Chapter – (Light – Reflection And Refraction)

Topic - 1 (Reflection of Light, Image Formed by Spherical Mirrors)

Very Short Answer Type Questions

Q.1. What is virtual image?

Q.2. Define the principal focus of a concave mirror.

Q.3. What do you mean by lateral inversion of the image in mirrors?

Q.4. What is the range of wavelengths of the visible light?

Q.5. What makes things visible?

Q.6. What are the two factors on which the lateral displacent of an emergent ray from a glass slab depends?

Q.7. What is the magnification of the images formed by plane mirror and why?

Q.8. What is the minimum distance between an object and its real image in case of a concave mirror?

Q.9. When a light ray passes obliquely through the atmosphere in an upward direction, how does its path generally change?

Q.10. Explain why a ray of light passing through the centre of curvature of a concave mirror, gets reflected along the same path.

Q.11. Why are convex mirrors preferred over plane mirrors as rear view mirrors?

Q.12. We prefer a convex as a rear view mirror in vehicles. Why?

Q13. Why does the bottom of a tank or a pond containing water appear to be raised?

Q.14. Name the mirror that can give an erect and enlarged image of an object.

Q.15. What are the values of angle of incidence i and angle of reflection r for a normal incidence?

Q.16. Does the speed of light increases or decreases in a medium in comparison to its value in vacuum? Give an illustrative example.

Q.17. Find the focal length of a convex mirror whose radius of curvature is 32 cm.

Q.18. The radius of curvature of a spherical mirror is 20 cm. What is its focal length?

Short Answer Type Questions – I

Q.1. List four characteristics of the image formed by plane mirrors.

Q.2. List two properties of the images formed by convex mirrors. Draw ray diagram in support of your answer.

Q.3. List four specific characteristics of the images of the objects formed by convex mirrors.

Q.4. Differentiate a real image from a virtual image giving two points of difference.

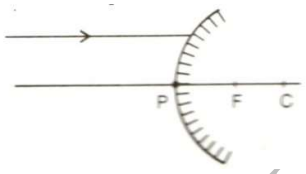
Q.5. You are given a concave mirror, plane mirror and a convex mirror. How can you distinguish between them by just looking your face in them. State the common nature of the image that you see in all of them.

Q.6. A ray of light travelling in air enters obliquely into water. Does the light ray bend towards the normal or away from the normal? Why?

Q.7. State two positions in which a concave mirror produces a magnified image of a given object. List two differences between the two images. OR

List two possible ways in which a concave mirror can produce a magnified image of an object placed in front of it. State the difference, if any, between these two images.

Q.8. A ray of light is incident on a convex mirror as shown. Redraw the diagram and complete the path of this ray after reflection from the mirror. Mark angle of incidence and angle of reflection on it.

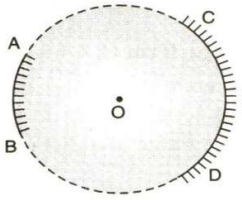


Q.9. The linear magnification produced by a spherical mirror is +3. Analyse this value and state the

(i) type of mirror and

(ii) Position of the object with respect to the pole of the mirror. Draw ray diagram to show the formation of image in this case.

Q.10. AB and CD, two spherical mirrors, form parts of a hollow spherical ball with its centre at O as shown in the diagram. If arc AB = $\frac{1}{2}$ arc, CD, What is the ratio of their focal lengths? State which of the two mirrors will always form virtual image of an object placed in front of it and why.



Q.11. Name the type of the mirrors used in the design of solar furnaces. Explain how high temperature is achieved b this device.

Q12. “The magnification produced by a spherical mirror is – 3”. List four informations you obtain from this statement about the mirror / image.

Q.13. Draw a ray diagram to show the path of the reflected ray corresponding to an incident ray of light parallel to the principal axis of a convex mirror and show the angle of incidence and angle of reflection on it.

Q.14. The image formed by a concave mirror is observed to be virtual, erect and larger than the object. Where should be the position of the object relative to the mirror? Draw ray diagram to justify your answer.

