UNIT 3 –LIGHT

CLASS: VIII

SUBJECT: SCIENCE

I. Choose the best answer.

1. Which of the following has curved reflecting surface?

a) plane mirrors **b) spherical mirrors**

c) simple mirrors d) None of the above

2. The spherical mirror with a reflecting surface curved inward is called

a) convex mirror **b) concave mirror**

c) curved mirror d) None of the above

3. The spherical mirror used as a rear view mirror in the vehicle is

a) concave mirror **b) convex mirror**

c) plane mirror d) None of the above

4. The imaginary line passing through the centre of curvature and pole of a spherical mirror is called

a) centre of curvature b) pole

c) principal axis d) radius curvature

5. The distance from the pole to the focus is called

a) pole length **b) focal length**

c) principal axis d) None of the above

6. If the image and object distance is same, then the object is placed at

a) infinity b) at F

c) between f and P **d) at C**

7. If the focal length of a spherical mirror is 10 cm, what is the value of its radius of curvature?

a) 10 cm b) 5 cm **c) 20 cm** d) 15 cm

II. Fill in the blanks.

1. The spherical mirror used in a beauty parlour as make-up mirror is **concave mirror.**
2. Geometric centre of the spherical mirror is **pole.**
3. Nature of the images formed by a convex mirror is **smaller, virtual and erect.**
4. The mirror used by the ophthalmologist to examine the eye is **concave.**
5. If the angle of incidence is 45°, then the angle of reflection is **45^0.**
6. If an object is placed between two mirrors which are parallel to each other, the number of images formed is **infinite.**

III. Match the following.

1. Convex mirror	-	Radio telescopes	2
2. Parobolic mirror	-	Rear – view mirror	1
3. Snell's law	-	Kaleidoscope	5
4. Dispersion of light	-	sin i/sin r =μ	3
5. Refractive index	-	Rainbow	4

IV. Answer briefly.

1. Define focal length.

The distance between the pole and the principal focus is called focal length (f) of a spherical mirror.

2. Give any two applications of a concave and convex mirror.

Concave mirror:

- ❖ Concave mirrors are used while applying make-up or shaving, as they provide a magnified image.
- ❖ They are used in torches, search lights and head lights as they direct the light to a long distance.

Convex mirror:

- ❖ They are found in the hallways of various buildings including hospitals, hotels, schools.
- ❖ They are also used on roads where there are sharp curves and turns.

3. State the laws of reflection.

- ➢ The incident ray, the reflected ray and the normal at the point of incidence, all lie in the same plane.
- ➢ The angle of incidence (i) and the angle of reflection (r) are always equal.

4. Define the refractive index of a medium.

The amount of refraction of light in a medium is denoted by a term known as refractive index of the medium, which is the ratio of the speed of light in the air to the speed of light in that particular medium.

5. State Snell's law of refraction.

Refraction of light rays, as they travel from one medium to another medium, obeys two laws, which are known as Snell's laws of refraction. They are given below:

- The incident ray, the refracted ray and the normal at the point of intersection, all lie in the same plane.
- The ratio of the sine of the angle of incidence (i) to the sine of the angle of refraction (r) is equal to the refractive index of the medium, which is a constant.

$$\text{Sin I / Sin r} = u$$

V. Answer in detail.

1. Explain the images formed by a concave mirror.

Ans:

Position of the Object	Position of the Image	Image Size	Nature of the Image
At infinity	At F	Highly diminished	Real and inverted
Beyond C	Between C and F	Diminished	Real and inverted
At C	At C	Same size as the object	Real and inverted
Between C and F	Beyond C	Magnified	Real and inverted
At F	At infinity	Highly magnified	Real and inverted
Between F and P	Behind the mirror	Magnified	Virtual and erect

2. What is reflection? Write a short note on regular and irregular reflection

. A ray of light, falling on a body having a shiny, polished and smooth surface alone is bounced back. This bouncing back of the light rays as they fall on the smooth, shiny and polished surface is called reflection.

Regular reflection

- When a beam of light (collection of parallel rays) falls on a smooth surface, it gets reflected.
- After reflection, the reflected rays will be parallel to each other. Here, the angle of incidence and the angle of reflection of each ray will be equal.
- Hence, the law of reflection is obeyed in this case and thus a clear image is formed. This reflection is called regular reflection' or 'specular reflection'.

