Ray Optics and Optical Instrument Important Questions With Answers

NEET Physics 2023

1. A ray of light is successively deflected from two plane mirrors inclined to each other at a certain angle. If the total deviation in the path of the rays reflected from the two mirrors be 300^0, then what is the number of images formed?
   a) 30   b) 15   **c) 11**   d) 5

2. A Concave mirror form the real image of an object which is magnified 4 times. The object is moved 3 cm away, the magnification of the image is 3 times. What is the focal length of the mirror?
   a) 3 cm   b) 12 cm   **c) 36 cm**

3. A room (cubical) is made of mirrors. An insect is moving along the diagonal on the floor , such that the velocity of image of insect on two adjacent wall mirrors, is $10cms^{-1}$. The velocity of image of insect in ceiling mirror is
   a) $10cms^{-1}$ b) $20cms^{-1}$ c) $\frac{10}{\sqrt{2}}cms^{-1}$ **d) $10\sqrt{2}cms^{-1}$**

4. The image formed by a convex mirror of focal length 30 cm is a quarter of the size of the object.The distance of the object from the mirror is
   a) 30 cm   **b) 90 cm**   c) 120 cm   d) 60 cm

5. A Convex lens and a concave lens, each having same focal length of 25 cm, are put in contact to form a combination of lenses. The power in dioptres of the combination is
   a) 25   b) 50   c) infinite   **d) zero**

6. In the given figure, the angle of reflection is
   a) 30^0 b) 60^0 **c) 45^0**   d) None of these

7. Aglass slab (μ = 1.5) of thickness 6 cm is placed over a paper. What is the shift in the letters?
   a) 4 cm   **b) 2 cm**   c) 1 cm   d) None of these

8. A 4 cm thick layer of water covers a 6 cm thick glass slab. Acoin placed at the bottom of the slab and is being observed from the air side along the normal to the surface. Find the apprent position of the coin from
   a) 7.0 cm   b) 8.0 cm   c) 10 cm   d) 5 cm

9. A microscope is focussed on a mark on a piece of paper and then, a slab of glass of thickness 3 cm and refractive index 1.5 is placed over the mark. How should the microscope be moved to get the mark in focus again?
   a) 1 cm upward   b) 4.5 cm downward   c) 1 cm downward   d) 2 cm upward

10. A small coin is resting on the bottom of a beaker filled with a liquid . A ray of light from the coin travels up to the surface of the liquid and moves along its surface as shown in figure. How fast is the light travelling in the liquid?
    a) $1.8 \times 10^8 ms^{-1}$ b) $2.4 \times 10^8 ms^{-1}$ c) $3.0 \times 10^8 ms^{-1}$ d) $1.2 \times 10^4 ms^{-1}$

11. The frequency of a light wave in a material and wavelength is 5000 A The refractive index of material will be
    a) 1.40   b) 1.50   **c) 3.00**   d) 1.33

12. A lens has focal length 10 cm. An object is placed 15 cm in front of it. Where should a convex mirror be placed, so that image is formed at the object itself,when focal length of convex mirror is 12 cm?

a) 6 cm from lens   b) 8 cm from lens   c) 5 cm from lens   d) 4 cm from lens

13. If in a plano-convex lens, radius of curvature of convex surface is 10 cm and the focal length of the lens is 30 cm. The refractive index of the material of the lens will be
    a) 1.5   b) 1.66   **c) 1.33**   d) 3

14. For an optical arrangement as shown in the figure,Find the position and nature of image.
    a) 32 cm   **b) 0.6 cm**   c) 6 cm   d) 0.5 cm

15. A thin convergent glass lens(μ = 1.5) has a power of + 5.0 D. When this lens is immersed in a liquid of refractive index μ it acts as a divergence lens of focal length 100 cm. the value of μ should be
    a) 3/2   b) 4/3   **c) 5/3**   d) 2

16. The distance of the image from the focus of a lens is X and that of object is Y. What is the nature of the graph Y versus X ?
    a) Straight line   b) Ellipse   c) Parabola   **d) Hyperbola**

17. Two lamps of powers P_1 and P_2 are placed on either side of apaper having an oil spot. The lamps are at 1m and 2 m respectively, On either side of the paper and the oil spot is invisible. What is the value of P_1/P_2 ?
    a) 0.25   b) 0.40   c) 0.50   d) 0.60