Q.15. Draw a ray diagram to show the path of the reflected ray corresponding to an incident ray which is directed parallel to the principal axis 7 a convex mirror. Mark on it the angle of incidence and the angle of reflection.

Q.16. Draw a ray diagram to show the path of the reflected ray corresponding to an incident ray which is directed parallel to the principal axis 7 a concave mirror. Mark on it the angle of incidence and the angle of reflection.

Q.17. "A concave mirror of focal length 'f' can form a magnified erect as well as an inverted image of an object placed in front of it." Justify this statement stating the position of the object with respect to the mirror in each case for obtaining these images.

Q.18. An object is placed at a distance of 20 cm from a convex mirror of focal length 15 cm. Find the position and nature of the image.

Q.19. The radius of curvature of a concave mirror is 50cm. Where should an object be placed from the mirror so as to form its image at infinity? Justify your answer.

Q.20. An object is placed at a distance of 20 cm in front of convex mirror of radius of curvature 30 cm. Find the position and nature of the image.

Q.21. An object is kept at a distance of 5 cm in front of a convex mirror of focal length 10 cm. Calculate the position and nature of the image formed.

Short Answer Type Questions – II

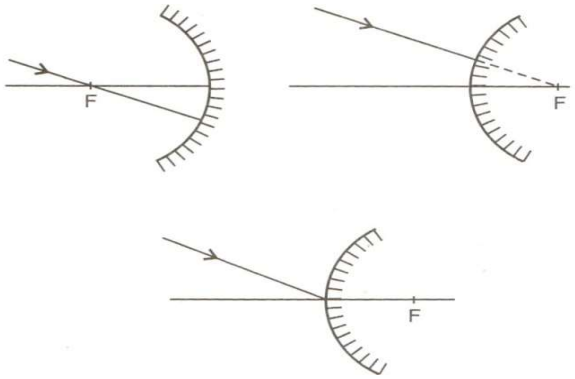
Q.1. Name the type of mirror used in the following situations:
(i) Headlights of a car (ii) Rear – view mirror of vehicles (iii) Solar furnace
Support your answer with reasons.

Q.2. Mention the types of mirrors used as
(i) rear view mirrors (ii) Shaving mirrors.
List two reasons to justify your answers in each case.

Q.3. (i) Name the spherical mirror used as:
(a) Shaving mirror
(b) Rear view mirror in vehicles
(c) Reflector in search – lig3hts
(ii) Write any three differences between a real and a virtual image.

Q.4. If the image formed by mirror for all positions of the object placed in front of it is always virtual and diminished, state the type of the mirror. Draw a ray diagram in support of your answer. Where are such mirrors commonly used and why?

Q.5. Draw the following diagram, in which a ray of light is incident on a concave / convex mirror, on your answer sheet. Show the path of this ray, after reflection, in each case.



Q.6. The image of an object formed by a mirror is real, inverted and is of magnification – 1. If the image is at a distance of 40 cm from the mirror, where is the object placed? Where would the image be if the object is moved 20 cm towards the mirror? State reason and also draw ray diagram for the new position of the object to justify your answer.

Q.7. A student wants to project the image of a candle flame on a screen 80 cm in front of a mirror by keeping the candle flame at a distance of 20 m from its pole.

(i) Which type of mirror should the student use?

(ii) Find the magnification of the image produced.

(iii) Find the distance between the object and its image.

(iv) Draw a ray diagram to show the image formation in this case and mark the distance between the object and its image.

Q.8. Draw a ray diagram to show the path of the reflected ray in each of the following cases. A ray of light incident on a convex mirror

(i) Strikes at its pole making an angle θ from the principal axis.

(ii) Is directed towards its principal focus.

(iii) Is parallel to its principal axis.

Q.9. To construct ray diagrams, two rays of light are generally so chosen that it is easy to determine their directions after reflection from a mirror. Choose two such rays and state the path / direction of these rays after reflection from a concave mirror. Use these two rays to find the position and nature of the image of an object placed at a distance of 8 cm from concave mirror of focal length 12 cm.