Irregular reflection:

- In the case of a body having a rough or irregular surface, each region of the surface is inclined at different angles.

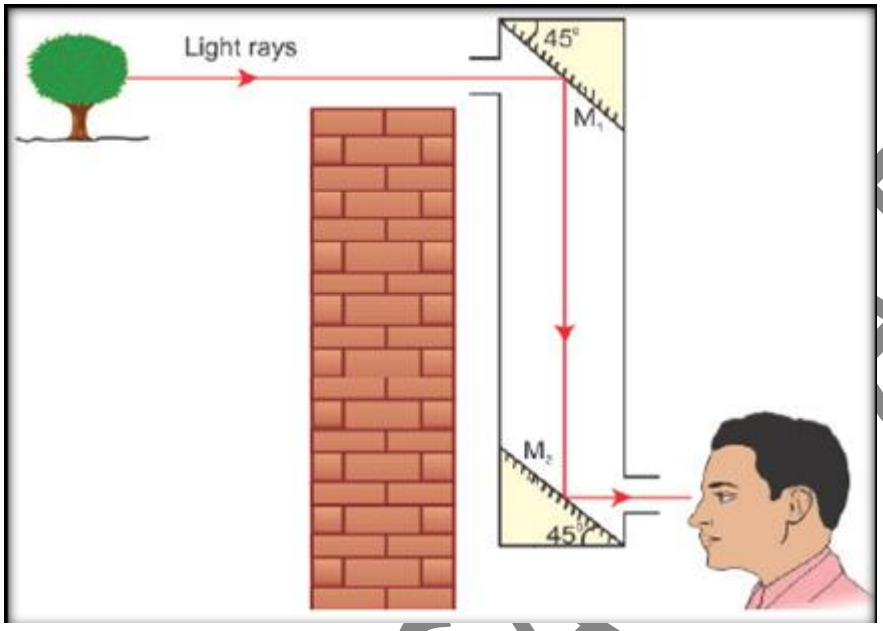
- ❖ When light falls on such a surface, the light rays are reflected at different angles. In this case, the angle of incidence and the angle of reflection of each ray are not equal.
- ❖ Hence, the law of reflection is not obeyed in this case and thus the image is not clear. Such a reflection is called 'irregular reflection' or 'diffused reflection'. Example: Reflection of light from a wall.

3. Explain the working of a periscope.

Periscope:

- ➢ It is an instrument used for viewing bodies or ships, which are over and around another body or a submarine.
- ➢ It is based on the principle of the law of reflection of light.
- ➢ It consists of a long outer case and inside this case mirrors or prisms are kept at each end, inclined at an angle of 45°.
- ➢ Light coming from the distant body, falls on the mirror at the top end of the periscope and gets reflected vertically downward.
- ➢ This light is reflected again by the second mirror kept at the bottom, so as to travel horizontally and reach the eye of the observer.

- In some complex periscopes, optic fibre is used instead of mirrors for obtaining a higher resolution.
- The distance between the mirrors varies depending on the purpose.



4. What is dispersion? Explain in detail.

- Splitting of white light into its seven constituent colours (wavelength), on passing through a transparent medium is known as dispersion of light.
- It is because, light of different colours present in white light have different wavelength and they travel at different speeds in a medium.
- That refraction of a light ray in a medium depends on its speed.
- As each coloured light has a different speed, the constituent coloured lights are refracted at different extents, inside the prism.

❖ Moreover, refraction of a light ray is inversely proportional to its wavelength.

VI. Numerical problems.

1. The radius of curvature of a spherical mirror is 25 cm. Find its focal length.

Radius of curvature = 25cm

Focal length (f) = Radius of curvature R / 2

25 / 2 = 12.5 cm.

2. If two plane mirrors are inclined to each other at an angle of 45°, find the number of images formed.

Angle of inclination = 45^0

To find the number of image formed = 360^{0S}/ angle -1

Solution = 360^0-1/45 = 8 -1 = 7 images

3. Speed of light in air is 3.108 m s–1 and the refractive index of a medium is 1.5. Find the speed of light in the medium

Speed of light in air c = $3x10^8$ ms^{-1}

Refraction index of a medium = 1.5

Speed of light in medium v = ?

$\mu = C / V$

$1.5 = 3x10^8/ v$

$V = 3x10^8 /1.5$

Speed of light in medium v = $2x10^8$ ms^{-1}.