

JEE Advanced Questions Based on Most Repeated Concepts of Optics

Q: On a hot summer night, the refractive index of air is smallest near the ground and increases with a height from the ground. When a light beam is directed horizontally, Huygen's principle leads us to conclude that as it travels, the light beam:

Q: A biconvex lens of focal length 15 cm is in front of a plane mirror. The distance between the lens and the mirror is 10 cm. A small object is kept at a distance of 30 cm from the lens. The final image is

Q: In an interference experiment the ratio of the amplitude of coherent waves is $(a_1/a_2) = 1/3$. The ratio of maximum and minimum intensities of fringes will be:

Q: Two coherent sources produce waves of different intensities which interfere. After interference, the ratio of the maximum intensity to the intensity is 16. The intensity of the waves are in the ratio:

Q: The image of an object, formed by a plano-convex lens at a distance of 8 m behind the lens, is real and is one-third the size of the object. The wavelength of light inside the lens is $2/3$ times the wavelength in free space. The radius of the curved surface of the lens is:

Q: A ball is dropped from a height of 20 m above the surface of the water in a lake. The refractive index of water is $4/3$. A fish inside the lake, in the line of fall of the ball, is looking at the ball. At an instant, when the ball is 12.8 m above the water surface, the fish sees the speed of the ball as $g = 10\text{m/s}^2$.

Q:) In Young's double-slit experiment, the separation between the slits is 0.15 mm. In the experiment, a source of light of wavelength 589 nm is used and the interference pattern is observed on a screen kept 1.5 m away. The separation between the successive bright fringes on the screen is

Q: A ray OP of monochromatic light is incident on the face AB of prism ABCD near vertex B at an incident angle of 60° . If the refractive index of the material of the prism is $\sqrt{3}$, which of the following is (are) correct?

Q: The focal length of a thin biconvex lens is 20 cm. When an object is moved from a distance of 25 cm in front of it to 50 cm, the magnification of its image changes from m_{25} to m_{50} . The ratio

Q: A student performed the experiment of determining the focal length of a concave mirror by the u-v method using an optical bench of length 1.5 m. The focal length of the mirror used is 24 cm. The maximum error in the location of the image can be 0.2 cm. The 5 sets of (u, v) values

recorded by the student (in cm) are : (42, 56), (48, 48), (60, 40), (66, 33), (78, 39). The data set(s) that cannot come from the experiment and is (are) incorrectly recorded, is (are) :

Q: In a Young's double slit experiment, 16 fringes are observed in a certain segment of the screen when light of wavelength 700 nm is used. If the wavelength of light is changed to 400 nm, the number of fringes observed in the same segment of the screen would be:

Q: A large glass slab $\mu = 5/3$ of thickness 8 cm is placed over a point source of light on a plane surface. It is seen that light emerges out of the top surface of the slab from a circular area of radius R cm. What is the value of R?

Q: Two coherent monochromatic light beams of intensities I and 4I are superposed. The maximum and minimum possible intensities in the resulting beam are

Q: In Young's double slit experiment, light of 500 nm is used to produce an interference pattern. When the distance between the slits is 0.05 mm, the angular width (in degree) of the fringes formed on the distance screen is close to:

Q:) In a double-slit experiment, when a thin film of thickness t having a refractive index μ is introduced in front of one of the slits, the maximum at the centre of the fringe pattern shifts by one fringe width. The value of t is ($\approx$ is the wavelength of the light used)