## Topic :- RAY OPTICS AND OPTICAL INSTRUMENTS

1. In compound microscope, magnifying power is 95 and the distance of object from objective lens is $\frac{1}{3.8}$ cm. The focal length of objective lens is $\frac{1}{4}$ cm. What is the magnification of eye piece?
   a) 5   b) 10   c) 100   d) 200

2. Electromagnetic radiation of frequency n, wavelength λ, travelling with velocity v in air, enters a glass slab of refractive index μ. The frequency, wavelength and velocity of light in the glass slab will be respectively
   a) $\frac{n}{\mu}, \frac{\lambda}{\mu}, \frac{v}{\mu}$ b) $n, \frac{\lambda}{\mu}, \frac{v}{\mu}$ c) $n, \lambda, \frac{v}{\mu}$ d) $\frac{n}{\mu}, \frac{\lambda}{\mu}, v$

3. In a plano-convex lens the radius of curvature of the convex lens is $10\ cm$. If the plane side is polished, then the focal length will be (Refractive index = 1.5)
   a) $10.5\ cm$ b) $10\ cm$ c) $5.5\ cm$ d) $5\ cm$

4. A thin convex lens of focal length $10\ cm$ is placed in contact with a concave lens of same material and of same focal length. The focal length of combination will be
   a) Zero   b) Infinity   c) $10\ cm$ d) $20\ cm$

5. Consider an equiconvex lens of radius of curvature R and focal length f. If $f > R$, the refractive index μ of the material of the lens
   a) Is greater than zero but less than 1.5   b) Is greater than 1.5 but less than 2.0
   c) Is greater than one but less than 1.5   d) None of the above

6. A convex lens of focal length f produces a virtual image n times the size of the object. Then the distance of the object from the lens is
   a) $(n-1)f$ b) $(n+1)f$ c) $\left(\frac{n-1}{n}\right)f$ d) $\left(\frac{n+1}{n}\right)f$

7. An object moving at a speed of 5 m/s towards a concave mirror of focal length $f = 1$ mis at a distance of 9 m. The average speed of the image is

   a) $\frac{1}{5}$ m/s   b) $\frac{1}{10}$ m/s   c) $\frac{5}{9}$ m/s   d) $\frac{4}{10}$ m/s

8. A man can see the objects upto a distance of one metre from his eyes. For correcting his eye sight so that he can see an object at infinity, he requires a lens whose power is

   Or

   A man can see upto 100 cm of the distant object. The power of the lens required to see far objects will be

   a) $+0.5\ D$ b) $+1.0\ D$ c) $+2.0\ D$ d) $-1.0\ D$

9. The refracting angle of a prism is A and the refractive index of the material of the prism is $\cot(A/2)$. The angle of minimum deviation of the prism is

   a) $\pi + 2A$ b) $\pi - 2A$ c) $\dfrac{\pi}{2} + A$ d) $\dfrac{\pi}{2} - A$

10. The wavelength of red light from He-Ne laser is 633nm in air but 474 nm in the aqueous humor inside the eye ball. Then the speed of red light through the aqueous humor is

    a) $3 \times 10^8 \text{ms}^{-1}$ b) $1.34 \times 10^8 \text{ms}^{-1}$ c) $2.25 \times 10^8 \text{ms}^{-1}$ d) $2.5 \times 10^8 \text{ms}^{-1}$

11. The magnifying power of an astronomical telescope is 10 and the focal length of its eye-piece is 20 cm. The focal length of its object will be

    a) 200 cm   b) 2 cm   c) 0.5 cm   d) 0.5×10^{-2} cm

12. The distance between a point source of light and a screen which is $60\ cm$ is increased to $180\ cm$. The intensity on the screen as compared with the original intensity will be

    a) (1/9) times   b) (1/3) times   c) 3 times   d) 9 times

13. If a ray of light in a denser medium enters into a rarer medium at an angle of incidence i, the angle of reflection and reflection are respectively r and r'. If the reflected and refracted rays are at right angles to each other, the critical angle for the given pair of media is

    a) $\sin^{-1}(\tan r')$ b) $\sin^{-1}(\tan r)$ c) $\tan^{-1}(\sin i)$ d) $\cot(\tan i)$

14. The objective lens of a compound microscope produces magnification of 10. In order to get an overall magnification of 100 when image is formed at $25\ cm$ from the eye, the focal length of the eye lens should be

    a) $4\ cm$ b) $10\ cm$ c) $\dfrac{25}{9}\ cm$ d) $9\ cm$

15. An object is placed asymmetrically between two plane mirrors inclined at an angle of 72°. The number of images formed is

    a) 5   b) 4   c) 2   d) Infinite

16. A convex mirror of radius of curvature 1.6 m has an object placed at a distance of 1 m from it. The image is formed at a distance of

    a) 8/13 m in front of the mirror   b) 8/13 m behind the mirror
    c) 4/9 m in front of the mirror   d) 4/9 m behind the mirror

17. A thin glass (refractive index 1.5) lens has optical power of -5 D in air. Its optical power in a liquid medium with refractive index 1.6 will be

    a) 1 D   b) -1 D   c) 25 D   d) -25 D

18. The refractive index of a prism for a monochromatic wave is $\sqrt{2}$ and its refracting angle is 60°. For minimum deviation, the angle of incidence will be

    a) 30°   b) 45°   c) 60°   d) 75°

19. A ray of light travelling in glass $\left(\mu = \frac{3}{2}\right)$ is incident on a horizontal glass air surface at the critical angle θ_c. If thin layer of water $\left(\mu = \frac{4}{3}\right)$ is now poured on the glass air surface, the angle at which the ray emerges into air the water-air surface is
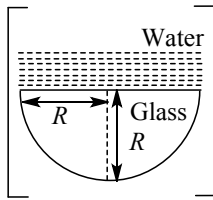
   a) 60°   b) 45°   c) 90°   d) 180°

20. A convex lens is placed between object and a screen. The size of object is 3 cm and an image of height 9 cm is obtained on the screen. When the lens is displaced to a new position, what will be the size of image on the screen?
   a) 2 cm   b) 6 cm   c) 4 cm   d) 1 cm