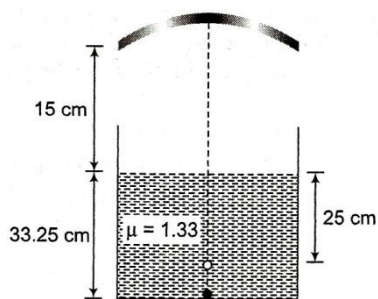
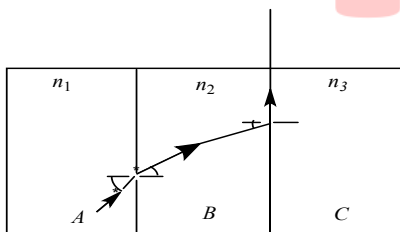


Topic :- RAY OPTICS AND OPTICAL INSTRUMENTS

1. A container is filled with water ($\mu = 1.33$) up to a height of 33.25 cm. A concave mirror is placed 15 cm above the water level and the image of an object placed at the bottom is formed 25 cm below the water level. The focal length of the mirror is



- a) 10 cm b) 15 cm c) 20 cm d) 25 cm
2. *A, B* and *C* are the parallel sided transparent media of refractive indices n_1, n_2 and n_3 respectively. They are arranged as shown in the figure. A ray is incident at an angle i on the surface of separation of *A* and *B* which is as shown in the figure. After the refraction into the medium *B*, the ray grazes the surface of separation of the media *B* and *C*. Then, $\sin i$ equal to



- a) $\frac{n_3}{n_1}$ b) $\frac{n_1}{n_3}$ c) $\frac{n_2}{n_3}$ d) $\frac{n_1}{n_2}$
3. An object is placed 30 cm to the left of a diverging lens whose focal length is of magnitude 20 cm. Which one of the following correctly states the nature and position of the virtual image formed?
- | Nature of image | Distance from lens | | |
|-----------------------|----------------------|-----------------------|----------------------|
| a) Inverted, enlarged | b) Erect, diminished | c) Inverted, enlarged | d) Erect, diminished |
| 60 cm to the right | 12 cm to the left | 60 cm to the left | 12 cm to the right |
4. The focal lengths of the objective and the eye piece of telescope are 100 cm and 10 cm respectively. The magnification of the telescope when final image is formed at infinity is
- a) 0.1 b) 10 c) 100 d) ∞

5. Chromatic aberration of lens can be corrected by
 - a) Reducing its aperture
 - b) Proper polishing of its two surfaces
 - c) Suitably combining it with another lens
 - d) Providing different suitable curvature to its two surfaces
6. A person using a lens as a simple microscope sees an
 - a) Inverted virtual image
 - b) Inverted real magnified image
 - c) Upright virtual image
 - d) Upright real magnified image
7. In order to obtain a real image of magnification 2 using a converging lens of focal length 20 cm, where should an object be placed
 - a) 50 cm
 - b) 30 cm
 - c) -50 cm
 - d) -30 cm
8. A biconvex lens form 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
 - a) Disappear
 - b) Remain as real image still
 - c) Be virtual and of the same size as the object
 - d) Suffer from aberrations
9. An object 1 cm tall is placed 4 cm in front of a mirror. In order to produce an upright image of 3 cm height one needs a
 - a) Convex mirror of radius of curvature 12 cm
 - b) Concave mirror of radius of curvature 12 cm
 - c) Concave mirror of radius of curvature 4 cm
 - d) Plane mirror of height 12 cm
10. A man runs towards mirror at a speed of 15 m/s. What is the speed of his image
 - a) 7.5 m/s
 - b) 15 m/s
 - c) 30 m/s
 - d) 45 m/s
11. 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 focused 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) $\frac{d-b}{a+b-c-d}$
12. In absorption spectrum of Na the missing wavelength (λ) are
 - a) 589 nm
 - b) 589.6 nm
 - c) Both
 - d) None of these
13. The optical path a monochromatic light is same if it goes through 4.0 cm of glass of 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
14. A square card of side length 1 mm is being seen through a magnifying lens of focal length 10 cm. The card is placed at a distance of 9 cm from the lens. The apparent area of the card through the lens is
 - a) 1 cm²
 - b) 0.81 cm²
 - c) 0.27 cm²
 - d) 0.60 cm²

15. The focal length of objective and eye-piece of a microscope are 1 cm and 5 cm respectively. If the magnifying power for relaxed eye is 45, then length of the tube is
 a) 9 cm b) 15 cm c) 12 cm d) 6 cm
16. Two plane mirrors are inclined to each other at an angle θ . A ray of light is reflected first at one mirror and then at the other. The total deviation of the ray is
 a) 2θ b) $240^\circ - 2\theta$ c) $360^\circ - 2\theta$ d) $180^\circ - \theta$
17. How should people wearing spectacles work with a microscope
 a) They cannot use the microscope at all
 b) They should keep on wearing their spectacles
 c) They should take off spectacles
 d) (b) and (c) is both way
18. Two thin lenses of focal lengths f_1 and f_2 are placed in contact with each other. The focal length of the combination is
 a) $\frac{f_1 + f_2}{2}$ b) $\sqrt{f_1 f_2}$ c) $\frac{f_1 f_2}{f_1 + f_2}$ d) $\frac{f_1 f_2}{f_1 - f_2}$
19. In an astronomical telescope in normal adjustment, a straight black line of length L is drawn on the objective lens. The eyepiece forms a real image of this line. The length of this image is l . The magnification of the telescope is
 a) $\frac{L}{l}$ b) $\frac{L}{l} + 1$ c) $\frac{L}{l} - 1$ d) $\frac{L + l}{L - l}$
20. An object 15 cm high is placed 10 cm from the optical centre of a thin lens. Its image is formed 25 cm from the optical centre on the same side of the lens as the object. The height of the image is
 a) 2.5 cm b) 0.2 cm c) 16.7 cm d) 37.5 cm