Q.10. If the image formed by a mirror for all positions of the object placed in front of it is always erect and diminished, what type of mirror is it? Draw a ray diagram to justify your answer. Where and why do we generally use this type of mirror?

Q.11. 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.

(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.

Q.12. A student wants to project the image of a candle flame on a screen 48 cm in front of a mirror by keeping the flame at a distance of 12 cm from its pole.

(i) Suggest the type of mirror he should use.

(ii) Find the linear magnification of the image produced.

(iii) How far is the image from its object?

(iv) Draw ray diagram to show the image formation in this case.

Q.13. A spherical mirror produces an image of magnification – 1 on a screen placed at a distance of 50 cm from the mirror.

(i) Write the type of mirror. (ii) Find the distance of the image from the object.

(iii) What is the focal length of the mirror? (iv) Draw the ray diagram to show the image formation in this case.

Q.14. Rohit wants to have an erect image of an object, using a converging mirror of focal length 40 cm.

(i) Specify the range of distance where the object can be placed in front of mirror. Give reason for your answer.

(ii) Will the image be bigger or smaller then the object?

(iii) Draw a ray diagram to show the image formation in this case.

Q.15. (i) A concave mirror produces three times enlarged image of an object placed at 10 cm in front of it. Calculate the focal length of the mirror.

(ii) Show the formation of the image with the help of a ray diagram when object is placed 6 cm away from the pole of a convex mirror.

Long Answer Type Questions

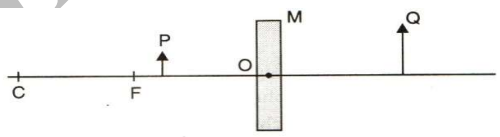
Q.1 (a) Define the following terms in the context of spherical mirrors:

(i) Pole (ii) Centre of curvature (iii) Principal axis (iv) Principal focus

(b) Draw ray diagrams to show the principal focus of a:

(i) Concave mirror (ii) Convex mirror

(c) Consider the following diagram in which M is a mirror and P is an object and Q is its magnified image formed by the mirror.



State the type of the mirror M and one characteristic property of the image Q.

Q.2. Suppose you have three concave mirrors A, B and C of focal lengths 10 cm, 15 cm and 20 cm. For each concave mirror you perform the experiment of image formation for three values of object distance of 10 cm, 20 cm and 30 cm. Giving reason answer the following :

(i) For the three object distances, identify the mirror / mirrors which will form an image of magnification – 1.

(ii) Out of the three mirrors identify the mirror which would be preferred to be used for shaving purposes / makeup.

(iii) For the mirror B draw ray diagram for image formation for object distances 10 cm and 20 cm.

Q.3. It is desired to obtain an erect image of an object, using concave mirror of focal length of 12 cm.

(i) What should be the range of distance of an object placed in front of the mirror?

(ii) Will the image be smaller or larger than the object. Draw ray diagram to show the formation of mage in this case.
(iii) Where will the image of this object be, if it is placed 24 cm in front of the mirror? Draw ray diagram for this situation also to justify your answer. Show the positions of pole, principal focus and the centre of curvature in the above ray diagrams.

Q.4. A student has focused the image of a candle flame on a white screen using a concave mirror. The situation is as given below:
Length of the flame = 1.5 cm
Focal length of the mirror = 12 cm
Distance of flame from the mirror = 18 cm
If the flame is perpendicular to the principal axis of the mirror, then calculate the following:
(i) Distance of the image from the mirror
(ii) Length of the image
If the distance between the mirror and the flame is reduced to 10 cm, then what would be observed on the screen? Draw ray diagram to justify your answer for this situation.

Q.5. A student wants to project the image of a candle flame on the walls of the school laboratory by using a mirror.
(i) Which type of mirror should he use and why?
(ii) At what distance, in terms of focal length 'f' of the mirror, should he place the candle flame to get the magnified image on the wall ?
(iii) Draw a ray diagram to show the formation of the image in this case.
(iv) Can he use this mirror to project a diminished image of the candle flame o the same wall? State 'how' if your answer is 'yes' and 'why not' if your answer is 'no'.

