EXERCISE # 1

A. Very Short Answer Type Questions

- Q.1 A ray of light is incident on a plane mirror, i being the angle of incidence. What is the deviation suffered by the ray of light?
- **Q.2** A plane mirror reflects a pencil of light to form a real image. What is the nature of the pencil of light incident on the mirror?
- Q.3 Define principal axis of a spherical mirror.
- Q.4 What is the focal length of a plane mirror?
- Q.5 Two perpendicular plane mirror forms number of images of a point source of light.
- **Q.6** What is the magnification produced by a plane mirror?
- Q.7 Which mirror would you use for shaving?
- **Q.8** Suppose x and y are distances of object and image respectively from a mirror. What shall

be the shape of the graph between $\frac{1}{x}$ and

 $\frac{1}{v}$ for a concave mirror ?

B. Short Answer Type Questions

- **Q.9** An object is placed between two plane parallel mirrors. Why do the distant images get fainter and fainter?
- Q.10 Why mirrors used in search light are parabolic and not concave spherical?
- Q.11 You read a newspaper because of the light that it reflects. Then why do you not see even a faint image of yourself in the newspaper?

- Q.12 If you were driving a car, what type of mirror would you prefer to use for observing traffic at your back and why?
- Q.13 We known that plane and convex mirrors produce virtual images of objects. Can they produce real images under some circumstances? Explain
- Q.14 The wall of a room is covered with perfect plane mirror. Two movie films are made, one recording the movement of a man and the other of his mirror image. From viewing the films later, can an outsider tell which is which?
- Q.15 A concave mirror is held in water. What would be the change in the focal length of the mirror?
- Q.16 What is the difference between the virtual images produced by (i) plane mirror, (ii) concave mirror, (iii) convex mirror?
- **Q.17** Show that if a ray of light is reflected successively from two mirrors inclined at an angle θ , the deviation of the ray does not depend upon the angle of incidence.
- **Q.18** Use the mirror equation to deduce that an object placed between f and 2f of a concave mirror produces a real image beyond 2f.
- **Q.19** Show that a convex mirror always produces a virtual image independent of the location of the object.
- **Q.20** Prove that the virtual image produced by a convex mirror is always diminished in size and is located between the focus and the pole.
- **Q.21** Show analytically that an object placed between the pole and focus of a concave mirror produces a virtual and enlarged image.

- Q.22 We know that a virtual image cannot be obtained on a screen. But when we see a virtual image, we are obviously bringing it on the retina (may be regarded as a screen) of the eye. Point out the contradiction, if any.
- **Q.23** Why a concave mirror of small aperture forms a sharper image?
- Q.24 What do you understand by the term 'parallax'?
- **Q.25** How can you distinguish between three different mirrors just by looking at them?
- **Q.26** What is the effect of size of mirror on the nature of image ?
- **Q.27** Is irregular reflection follows the laws of reflections or not ?

C. Long Answer Type Questions

Q.28 Prove that the radius of curvature of a spherical mirror is equal to twice the focal length of the mirror.

- **Q.29** Derive mirror formula for a concave mirror when image formed is (i) real (ii) virtual Also give the sign convention used.
- Q.30 Find formulae for magnification produced in the following cases : (i) concave mirror, when image formed is real (ii) concave mirror, when image formed is virtual (ii) convex mirror.
- Q.31 Draw a ray diagram to show the formation of image of an object placed between the pole and centre of curvature of a concave mirror. Derive the formula connecting object distance (u), image distance (v) and focal length (f) for this particular case for the given concave mirror. State clearly the assumptions and sign conventions used.
- Q.32 Express magnification produced by a spherical mirror in terms of (i) u and f(ii) u and f.

