Ray Optics & Optical Instrument

Q.No.1:
Diameter of a plano-convex lens is 6 cm and thickness at the centre is 3 mm. If speed of light in material of lens is 2×10^8 m/s, the focal length of the lens is:

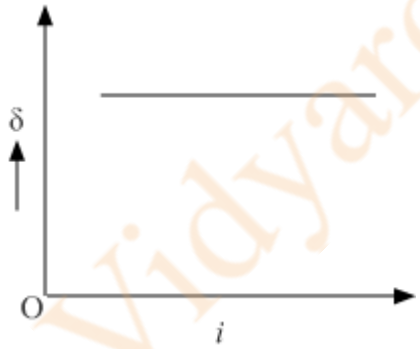
JEE 2013

A. 15 cm
B. 20 cm
C. 30 cm
D. 10 cm

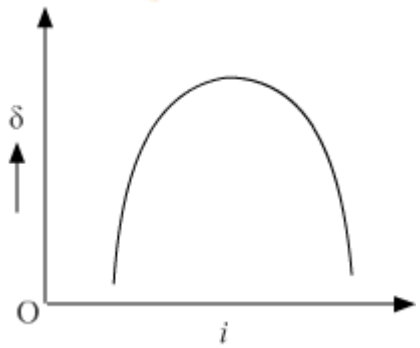
Q.No.2:
The graph between angle of deviation (δ) and angle of incidence (i) for a triangular prism is represented by:

JEE 2013

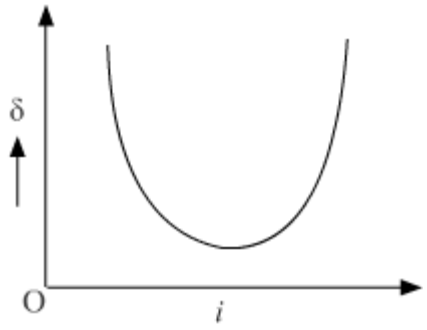
A.



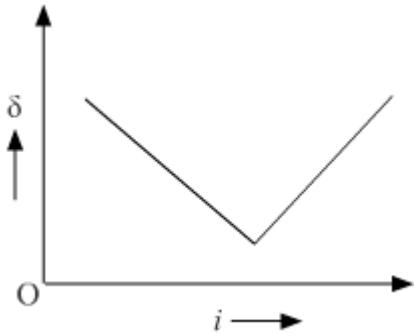
B.



C.



D.



Q.No.3: A thin convex lens made from crown glass $\left(\mu = \frac{3}{2}\right)$ has focal length *f*. When it is measured in two different liquids of refractive indices $\frac{4}{3}$ and $\frac{5}{3}$, it has focal lengths f_1 and f_2, respectively. The correct relation between the focal lengths is

A. $f_2 > f$ and f_1 becomes negative

B. f_1 and f_2 become negative

C. $f_1 = f_2 < f$

D. $f_1 > f$ and f_2 becomes negative

Q.No.4: A green light is incident from water on the air - water interface at critical angle (θ). Select the **correct** statement.

A. The spectrum of visible light whose frequency is more than that of green light will come out to the air medium.

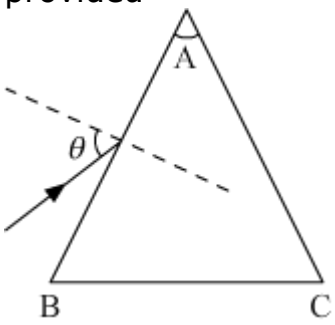
B. The entire spectrum of visible light will come out of water at various angles to the normal.

C. The entire spectrum of visible light will come out of water at an angle of 90° to the normal.

D. The spectrum of visible light whose frequency is less than that of green light will come out to the air medium.

Q.No.5: Monochromatic light is incident on a glass prism of angle *A*. If the refractive index of the material of the prism is μ, then a ray, incident at an angle θ on the face AB, would get transmitted through the face AC of the prism provided

JEE 2015



A. $\theta > \sin^{-1}\left[\mu \sin\left(A - \sin^{-1}\left(\frac{1}{\mu}\right)\right)\right]$

B. $\theta < \sin^{-1}\left[\mu \sin\left(A - \sin^{-1}\left(\frac{1}{\mu}\right)\right)\right]$

C. $\theta > \cos^{-1}\left[\mu \sin\left(A + \sin^{-1}\left(\frac{1}{\mu}\right)\right)\right]$

D. $\theta < \cos^{-1}\left[\mu \sin\left(\mathrm{A} + \sin^{-1}\left(\frac{1}{\mu}\right)\right)\right]$

Q.No.6: An observer looks at a distant tree of height 10 m with a telescope of magnifying power of 20. To the observer the tree appears: **JEE 2016**

A. 10 times nearer

B. 20 times taller

C. 20 times nearer

D. 10 times taller.

Q.No.7: A diverging lens with magnitude of focal length 25 cm is placed at a distance of 15 cm from a converging lens of magnitude of focal length 20 cm. A beam of parallel light falls on the diverging lens. The final image formed is:

JEE 2017

A. real and at a distance of 6 cm from the convergent lens

B. real and at a distance of 40 cm from convergent lens

C. virtual and at a distance of 40 cm from convergent lens

D. real and at distance of 40 cm from the divergent lens

Q.No.8: A convex lens is put 10 cm from a light source and it makes a sharp image on a screen, kept 10 cm from the lens. Now a glass block (refractive

index 1.5) of 1.5 cm thickness is placed in contact with the light source. To get the sharp image again, the scree is shifted by a distance d. Then d is: **JEE 2019**

A. 1.1 cm away from the lens

B. 0

C. 0.55 cm towards the lens

D. 0.55 cm away from the lens

Q.No.9: Two plane mirrors are inclined to each other such that a ray of light incident on the first mirror (M_1) and parallel to the second mirror (M_2) is finally reflected from the second mirror (M_2) parallel to the first mirror (M_1). The angle between the two mirrors will be: **JEE 2019**

A. 45°

B. 60°

C. 75°

D. 90°

Q.No.10: A plano convex lens of refractive index μ_1 and focal length f_1 is kept in contact with another plano concave lens of refractive index μ_2 and focal length f_2. If the radius of curvature of their spherical faces is R each and $f_1 = 2f_2$, then μ_1 and μ_2 are related as: **JEE 2019**

A. $\mu_1 + \mu_2 = 3$

B. $2\mu_1 - \mu_2 = 1$

C. $3\mu_2 - 2\mu_1 = 1$

D. $2\mu_2 - \mu_1 = 1$