Q.6. (i) 4.5 cm needle is placed 12 cm away from a convex mirror of focal length 15 cm. Give the location of the image and the magnification. Describe what happens as the needle is moved farther from the mirror.
(ii) What kind of mirror is used in a solar furnace? Give reason for using this mirror.
(iii) One half of a convex lens is covered with a black paper. Will this lens produce a complete image of the object ? Justify your answer.

Q.7. (i) An object is placed at a distance of 60 cm from a convex mirror where the magnification produced is $\frac{1}{2}$. Where should the object be placed to get a magnification of $\frac{1}{3}$?
(ii) A small electric lamp is placed at the focus of a convex lens. State the nature of beam of light produced by the lens. Draw a diagram to show this.

Q.8. Draw a ray diagram in each of the following cases to show the position and nature of image formed when the object is placed:
(i) Between pole and focus of a concave mirror.
(ii) Between focus and centre of curvature of a concave mirror.
(iii) At the centre of curvature of a concave mirror.
(iv) Between infinity and pole of a convex mirror.
(v) At infinity from a convex mirror.

Topic - 2 (Refraction, Lenses, Power of Lens)

Very Short Answer Type Questions

Q.1. What is meant by power of a lens?

Q.2. Define angle of incidence and angle of refraction.

Q.3. What is the unit of refractive index?

Q.4. Define 1 dioptre of power of alens.

Q.5. State a condition for no refraction of light entering from one medium to another.

Q.6. What is the change in image observed as the object is moved from infinity towards the concave lens?

Q.7. Why is refractive index of atmosphere different at different altitudes?

Q.8. How does the size of the image change as the object is brought closer from infinity towards the convex lens?

Q.9. Do, all cartesian sign conventions are applicable in each case of spherical lens as in mirrors?

Q.10. Why does light change its path as the medium changes during the transit?

Q.11. Arrange the following common substances in the increasing order of refractive indices, Ice, Kerosene, Glass, Diamond, Alcohol, Water.

Q.12. the refractive index of diamond is 2.42. What is the meaning of this statement?

Short Answer Type Questions-I

Q.1. What is meant by power of a lens? What does its sign (+ ve or – ve) indicate? State its S.I. unit. How is this unit related to focal length of a lens?

Q.2. What is meant by power of lens? Define its SI unit.

Q.3. State two laws of refraction.

Q.4. State four characteristics of the image formed by plane mirror.

Q.5. Mention the kind of lens that can form:
(i) Real, inverted and magnified image
(ii) Virtual, erect and magnified image
(iii) Real, inverted and diminished image
(iv) Virtual, erect and diminished image.

Q.6. Briefly describe an activity to find approximate focal length of a convex lens.

Q.7. What is meant by the power of a lens? Give its SI unit. When two or more lenses are placed in contact what will be their combined power?

Q.8. The refractive indices of glass and water are 4/3 and 3/2 respectively. IF speed of light in glass is 2×10^8 m/s, find the speed of light in water.

Q.9. The absolute refractive indices of glass and water are 4/3 and 3/2 respectively. If the speed of light in glass is 2×10^8 m/s, calculate the speed of light in (i) vacuum, (ii) water.

Q.10. "A ray of light incident on a rectangular glass slab immersed in any medium emerges parallel to itself." Draw a diagram to justify the statement.

Q.11. A ray of light falls normally on the surface of a transparent glass slab. Draw a ray diagram to show its path and also mark angle of incidence and angle of emergence.

Q.12. Light enters from air into glass plate which has refractive index 1.5 Calculate the speed of light in glass (velocity of light in air is 3×10^8 m/s).

Q.13. Draw the ray diagram for the formation of image by a concave lens when the object is placed in between infinity and optical centre of the lens. State the nature of the image formed.

Q.14. For the same angle of incidence in media P, Q and R the angles of refraction are $45^\circ, 35^\circ \; and \; 15^\circ$ respectively. In which medium will the velocity of light be minimum? Give reason for your answer.

