

## Chapter 5 – Light Energy

### A. Objective Questions

#### 1. Write true or false for each statement

(a) Water is optically denser than glass.

**Solution:** False.

(b) A ray of light when passes from glass to air, bends towards the normal.

**Solution:** False.

(c) The speed of light is more in glass than in water.

**Solution:** False.

(d) The depth of a pond when seen from above appears to be less.

**Solution:** True.

(e) Light travels at a lower speed in water than in air.

**Solution:** True.

(f) Light travels in the same straight line path while passing through different media.

**Solution:** False.

(g) The angle formed between the normal and the refracted ray is known as the angle of incidence.

**Solution:** False.

(h) At the point of incidence, a line drawn at right angles to the surface, separating the two media, is called the normal.

**Solution:** True.

(i) Image is formed by a mirror due to refraction of light.

**Solution:** False.

(j) Rays of light incident parallel to the principal axis pass through the focus after reflection from a concave

**Solution:** True.

(k) A convex mirror is used as a shaving mirror.

**Solution:** False.

(l) The focal length of a convex mirror is equal to its radius of curvature.

**Solution:** False.

(m) A concave mirror converges the light-rays, but a convex mirror diverges the mirror.

**Solution:** True.

## Question 2.

### Fill in the blanks

(a) Water is optically denser than air.

(b) Air is optically rarer than glass.

(c) When a ray of light travels from water to air, it bends away from the normal.

(d) When a ray of light travels from air to glass, it bends towards the normal.

- (e) When white light passes through a prism, it **disperses**
- (f) The splitting of white light into its constituent colours is called **dispersion**.
- (g) A **concave** mirror is obtained on silvering the outer surface of a part of a hollow glass sphere.
- (h) Radius of curvature of a spherical mirror is **two times** its focal length.
- (i) The angle of incidence for a ray of light passing the centre of curvature of a spherical mirror is **0°**
- (j) A **convex** mirror always forms a virtual image.
- (k) A concave mirror forms a virtual image for an object placed **between pole and focus**.

### Question 3.

Match the following:

Column A

Column B.

- |                    |                                    |
|--------------------|------------------------------------|
| (a) White light    | (i) convex mirror                  |
| (b) Refraction     | (ii) concave mirror                |
| (c) Virtual images | (iii) refraction                   |
| (d) Real images    | (iv) spectrum                      |
| (e) Prism          | (v) ray of light from glass to air |

**Solution:**

Column A

Column B.

- |                    |                                    |
|--------------------|------------------------------------|
| (a) White light    | (iv) spectrum                      |
| (b) Refraction     | (v) ray of light from glass to air |
| (c) Virtual images | (i) convex mirror                  |
| (d) Real images    | (ii) concave mirror                |
| (e) Prism          | (iii) refraction                   |

### Question 4.

**Select the correct alternative**

(a) The speed of light in air or vacuum is

1.  $3 \times 10^8 \text{ ms}^{-1}$
2.  $2.25 \times 10^8 \text{ ms}^{-1}$
3.  $332 \text{ ms}^{-1}$
4.  $2.0 \times 10^8 \text{ ms}^{-1}$

Answer: 1.  $3 \times 10^8 \text{ ms}^{-1}$

(b) A ray of light moving from an optically rarer to a denser medium

1. bends away from the normal
2. bends towards the normal
3. remains undeviated
4. none of the above

Answer: 2. bends towards the normal

(c) The angle between the normal and refracted ray is called

1. angle of deviation
2. angle of incidence
3. angle of refraction
4. angle of emergence.

Answer: 3. angle of refraction

(d) The property of splitting of white light into its seven constituent colours is known as

1. rectilinear propagation
2. refraction

3. reflection

4. dispersion

Answer: 4. dispersion

(e) The seven colours in the spectrum of sunlight in order, are represented as:

1. VIBGYOR

2. VIGYBOR

3. BIVGYOR

4. RYOBIVG

Answer: 1. VIBGYOR

(f) A ray of light passing through centre of curvature of a spherical mirror, after reflection

1. passes through the focus

2. passes through the pole

3. becomes parallel to the principal axis

4. retraces its own path.

Answer: 4. retraces its own path.

(g) If the radius of curvature of a concave mirror is 20 cm its focal length is:

1. 10 cm

2. 20 cm

3. 40 cm

4. 80 cm

Answer: 1. 10 cm

(h) The image formed by a convex mirror is

1. erect and diminished
2. erect and diminished
3. inverted and diminished
4. inverted and enlarged.

Answer: 1. erect and diminished

(i) The image formed by a concave mirror is of the same size as the object, if the object is placed

1. at the focus
2. between the pole and focus
3. between the focus and centre of curvature
4. at the centre of curvature

Answer: 4. at the centre of curvature

(j) A convex mirror is used

1. as a shaving mirror
2. as a head mirror by a dentist
3. as a rear view mirror by a driver
4. as a reflector in torch.

Answer: 3. as a rear view mirror by a driver