

(c) Make an angle $2\sin^{-1}(0.72)$ with each other

(d) Make an angle $2\sin^{-1}(0.72) - 30^o$ with each other

Defects of Images and Spectrum

293 The dark lines of solar spectrum are known as **[MP PMT 2004]**

(a) Planck's lines (b) Kepler's lines (c) Fraunhofer's lines (d) Black lines

294 Colour of the sky is blue due to **[AFMC 1993; CPMT 1996, 99; AIIMS 1999; AIEEE 2002; BCECE 2003]**

(a) Scattering of light (b) Total internal reflection (c) Total emission (d) None of the above

295 In the formation of a rainbow light from the sun on water droplets undergoes **[CBSE PMT 2000; Orissa JEE 2002; MP P**

(a) Dispersion only (b) Only total internal reflection

(c) Dispersion and total internal reflection (d) None of these

296 The solar spectrum during a complete solar eclipse is **[Kerala PET 2002]**

(a) Continuous (b) Emission line (c) Dark line (d) Dark band

297 Fraunhofer spectrum is a **[KCET 1993, 94; JIPMER 2000; AIIMS 2001]**

(a) Line absorption spectrum (b) Band absorption spectrum (c) Line emission spectrum (d) Band emission spectrum

298 The nature of sun's spectrum is **[MP PET 2000; MP PMT 2001]**

(a) Continuous spectrum with absorption lines (b) Line spectrum
(c) The spectrum of the helium atom (d) Band spectrum

299 The spectrum obtained from an electric lamp is **[BHU 2001]**
(a) Line spectrum (b) Band spectrum (c) Absorption spectrum (d) Continuous spectrum

300 Which radiation in sunlight, causes heating effect **[AFMC 2001]**
(a) Ultraviolet (b) Infrared (c) Visible light (d) All of these

301 Consider the following statements
Assertion (A) : Blue colour of sky appears due to scattering of blue colour
Reason (R) : Blue colour has shortest wavelength in visible spectrum
Of these statements **[AIIMS 2001]**
(a) Both A and R true and the R is a correct explanation of the A
(b) Both A and R true and the R is not a correct explanation of the A
(c) A is true but the R is false
(d) Both A and R are false
(e) A is false but the R is true

302 Which of the prism is used to see infrared spectrum of light **[RPMT 2000]**
(a) Rock Salt (b) Nicol (c) Flint (d) Crown

303 Consider the following two statements A and B and identify the correct choice in the given answers **[EAMCET (Engg.) 2**
A : Line spectra is due to atoms in gaseous state
B : Band spectra is due to molecules
(a) Both A and B are false (b) A is true and B is false (c) A is false and B is true (d) Both A and B are true

304 A real image of a distant object is formed by a plano-convex lens on its principal axis. Spherical aberration **[IIT-JJE 19**
(a) Is absent (b) Is smaller if the curved surface of the lens faces the object
(c) Is smaller if the plane surface of the lens faces the object (d) Is the same whichever side of the lens faces the object

305 From which source a continuous emission spectrum and a line absorption spectrum are simultaneously obtained **[MP PMT 1997]**
(a) Bunsen burner flame (b) The sun
(c) Tube light (d) Hot filament of an electric bulb

306 A white screen illuminated by green and red light appears to be **[KCET 1994; RPMT 1997]**
(a) Green (b) Red (c) Yellow (d) White

307 Stars are not visible in the day time because **[JIPMER 1997]**
(a) Stars hide behind the sun
(b) Stars do not reflect sun-rays during day
(c) Stars vanish during the day
(d) Atmosphere scatters sunlight into a blanket of extreme brightness through which faint stars cannot be visible

308 A neon sign does not produce **[MP PET 1996]**
(a) Line spectrum (b) An emission spectrum (c) An absorption spectrum (d) Photons

309 Which of the following spectrum have all the frequencies from high to low frequency range **[CPMT 1996]**

(a) Band spectrum (b) Continuous spectrum (c) Line spectrum (d) Discontinuous spectrum

310 The light from a sodium vapour lamp passes through a single narrow slit and then through two close parallel narrow slits. The single slit lies on the perpendicular bisector of the line joining the two close parallel slits. An observer looking towards the lamp through the double slit will see **[Manipal MEE 1995]**