EXERCISE # 2

Single Correct Answer type Questions

Q.1 A child walks towards a fixed plane mirror at a speed of 5 km h⁻¹. The velocity of the image with respect to mirror is -

(A) 5 km h⁻¹ (B) -5 km h⁻¹

(C) $10 \text{ km } \text{h}^{-1}$ (D) $-10 \text{ km } \text{h}^{-1}$

Q.2 The letter that does not show lateral inversion-

 $(A) Z \qquad (B) M \qquad (C) O \qquad (D) W$

Q.3 In a plane mirror, an object is 0.5 m in front of the mirror. The distance between object and image is -

(A) 0.5 m	(B) 1 m
(C) 0.25 m	(D) 0.75 m

Q.4 An object 0.5 m tall is in front of a plane mirror at a distance of 0.2 m. The size of the image formed is-

(A) 0.2 m (B) 0.5 m (C) 0.1 m (D) 1 m

Q.5 A plane mirror is approaching you at 10 cm s^{-1} . Your image shall approach you with a speed of-

(A) + 10 cm s⁻¹ (B) - 10 cm s⁻¹ (C) + 20 cm s⁻¹ (D) - 20 cm s⁻¹

- Q.6 The path along which light travels in a homogeneous medium is called a-
 - (A) beam of light (B) ray of light
 - (C) pencil of light (D) none of these
- Q.7 A thin layer of water is transparent but a very thick layer of water is-

(A) translucent (B) opaque

(C) most transparent (D) none of these

- Q.8 Air is not visible because it-
 - (A) is nearly a perfectly transparent
 - (B) neither absorbs nor reflects light
 - (C) transmits whole of light
 - (D) all of the above are correct
- Q.9 According to laws of reflection of light -
 - (A) Angle of incidence is equal to the angle of reflection
 - (B) Angle of incidence is less than the angle of reflection
 - (C) Angle of incidence is greater than the angle of reflection
 - (D) None of these
- Q.10 Which of the following correctly represents graphical relation between angle of incidence (i) and angle of reflection (r) ?



Q.11 A light ray falls on a mirror and deviates by 60° then the angle of reflection will be

- **Q.12** A ray of light is incident on a plane mirror at an angle θ . If the angle between the incident and reflected rays is 80°, what is the value of θ .
 - (A) 40° (B) 50°
 - (C) 45° (D) 55°
- Q.13 Light shows -
 - (A) Random propagation
 - (B) Curvilinear propagation
 - (C) Rectilinear propagation
 - (D) None of these
- Q.14 The image of the moon is formed by a concave mirror whose radius of curvature is 4.8 m at a time when distance from the moon is 2.4×10^8 m. if the diameter is of the image is 2.2 cm, the diameter of the moon is-
 - (A) 1.1×10^{6} m (B) 2.2×10^{6} m (C) 2.2×10^{8} m (D) 2.2×10^{10} m
- Q.15 The focal length of a concave mirror is f and the distance of the object from the principal focus is a. The magnitude of magnification obtained will be-

(A) $(f + a)/f$	(B) f /a
(C) \sqrt{f} / \sqrt{a}	(D) f^2/a^2

Q.16 The magnification of an object placed 10 cm from a convex mirror of radius of curvature 20 cm will be-

(A) 0.2	(B) 0.5
(C) 1	(D) infinity

- Q.17 The image formed by a concave mirror is observed to be virtual, erect and larger than the object. then the position of the object should be-
 - (A) between the 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 the focus
- Q.18 The magnification produced by a concave mirror -
 - (A) is always more than one
 - (B) is always less than one
 - (C) is always equal to one
 - (D) may be less than or greater than one
- Q.19 Choose the correct relation between u, v and R-

(A)
$$R = \frac{2uv}{u+v}$$
 (B) $R = \frac{2}{u+v}$
(C) $R = \frac{2(u+v)}{(uv)}$ (D) none of these

Q.20 The image formed by a concave mirror is real, inverted and of the same size as that of the object. The position of the object should be-

Q.21 A boy is standing in front of a plane mirror at a distance of 3m form it. What is the distance between the boy and his image ?

(A) 3 m	(B) 4.5 m
(C) 6 m	(D) none of these

ANSWER KEY EXERCISE-1

1. $\pi - 2i$

6. 1

2. virtual

7. plane mirror

9. as $I \propto \frac{1}{r^2}$

26. Image becomes brighter

10. They reflect light parallel

27. Yes

5. 3 8. $\frac{1}{v} + \frac{1}{u} = \frac{1}{f} \Rightarrow \text{linear}$

15. No change

EXERCISE-2

Ques	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans	В	А	В	В	С	В	А	D	А	D	С	В	С	В	В
Ques	16	17	18	19	20	21									
Ans	В	D	D	A	С	С									