18. If the critical angle for total internal reflection from a medium to vaccum is 30^0, the velocity of light in the medium is
    a) $3 \times 10^8 ms^{-1}$ **b) $1.5 \times 10^8 ms^{-1}$**   c) $6 \times 10^8 ms^{-1}$ d) $\sqrt{3} \times 10^8 ms^{-1}$

19. A glass prism ABC (refractive index 1.5), immersed in water (refractive index 4/3). A ray of light is incident normally on face AB. If it is totally reflected at face AC, then
    a) $sin\theta \geq \frac{8}{9}$ b) $sin\theta \geq \frac{2}{3}$ c) $sin\theta \geq \frac{\sqrt{3}}{2}$ d) $\frac{2}{3}$

20. A thin prism of angle 7^0 and refractive index 1.5 is combined with another prism of angle θ and refractive index 1.7. The emergent ray goes undeviated. What is the value of θ ?
    a) 3^0 **b) 5^0**   c) 9^0 d) 1^0

21. A thin glass prism (μ = 1.5) is immersed in water (μ = 1.3). if the angle of deviation in air for a particular ray be D, then in water will be
    a) 0.2 D   **b) 0.3 D**   c) 0.5 D   d) 0.6 D

22. A ray of light incident at an angle θ on a refracting face of aprism emerges from the other face normally. if the angle of the prism is 5^0 and the prism is made of a material of refractive index 1.5, the angle of incidence is
    a) 7.5^0   b) 5^0 c) 15^0 d) 15^0

23. The refractive index of the material of a prism is $\sqrt{2}$ and its refracting angle is 30^0. One of the refracting surfaces of the prism is made a mirror inwards. A beam of monochromatic light entering the prism from the other face will retrace its path after reflection from the mirrored surface, if its angle of incidence on the prism is
    a) 45^0   b) 60^0 c) 0^0 d) 30^0

24. To correct myopia, the focal length of the concave lens should be
    a) equal to the distance of far point   b) less than the distance of far point
    c) less than the distance of near point   d) equal to the distance of near point

25. A simple telescope, consisting of an objective of focal length 60 cm and a single eye lens of focal length 5cm is focused on a distant object in such a way that parallel rays emerge from the eye lens.if the object subtends an angle of 2^0 at the objective, the angular width of the image is
    a) 10^0 **b) 24^0**   c) 50^0 d) $(1/6)^0$

26. The diameter of the moon is $3.5 \times 10^3 km$ and its distance from the earth is $3.8 \times 10^5 km$ .seen by a telescope having focal lengths of the objective and the eye piece as 40mm and 1.0 cm respectively, the angular diameter of the image of the moon will be approximately.

a) **2°**   b) 10°   c) 20°   d) None of these

27. For the figure as shown below ,match the following columns.

a)	b)	c)	d)
A B C	**A B C**	A B C	A B C
2 3 1	**2 1 3**	3 2 1	3 1 2

28. The r efracting angle of a prism is A and refractive index of the material of the prism is cot(A/2). The angle of minimum deviation is

a) 180°-3A   **b) 180°-2A**   c) 90°-A   d) 180°+2A

29. A hollow prism is filled with water and placed in air,It will deviate the incident rays

a) towards the base   b) away from base   c) parallel to base

d) towards or away from base depending on the location

30. A convex lens has mean focal length 20 cm.The dispersive power of the material of the lens is 0.02.The longitudinal chromatic aberration for an object at infity,is

a) 0.20   **b) 0.40**   c) 0.80   d) 10^3

31. Two identical thin plano-convex glass lenses each having radius of curvature of 20cm are placed with their convex surfaces in contact at the centre.The intervening space is filled with oil of refractive index 1.7.The intervening space is filled with oil refractive index 1.7.The focal length of the combination is

a) -20 cm   b) -25 cm   **c) -50 cm**   d) 50 cm

32. The angle of a prism is A. One of its refracting

a) 2 sin A   **b) 2 cos A**   c) 1/2 cos A   d) tan A

33. The focal length of objective lens is increased then magnifying power of

a) Microscope will increase but that of telescope decreases   b) Microscope and telescope both will increase