(a) A continuous yellow band (b) A continuous black band

(c) Alternate black and yellow bands (d) A coloured spectrum

311 Missing lines in a continuous spectrum reveal **[MP PET 1995]**

(a) Defects of the observing instrument

(b) Absence of some elements in the light source

(c) Presence in the light source of hot vapours of some elements

(d) Presence of cool vapours of some elements around the light source

312 A source emits light of wavelength 4700 Å, 5400 Å and 6500 Å. The light passes through red glass before being tested by a spectrometer. Which wavelength is seen in the spectrum **[MP PMT 1995]**

(a) 6500 Å (b) 5400 Å (c) 4700 Å (d) All the above

313 Dark lines on solar spectrum are due to **[EAMCET (Engg.) 1995]**

(a) Lack of certain elements (b) Black body radiation

(c) Absorption of certain wavelengths by outer layers (d) Scattering

314 When seen in green light, the saffron and green portions of our National Flag will appear to be **[Manipal MEE 1995]**

(a) Black (b) Black and green respectively

(c) Green (d) Green and yellow respectively

315 Chromatic aberration in the formation of images by a lens arises because **[CPMT 1994]**

(a) Of non-paraxial rays (b) The radii of curvature of the two sides are not same

(c) Of the defect in grinding (d) The focal length varies with wavelength

316 Spherical aberration in a thin lens can be reduced by **[IIT-JEE 1994]**

(a) Using monochromatic light (b) Using a doublet combination

(c) Using a circular annular mask over the lens (d) Increasing the size of lens

317 Band spectrum is obtained when the source emitting light is in the form of

or

Band spectrum is characteristic of **[CPMT 1988; MP PET 1994]**

(a) Atoms (b) Molecules (c) Plasma (d) None of the above

318 An achromatic combination of lenses produces **[KCET 1993]**

(a) Images in black and white

(b) Coloured images

(c) Images unaffected by variation of refractive index with wavelength

(d) Highly enlarged images

319 The band spectrum (characteristic of molecular species) is due to emission of radiation **[CPMT 1982, 92]**

(a) Gaseous state (b) Liquid state (c) Solid state (d) All of three states

320 When light emitted by a white hot solid is passed through a sodium flame, the spectrum of the emergent light will show **[MP PMT 1992]**

(a) The D_1 and D_2 bright yellow lines of sodium (b) Two dark lines in the yellow region

(c) All colours from violet to red (d) No colours at all

321 What will be the colour of sky as seen from the earth, if there were no atmosphere **[MP PMT 1992]**

(a) Black (b) Blue (c) Orange (d) Red

322 At the time of total solar eclipse, the spectrum of solar radiation would be **[MP PMT 1990]**

(a) A large number of dark Fraunhofer lines (b) A less number of dark Fraunhofer lines

(c) No lines at all (d) All Fraunhofer lines changed into brilliant colours

323 The dispersive powers of the materials of the two lenses are in the ratio 4 : 3. If the achromatic combination of these two lenses in contact is a convex lens of focal length 60 *cm* then the focal lengths of the component lenses are **[CPMT 1989]**

(a) – 20 *cm* and 25 *cm* (b) 20 *cm* and – 25 *cm* (c) – 15 *cm* and 40 *cm* (d) 15 *cm* and – 20 *cm*

324 The number of wavelengths in the visible spectrum **[MP PMT 1989]**

(a) 4000 (b) 6000 (c) 2000 (d) Infinite

325 Light coming from a commercial lighted mercury fluorescent tube consists of **[CPMT 1986, 88]**

(a) Emission lines of mercury only (b) Emission lines of mercury with a continuous background

(c) Emission lines of mercury atoms with few bands of Hg_2 (d) Emission lines of mercury and those of electrode material

326 An incandescent electric lamp gives a spectrum consisting of **[NCERT 1982; CPMT 1984]**

(a) Sharp lines (b) Bands (c) A continuum (d) Diffused lines

327 Objects are visible in light due to **[CPMT 1983]**

(a) Scattering (b) Refraction (c) Absorption (d) Fluorescence

328 In the formation of primary rainbow, the sunlight rays emerge at minimum deviation from rain-drop after **[MP PET 1**

