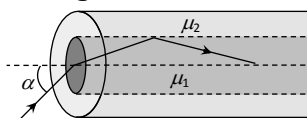


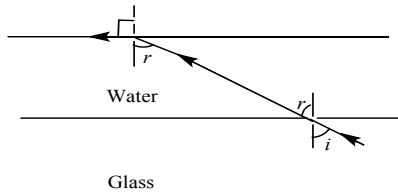
Topic :- RAY OPTICS AND OPTICAL INSTRUMENTS

- Light takes 8 min 20 s to reach from sun on the earth. If the whole atmosphere is filled with water, the light will take the time (${}_a\mu_w = 4/3$)
 - 8 min 20 s
 - 8 min
 - 6 min 11 s
 - 11 min 6 s
- The wavelength of a certain colour in air is 600 nm. What is the wavelength and speed of this colour in glass of refractive index 1.5?
 - 500 nm and $2 \times 10^{10} \text{cms}^{-1}$
 - 400 nm and $2 \times 10^8 \text{ms}^{-1}$
 - 300 nm and $3 \times 10^9 \text{cms}^{-1}$
 - 700 nm and $1.5 \times 10^9 \text{ms}^{-1}$
- The combination of a convex lens ($f = 18 \text{ cm}$) and a thin concave lens ($f = 9 \text{ cm}$) is
 - A concave lens ($f = 18 \text{ cm}$)
 - A convex lens ($f = 18 \text{ cm}$)
 - A convex lens ($f = 6 \text{ cm}$)
 - A concave lens ($f = 6 \text{ cm}$)
- 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
 - 0°
 - 30°
 - 45°
 - 60°
- A normally incident ray reflected at an angle of 90° . The value of critical angle is
 - 45°
 - 90°
 - 65°
 - 43.2°
- Red colour is used for danger signals because
 - It causes fear
 - It undergoes least scattering
 - It undergoes maximum scattering
 - It is in accordance with international convention
- A convex mirror and a concave mirror has radii of curvature 10 cm each are placed 15 cm apart facing each other. An object is placed midway between them. If the reflection first takes place in the concave mirror and then in convex mirror, the position of the final image is
 - on the pole of the convex mirror
 - on the pole of the concave mirror
 - at a distance of 10 cm from convex mirror
 - at a distance of 5 cm from concave mirror
- 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



- $\cos^{-1} \sqrt{\mu_2^2 - \mu_1^2}$
- $\sin^{-1} \sqrt{\mu_1^2 - \mu_2^2}$
- $\tan^{-1} \sqrt{\mu_1^2 - \mu_2^2}$
- $\sec^{-1} \sqrt{\mu_1^2 - \mu_2^2}$

9. The sun (diameter d) subtends an angle θ radian at the pole of a concave mirror of focal length f . The diameter of the image of sun formed by mirror is
 a) θf b) $\frac{\theta}{2} f$ c) $2\theta f$ d) $\frac{\theta}{\pi} f$
10. The diameter of the objective of the telescope is 0.1 metre and wavelength of light is 6000 \AA . Its resolving power would be approximately
 a) $7.32 \times 10^{-6} \text{ rad}$ b) $1.36 \times 10^6 \text{ rad}$ c) $7.32 \times 10^{-5} \text{ rad}$ d) $1.36 \times 10^5 \text{ rad}$
11. A ray of light is incident at the glass-water interface at an angle i it emerges finally parallel to the surface of water, then the value of μ_g would be



- a) $(4/3) \sin i$ b) $1/\sin i$ c) $4/3$ d) 1
12. Angle of deviation (δ) by a prism (refractive index $= \mu$ and supposing the angle of prism A to be small) can be given by

- a) $\delta = (\mu - 1)A$ b) $\delta = (\mu + 1)A$ c) $\delta = \frac{\sin \frac{A + \delta}{2}}{\sin \frac{A}{2}}$ d) $\delta = \frac{\mu - 1}{\mu + 1} A$

13. A compound microscope is used to enlarge an object kept at a distance 0.03 m from its objective which consists of several convex lenses in contact and has focal length 0.02 m . If a lens of focal length 0.1 m is removed from the objective, then by what distance the eye-piece of the microscope must be moved to refocus the image

- a) 2.5 cm b) 6 cm c) 15 cm d) 9 cm

14. A cut diamond sparkles because of its

- a) Hardness b) High refractive index
 c) Emission of light by the diamond d) Absorption of light by the diamond

15. In an optics experiments, with the position of the object fixed, a student varies the position of a convex lens and for each position, the screen is adjusted to get a clear image of the object. A graph between the object distance u and the image distance v , from the lens, is plotted using the same scale for the two axes. A straight line passing through the origin and making an angle of 45° with the x -axis meets the experimental curve at P . The coordinates of P will be

- a) $(2f, 2f)$ b) $\left(\frac{f}{2}, \frac{f}{2}\right)$ c) (f, f) d) $(4f, 4f)$

16. A compound microscope has an eyepiece of focal length 10 cm and an objective of focal length 4 cm . Calculate the magnification, if an object is kept at a distance of 5 cm from the objective, so that final image is formed at the least distance of distinct vision 20 cm .

- a) 12 b) 11 c) 10 d) 13

17. A lamp is hanging at a height of 4 m above a table. The lamp is lowered by 1 m . The percentage increase in illuminance will be

- a) 40% b) 64% c) 78% d) 92%

48. A person who can see things most clearly at a distance of 10 cm. Requires spectacles to enable to him to see clearly things at a distance of 30 cm. What should be the focal length of the spectacles
- a) 15 cm (Concave) b) 15 cm (Convex) c) 10 cm d) 0
19. The spectrum of an oil flame is an example for
- a) Line emission spectrum b) Continuous emission spectrum
c) Line absorption spectrum d) Band emission spectrum
20. A biconvex lens of focal length f forms a circular image of radius r of sun in focal plane. Then which option is correct?
- a) $\pi r^2 \propto f$
b) $\pi r^2 \propto f^2$
c) If lower half part is covered by black sheet, then area of the image is equal to $\pi r^2 / 2$
d) If f is doubled, intensity will increase

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