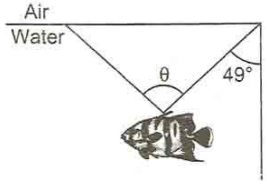
DPP
DAILY PRACTICE PROBLEMS

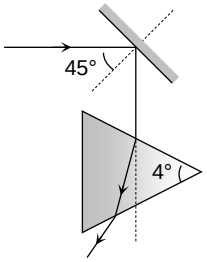
Class : XIIth **Subject : PHYSICS**
Date : **DPP No. : 3**

Topic :- RAY OPTICS AND OPTICAL INSTRUMENTS

1. The two surfaces of a biconvex lens has same radii of curvatures. This lens is made of glass of refractive index 1.5 and has a focal length 10 cm in air. The lens is cut into two equal halves along a plane perpendicular to its principle axis to yield two plano-convex lenses. The two pieces are glued such that the convex surfaces touch each other. If this combination lens is immersed in water (refractive index $= 4/3$), its focal length (in cm) is
   a) 5 b) 10 c) 20 d) 40
2. A fish is a little away below the surface of a lake. If the critical angle is 49° , then the fish could see things above water surface within an angular range of θ° where

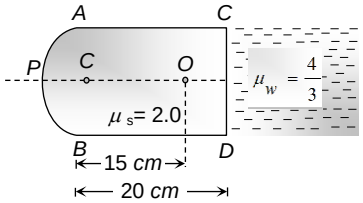


   a) $\theta = 49°$ b) $\theta = 98°$ c) $\theta = 24\frac{1}{4}°$ d) $\theta = 90°$
3. A thin equiconvex lens of refractive index 3/2 and radius of curvature 30 m is put in water (refractive index $=\frac{4}{3}$). Its focal length is
   a) 0.15 m b) 0.30 m c) 0.45 m d) 1.20 m
4. A concave mirror of focal length 15 cm forms an image having twice the linear dimensions of the object. The position of the object when the image is virtual will be
   a) 22.5 cm b) 7.5 cm c) 30 cm d) 45 cm
5. A planoconvex lens has a maximum thickness of 6 cm. When placed on a horizontal table with the curved surface in contact with the table surface, the apparent depth of the bottommost point of the lens is found to be 4 cm. If the lens is inverted such that the plane face of the lens is in contact with the surface of the table, the apparent depth of the centre of the plane face is found to be $\left(\frac{17}{4}\right)$ cm. The radius of curvature of the lens is
   a) 34 cm b) 128 cm c) 75 cm d) 68 cm
6. A ray of light strikes a plane mirror M at an angle of 45° as shown in the figure. After reflection, the ray passes through a prism of refractive index 1.5 whose apex angle is 4°. The total angle through which the ray is deviated is



a) 90° b) 91° c) 92° d) 93°

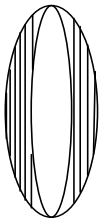
7. The slab of a material of refractive index 2 shown in figure has curved surface APB of radius of curvature 10 cm and a plane surface CD. On the left of APB is air and on the right of CD is water with refractive indices as given in figure. An object O is placed at a distance of 15 cm from pole P as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

8. The diameter of the objective of a telescope is a, its magnifying power is m and wavelength of light is λ. The resolving power of the telescope is
a) $(1.22\lambda)/a$ b) $(1.22a)/\lambda$ c) $\lambda m/(1.22a)$ d) $a/(1.22\lambda)$

9. A convex lens is made of 3 layers of glass of 3 different materials as in the figure. A point object is placed on its axis. The number of images of the object are



a) 1 b) 2 c) 3 d) 4

10. Transmission of light to large distances through optical fibres is based on
a) Dispersion b) Refraction
c) Total internal reflection d) Interference

11. 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
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

12. The head lights of a jeep are 1.2 m apart. If the pupil of the eye of an observer has a diameter of 2mm and light of wavelength 5896 Å is used, what should be the maximum distance of the jeep from the observer if the two head lights are just separated?
a) 33.9 km b) 33.9 m c) 3.34 km d) 3.39 m

13. 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 a distance from the surface of water equal to (Refractive Index of water is $\frac{4}{3}$)
a) 24 m b) 12 m c) 18 m d) 9 m

14. 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 red colour is the shortest

15. To an observer on the earth the starts appear to twinkle. This can be ascribed to
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 in the earth's atmosphere

16. The path of a refracted ray of light in a prism is parallel to the base of the prism only when the
a) Light is of a particular wavelength
b) Ray is incident normally at one face
c) Ray undergoes minimum deviation
d) Prism is made of a minimum deviation

17. For a real object, which of the following can produced a real image?
a) Plane mirror
b) Concave lens
c) Convex mirror
d) Concave mirror

18. A light ray of 5895Å wavelength travelling in vacuum enters a medium of refractive index 1.5. The speed of light in the medium is
a) $3 \times 10^8 ms^{-1}$
b) $2 \times 10^8\ ms^{-1}$
c) $1.5 \times 10^8\ ms^{-1}$
d) $6 \times 10^8\ ms^{-1}$

19. Resolving power of a microscope depends upon
a) Wavelength of light used, directly
b) Wavelength of light used, inversely
c) Frequency of light used
d) Focal length of objective

20. 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
a) $f_v < f_r$ and $F_v > F_r$
b) $f_v < f_R$ and $F_v < F_r$
c) $f_c > f_r$ and $F_v > F_r$
d) $f_v > f_r$ and $F_v < F_r$