(a) One internal reflection and one refraction (b) One internal reflection and two refractions

(c) Two internal reflections and one refraction (d) Two internal reflections and two refractions

329 Chromatic aberration will be absent if for two thin lenses in contact **[CPMT 1984]**

(a) $(\omega_1 / F_1)+(\omega_2 / F_2)=0$ (b) $(\omega_1 / F_2)+(\omega_2 / F_1)=0$ (c) $(F_1 / \omega_2)+(F_2 / \omega_1)=0$ (d) $(\omega_1+\omega_2)+(F_1+F_2)=0$

330 Chromatic aberration of a lens can be corrected by **[CPMT 1983]**

(a) Providing different suitable curvatures of its two surfaces (b) Proper polishing of its two surfaces

(c) Suitably combining it with another lens (d) Reducing its aperture

331 An achromatic telescope objective is to be made by combining the lenses of flint and crown glass. The proper choice is **[CPMT 1977]**

(a) Convergent of crown, divergent of flint (b) Divergent of crown, convergent of flint

(c) Both divergent (d) Both convergent

332 Two lenses of focal length +10 *cm* and – 15 *cm* when put in contact behave like a convex lens. They will have zero longitudinal chromatic aberration if their dispersive powers are in the ratio **[CPMT 1976]**

(a) +3/2 (b) +2/3 (c) – 3/2 (d) – 2/3

333 In a room containing smoke particles the intensity due to source of light will **[CPMT 1971; NCERT 1972]**

(a) Obey the law of inverse-square

(b) Fall off faster with distance from the source than inverse-square law

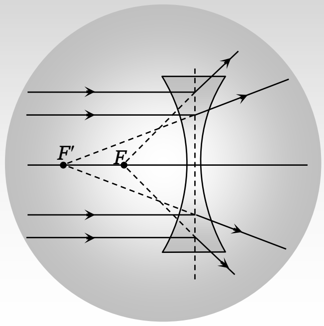
(c) Increase faster with distance from the source than the inverse-square law

(d) Remain constant at all distances

334 One cannot see through fog because **[CPMT 1971]**

(a) Fog absorbs light (b) Light is scattered by the droplets in fog

(c) Light suffers total reflection at the droplets in fog (d) The refractive index of fog is infinity



Answer Sheet

Assignments

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
c	b	a	b	c	d	c	d	d	c	b	b	c	c	b	a	a	c	c	d
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
a	b	b	b	a	b	d	c	a	c	b	a	b	b	b	b	d	a	b	a
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
d	b	c	a	b	a	b	b	a	c	c	a	b	d	a	b	a	b	b	b
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
c	a, c	a	d	d	a	d	a	c	a	d	a	a	c	d	d	c	d	b	a
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
a	c	c	d	c	c	c	d	a	c	d	c	a	c	c, d	a	b	a	b	a
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
d	c	b	b	c	d	a	b	d	d	c	c	c	d	c	c	a	a	d	c
121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140
a	c	a	d	b	c	c	d	a	a	c	a	a	d	a	a	a	c	b	b
141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160
a,d	c	b	a	b	a	b	d	d	c	b	a	c	d	a	b	c	a	c	c
161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
b,c	a	a	a	c	a	c	a	c	b, c	c	c	d	b	b	c	c	d	b	c
181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
a	c	a	c	d	d	c	b	b	b	d	d	b	c	a	d	b	c	d	d
201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220
c	c	d	d	b	c	d	d	c	a	b	d	d	a	c	d	a	d	a, c	b
221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240
a	b	a	a	b	a	c	c	a	b	d	a	a	c	a	d	b	c	c	b
241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260
d	b	a	c	c	b	a	c	d	d	c	d	d	a	a	b	b	a	a	b
261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280
c	a	b	a	c	b	a	a	c	c	a	b	a	a	a	a	a	a	c	c
281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
a	d	b	d	d	b	b	c	b	a	b	d	c	a	c	a	a	a	d	b
301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320
a	a	d	b	b	c	d	c	b	c	d	a	c	b	d	c	b	c	a	b
321	322	323	324	325	326	327	328	329	330	331	332	333	334						
a	d	d	d	b	c	a	b	a	c	a	b	b	b						