c) Microscope and telescope both will decrease

d) Microscope will decrease but that of telescope will increase

34. What is the refractive index of a prism whose angle A=60° and angle of minimum deviation d_m=30°?

a) $\sqrt{2}$ b) $\frac{1}{\sqrt{2}}$ c) 1   d) $\frac{1}{\sqrt{3}}$

35. A thin prism P_1 of angle 4° and refractive index 1.54° is combined with another thin prism P_2 of refractive index 1.72 to produce dispersion without deviation.The angle of P_2 is

a) 4°   b) 5.33°   c) 2.6°   **d) 3°**

36. Which of the following is not due to total internal reflection?

a) Difference between apparent and real depth of a pond   b) Mirage on hot summer days

c) Brilliance of diamond   d) Working of optical fibre

37. A ray of light travelling in a transparent medium of refractive index μ on a surface separating the medium from air at an angle of incidence of 45° For which of the following value of μ the ray can undergo total internal reflection?

a) μ =1.33   b) μ =1.40   **c) μ =1.50**   d) μ =1.25

38. Which of the following is correct for the image formed by a plane mirror?

a) Always real   b) Always virtual   **c) Virtual and laterally inverted**   d) Real and laterally inverted

39. If the reflected ray is rotated by an angle of 4θ in clockwise direction then the mirror was rotated by

a) 2θ in anti-clockwise direction   b) 4θ in anti-clockwise direction   c) 2θ in clockwise direction

d) 4θ in clockwise direction

40. An object is moving towards a stationary plane mirror with a speed of 2 m/s. Velocity of the image w.r.t. the object is

a) 2 m/s towards right   b) 4 rn/s towards right   c) 2 rn/s towards left   **d) 4 rn/s towards left**

41. A point object is placed at a distance of 30 cm from a convex mirror of focal length 30 cm. The image will form at

a) infinity   b) pole   c) focus   **d) 15 cm behind the mirror**

42. A convex mirror of focal length f forms an image which is 1/n times the object. The distance of the object from the mirror is

    a) (n-1)f   b) $\left[\frac{n-1}{n}\right] f$ c) $\left[\frac{n+1}{n}\right] f$ d) (n+1)f

43. An object of size 7.5 cm is placed in front of a convex mirror of radius of curvature 25 cm at a distance of 40 cm.The size of the image should be

    a) 2.3 cm   **b) 1.78cm**   c) 1 cm   d) 0.8 cm

44. A spot is placed on the bottom of a slab made of a transparent material of refractive index 1.5. The spot is viewed vertically from the top when it seems to be raised by 2 cm. Then, the height of the slab is

    a) 10 cm   b) 8 cm   **c) 6 cm**   d) 4 cm

45. A vessel of depth 2 d cm is half filled with a liquid of refractive index μ_1 and the upper half with a liquid of refractive index μ_2 The apparent depth of the vessel seen perpendicu.

    a) $d\left[\frac{\mu_1\mu_2}{\mu_1+\mu_2}\right]$ **b)** $d\left[\frac{1}{\mu_1}+\frac{1}{\mu_2}\right]$ c) $2d\left[\frac{1}{\mu_1}+\frac{1}{\mu_2}\right]$ d) $2d\left[\frac{1}{\mu_1\mu_2}\right]$

46. A glass-slab is immersed in water. What will be the critical angle for a light ray at glass-water interface? Where $_a n_g = 1.50, _a n_w = 1.33$ and sin⁻¹ (0.887)=62.5

    a) 48.8°   b) 72.8°   **c) 62.5°**   d) 64.5°

47. The critical angle of a prism is 30°. The velocity of light in the medium is

    a) 1.5 x 10⁸ m/s   b) 3 x 10⁸ m/s   c) 4.5 x 10⁸ m/s   d) None of these

48. A glass slab has a critical angle of 30° when placed in air. What will be the critical angle when it is placed in liquid of refractive index 6/5?

    a) 45°   **b) 37°**   c) 53°   d) 60°

49. A plano-convex lens is made of glass of refractive index 1.5. The radius of curvature of its convex surface is R. Its focal length is

    a) R/2   b) R   **c) 2R**   d) 1.5R

50. An object is placed at 10 cm from a lens and real image is formed with magnification of 0.5. Then the lens is

    a) concave with focal length of 10/3 cm   **b) convex with focal length of 10/3 cm**
    c) concave with focal length of 10 cm   d) convex with focal length of 10 cm