Octahedron institute, chandan nagar

office no 2, 1st floor chandan complex

Class 10 - Science

light

Maximum Marks: 100   **Time Allowed: 2 hours**

Section A

1. Explain the term lateral inversion. **2**

2. Sudha finds out that the sharp image of window pane of her science laboratory is formed at a distance of 15 cm from the lens. She now tries to focus the building visible of her outside the window instead of the window pane without disturbing the lens. In which direction will she move the screen to obtain a sharp image of the building? What is the approximate focal length of this lens? **2**

3. Find the focal length of a convex mirror whose radius of curvature is 32 cm. **2**

4. The refractive index of diamond is 2.42. What is the meaning of this statement? **2**

5. What will happen to a ray of light when it falls normally on a surface? Show it diagrammatically. **2**

6. Velocity of light in diamond is 1.2×10^8 ms^{-1} and in vacuum, it is 3×10^8 ms^{-1}, what is refractive index of diamond ? **2**

7. Define the term power of a lens. Give its SI unit. State whether the power of a converging lens is positive or negative. **2**

8. A doctor has prescribed a corrective lens of power + 1.5 D. Find the focal length of lens. Is prescribed lens diverging or converging? **2**

9. The refractive indices 1.0003, 1.31 1.5 respectively of Air, Ice and Benzine in which of these does the light travels fastest? **2**

10. A mirror has magnification 0.4, what type of the mirror is that? and what type of the image is formed ? **2**

11. An object is placed at a distance of 10 cm from a convex mirror of focal length 15 cm. Find the position and nature of the image. **3**

12. A convex lens of focal length 15 cm forms an image 10 cm from the lens. How far is the object placed from the lens? Draw the ray diagram. **3**

13. A convex mirror used for rear-view on an automobile has a radius of curvature of **3**

3.00 m. If a bus is located at 5.00 m from this mirror, find the position, nature and size of the image.

14. An object 3 cm high is placed 20 cm from convex lens of focal length 12 cm. Find the nature, position and height of the image. **3**

15. A real image, $\frac{4}{5}$ size of the object is formed 18 cm from a lens. Calculate focal length of the lens. **3**

16. Name the type of mirror used in the following situations: **3**

    (a) Headlights of a car

    (b) Side/rear-view mirror of a vehicle.

    (c) Solar furnace.

    Support your answer with reason.

17. A truck uses a convex mirror as view finder whose radius of curvature is 2.0 m. A maruti car is coming behind the truck at a distance of 10 m. What will be the position of the image of the car and size of the image of the car when observed by the driver of the truck through the convex mirror? **3**

18. How can you show that if a ray enters a rectangular glass slab obliquely and emerges from the opposite face, the emergent ray is parallel to the incident ray? **3**

19. A concave mirror of focal length 10 cm is placed at a distance of 35 cm from a wall. How far from the wall an object be placed so that its image formed by mirror falls on the wall? **3**

20. We wish to obtain an erect image of an object, using a concave mirror of focal length 15 cm. What should be the range of distance of the object from mirror? What is the nature of image? Is the image larger or smaller than the object? Draw a ray diagram to show the image formation in this case. **3**

21. An object 5 cm high is placed at a distance of 10 cm from a convex mirror of radius of curvature 30 cm. Find the nature, position and size of the image. **3**

22. An object is kept at a distance of **3**

    (i) $\frac{a}{2}$ (ii) $\left(\frac{3}{2}\right) a$ from a convex lens having focal length of magnitude (a) Draw ray diagrams showing the formation of images formed in the two cases.

23. An object 5.0 cm in length is placed at a distance of 20 cm in front of a convex mirror of radius of curvature 30 cm. Find the position of the image, its nature and **3**

size.

24. A concave mirror produces three times magnified real image of an object placed at 10 cm in front of it. Where is the image located ? **3**

25. An object of size 7.0 cm is placed 27 cm in front of concave mirror of focal length 18 cm. At what distance should the screen be placed so that a sharp focused image can be obtained ? Find the size and nature of the image. **3**

26. Find the velocity of light in diamond. Given the velocity of light in glass is 2×10^8 ms^{-1}. Given refractive index of glass with respect to air is 1.5 and that of diamond with respect to air is 2.5. **3**

27. One half of a convex lens is covered with a black paper. Will this lens produce a complete image of the object? Explain your observation. **3**

28. Explain with the help of a ray diagram, why a pencil partly immersed in water appears to be bent at the water surface. **3**

29. Three mirrors, one plane, one concave and one convex are lying on the table. How can a person identify them without touching them or using any other apparatus or device? **3**

30. Distinguish between real image and virtual image. **3**

31. What are the rules to form image of an object by concave lens ? Form the images of an object when it is moved from infinity to the lens. **5**

32. Define magnification of a spherical mirror. What will be the magnification in case of plane mirror ? **5**

33. Find the size, nature and position of image formed when an object of size 1 is placed at a distance of 15 cm from a concave mirror of focal length 10 cm. **5**

34. An object 2 cm high is placed at a distance of 16 cm from a concave mirror which produces a real image 3 cm high. **5**

    (i)Find the position of the image.

    (ii)What is the focal length of mirror?