Q.15. The refractive index of a dense flint glass is 1.65 and for alcohol it is 1.36 with respect to air. Find the refractive index of dense flint glass with respect to alcohol.

Q.16. Define absolute refractive index of a medium. Light enters from air to water having refractive index $\frac{4}{3}$. Find the absolute refractive index of a medium if the speed of light in vacuum is 3×10^8 m/s.

Q.17. A convex lens of focal length 10 cm is placed at a distance of 12 cm from a wall. Calculate the distance from the lens where an object can be placed so as to form its distinct real image on the wall.

Short Answer Type Questions-II

Q.1. State the laws of refraction of light. If the speed of light in vacuum is 3×10^8 m/s find the absolute refractive index of a medium in which light travels with a speed of 1.4×10^8 m/s.

Q.2. State the laws of refraction of light. If the speed of light in vacuum is 3×10^8 m/s, find the speed of light in a medium of absolute refractive index 1.5.

Q.3. (i) Define the term magnification. Write the formula for magnification of mirror explaining the symbols used in the formula.
(ii) The magnification produced by a convex lens is – 2. What is meant by this statement and also write the information regarding image obtained from it.

Q.4. Define the power of lens. The power of lens is + 2.0 D.
(i) Find the focal length of lens is m.

(ii) Name the kind of this lens. Explain with the help of figure whether this lens would coverage or diverge a beam of lens.

Q.5. Draw a ray diagram to show that path of the refracted ray in each of the following cases:
A ray of light incident on a concave lens is
(i) Passing through its optical centre.
(ii) Parallel to its principal axis.
(iii) Directed towards its principal focus.

Q.6. (i) Draw a ray diagram to show the refraction of light through a glass slab and mark angle of refraction and the lateral shift suffered by the ray of light while passing through the slab.
(ii) If the refractive index of glass for light going from air to glass is 3/2, find the refractive index of air for light going from glass to air.

Q.7. The image formed by a spherical mirror is real inverted and is of magnification – 2. If the image is at distance of 30 cm from the mirror, where is the object placed? Find the focal length of the mirror. List two characteristics of the image formed if the object is moved 10 cm towards the mirror.

Q.8. If the image formed by a lens for all positions of the object placed in front of it is always virtual, erect and diminished, state the type of the lens. Draw a ray diagram in support of your answer. If the numerical value of focal length of such a lens is 20 cm, find its power in new Cartesian sign conventions.

Q.9. The image of an object formed by a lens is of magnification – 1. If the distance between the object and its image is 60 m, what is the focal length of the lens? If the object is moved 20 cm towards the lens, where would the image be formed? State reason and also draw a ray diagram in support of your answer.

Q.10. An object of height 5 cm is placed perpendicular to the principal axis of a concave lens of length 10 cm. If the distance of the object from the optical centre of the lens is 20 cm, determine the position, nature and size of the image formed using the lens formula.

Q.11. The image of candle flame placed at a distance of 40cm from a spherical lens is formed on a screen placed on the other side of the lens at a distance of 40 cm from the lens. Identify the types of lens and write its focal length. What will be the nature of the image formed it the candle flame is shifted 25cm towards the lens ? Draw ray diagram to justify.

Q.12. An object of height 6 cm is placed perpendicular to the principal axis of a concave lens of focal length 5 cm. Use lens formula to determine the position, size and nature of the image if the distance of the object from the lens is 10 cm.

Q.13. Calculate the distance at which an object should be placed in front of a convex lens of focal length 100 cm to obtain an erect image of double its size.

Q.14. An image $\frac{2}{3}$ of the size of the object is formed by a convex lens at a distance of 12 cm from it. Find the focal length of the lens.

Q.15. (a) An object is kept at a distance of 18 cm, 20 cm, 22 cm and 30 cm, from a lens of power + 5D.

(i) In which case or cases would you get a magnified image?

(ii) Which of the magnified image can we get on a screen?

(b) List two widely used applications of a convex lens.

Q.16.(i) Water has a refractive index 1.33 and alcohol has refractive index 1.36. Which of the two medium is optically denser? Give reason for your answer. Draw a ray diagram to show the path of a ray of light passing obliquely from water to alcohol.

