Science   Reg.No. : ☐☐☐☐☐☐

Time : 01:00:00 Hrs

Total Marks : 50

Section - A

1) The image formed by a concave mirror is observed to be virtual, erect and larger than the object.Where should   **1**
be the position of the object?

   (a) Between the principal focus and the centre of curvature   (b) At the centre of curvature

   (c) Beyond the centre of curvature   (d) Between the pole of the mirror and its principal focus.

2) A spherical mirror and a thin spherical lens have each a focal length of - 15 cm. The mirror and the lens are   **1**
likely to be

   (a) both concave   (b) both convex   (c) the mirror is concave and the lens is convex.

   (d) the mirror is convex, but the lens is concave.

3) Which of the following can make a parallel beam of light when light from a point source is incident on it?   **1**

   (a) Concave mirror as well as convex lens   (b) Convex mirror as well as concave lens

   (c) Two plane mirrors placed at 90° to each other   (d) Concave mirror as well as concave lens

4) A full length of a distant tall building can definitely be seen by using.   **1**

   (a) a concave mirror   (b) a convex mirror   (c) a plane mirror   (d) both concave as well as plane mirror

5) The laws of reflection hold good for   **1**

   (a) plane mirror only   (b) concave mirror only   (c) convex mirror only

   (d) all mirrors irrespective of their shape

6) In which of the following, the image of an object placed at infinity will be highly diminished and point sized?   **1**

   (a) Concave mirror only   (b) Convex mirror only   (c) Convex lens only

   (d) Concave mirror, convex mirror, concave lens and convex lens

7) A beam of light is incident through the holes on side A and emerges out of the holes on the other face of the   **1**
box as shown in the figure. Which of the following could be inside the box?
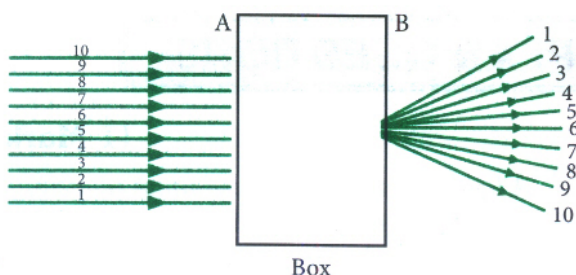
   (a) Concave lens   (b) Rectangular glass slab   (c) Prism   (d) Convex lens

8) Which of the following ray diagrams is correct for the ray of light incident on a concave mirror as shown in Figure? **1**

Fig A   Fig B   Fig C   Fig D
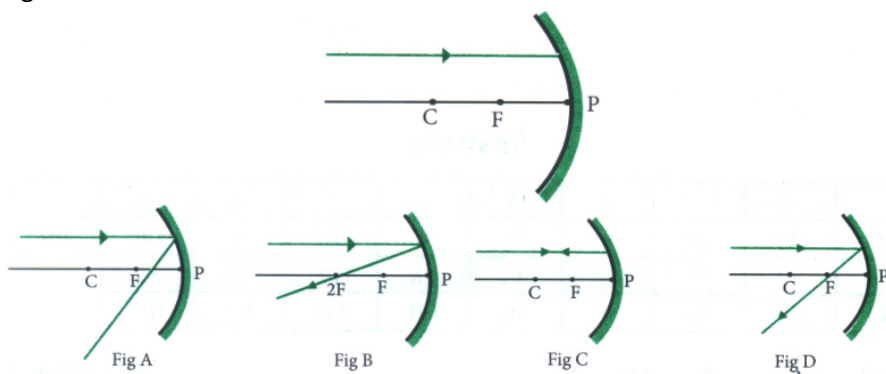
(a) Fig. A   (b) Fig. B   (c) Fig. C   (d) Fig. D

9) The size of an object is 2 cm. The magnification produced by a mirror is +1. What is the size of the image? **1**

10) What will happen to ray of light when it falls normally on a surface? **1**

Section - B

11) Name the mirror that can give an erect and enlarged image of an object. **2**

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

13) How do you find the rough focal length of a convex lens? Is the same method applicable to a concave lens? **2**

14) How is the refractive index of a medium related to the speed of light? Obtain an expression for refractive index of a medium with respect to another in terms of speed of light in these two media? **2**

15) How are power and focal length of a lens related? You are provided with two lenses of focal length 20 cm and 40 cm respectively. Which lens will you use to obtain more convergent light? **2**

16) List four properties of the image formed by a concave mirror when object is placed between focus and pole of the mirror. **2**

17) List four specific characteristics of the images of the objects formed by convex mirrors. **2**

18) A spherical mirror produces an image of magnification -1 on a screen at a distance of 40 cm from the mirror. **2**
   (i) Write the type of mirror
   (ii) What is the nature of the image formed?
   (iii) How far is the object located from the mirror?
   (iv) Draw the ray diagram to show the image formation in this case.

19) A student wants to project the image of a candle flame on a screen 60 cm in front of a mirror by keeping the flame at a distance of 15 cm from its pole. **2**
   (i) Write the type of mirror he should use.
   (ii) Find the linear magnification of the image produced.
   (iii) What is the distance between the object and its image?
   (iv) Draw a ray diagram to show the image formation in this case.

20) Name the type of mirrors used in the design of solar furnaces. Explain how high temperature is achieved by this device. **2**

Section - C

21) Define power of a lens. What is its unit? One student uses a lens of focal length 50 cm and another of - 50 cm. What is the nature of the lens and its power used by each of them? **5**

22) A student focussed the image of a candle flame on a white screen using a convex lens. He noted down the **5** position of the candle screen and the lens as under

Position of candle = 12.0 cm

Position of convex lens = 50.0 cm

Position of the screen = 88.0 cm

(a) What is the focal length of the convex lens?

(b) Where will the image be formed if he shifts the candle towards the lens at a position of 31.0 cm?

(c) What will be the nature of the image formed if he further shifts the candle towards the lens?

(d) Draw a ray diagram to show the formation of the image in case c) as said above.

23) (i) " A convex lens can form a magnified erect as well as magnified inverted image of an object placed in front **5** of it. " Draw ray diagram to justify this statement stating the position of the object with respect to the lens in each case.

(ii) As object of height 4 cm is placed at a distance of 20 cm from a concave lens of focal length 10 cm. Use lens formula to determine the position of the image formed.

24) Explain the following terms related to spherical lenses : **5**

(a) (i) optical centre

(ii) Centres of curvature

(iii) principal axis

(iv) aperture

(v) principal focus

(vi) focal length

(b) A converging lens has focal length of 12 cm. Calculate at what distance should the object be placed from the lens so that it forms an image at 48 cm on the other side of the lens.

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