(ii) The absolute refractive index of diamond is 2.42 and the absolute refractive index of glass is 1.50. Find the refractive index of diamond with respect to glass

Q.17. A glass slab made of a material of refractive index n, is kept in a medium of refractive index n_2. A light ray is incident on the slab. Complete the path of rays of light emerging from the glass slab, if:

(i) $n_1 > n_2$, (ii) $n_1 = n_2$, (iii) $n_1 < n_2$.

Q.18. (a) Two lenses have power of (i) + 2 D (ii) – 4 D. What is the nature and focal length of each lens?

(b) An object is kept at a distance of 100 cm from lens of power – 4 D. Calculate the image distance.

Q.19. (i) A ray of light falls normally on a face of a glass slab. What are the values of angle of incidence and angle of refraction of this ray?

(ii) Light enters from air to a medium 'X' Its speed in medium 'X' becomes 1.5×10^8 m/s. Speed of light in air is 3×10^8 m/s. Find the refractive index of medium 'X'.

Q.20. Where should an object be placed from a converging lens of focal length 20 cm, so as to obtain a real magnified image.

Q.21. A concave lens has focal length of 15 cm. At what distance should the object from the lens be placed so that it forms an image at 10 cm from the lens? Also find the magnification produced by the lens.

Q.22. A concave lens made of a material of refractive index n_1 is kept in a medium of refractive index n_2. A parallel beam of light is incident on the lens. Trace the path of rays of light parallel to the principal axis incident on the concave lens after refraction when: (i) $n_1 > n$ (ii) $n_1 = n_2$. Give reason for each.

Q.23. A student focused the image of a candle flame on a white screen by placing the flame at various distances from a convex lens. He noted his observations as:

S.No.	Distance of flame from the lens (cm)	Distance of the screen from the lens (cm)
(i)	60	20
(ii)	40	24
(iii)	30	30
(iv)	24	40
(v)	15	70

(a) From the above table, find the focal length of lens without using lens formula.

(b) Which set of observations is incorrect and why?

(c) In which case, the size of the object and image will be same? Give reason for your answer.

Long Answer Type Questions

Q.1. (i) Define optical centre of a spherical lens.

(ii) A divergent lens has a focal length of 20 cm. At what distance should an object of height 4 cm from the optical centre of the lens be placed so that its image is formed 10 cm away from the lens. Find the size of the image also.

(iii) Draw a ray diagram to show the formation of image in above situation.

Q.2. (i) Define focal length of a spherical lens.

(ii) A divergent lens has a focal length of 30 cm. At what distance should an object of height 5 cm from the optical centre of the lens be placed so that its image is formed 15 cm away from the lens. Find the size of the image also.

(iii) Draw a ray diagram to show the formation of image in the above situation.

Q.3. (i) Define focal length of a divergent lens.

(ii) A divergent lens of focal length 30 cm from the image of an object of size 6 cm on the same side as the object at a distance of 15 cm from its optical centre. Use lens formula to determine the distance of the object from the lens and the size of the image formed.

(iii) Draw a ray diagram to show the formation of image in the above situation.

Q.4. (a) State the laws of refraction of light. Explain the term absolute refractive index of a medium and write an expression to relate it with the speed of light in vacuum.

(b) The absolute refractive indices of two media 'A' and 'B' are 2.0 and 1.5 respectively. If the speed of light in medium 'B' is 2×10^8 m/s, calculate the speed of light in : (i) vacuum (ii) medium 'A'

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

An 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.

Q.6. (a) Explain the following terms related to spherical lenses:

(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.

Q.7. (i) Define power of a lens. Write its SI units.

(ii) You are provided with two convex lenses of focal length 15 cm and 25 cm, respectively. Which of the two is of larger power? Give reason for your answer.

(iii) A 20 cm tall object is placed perpendicular to the principal axis of a convex lens of focal length 10 cm. The distance of the object from the lens is 15 cm. Find the nature, position and size of the image. Also find its magnification.

Q.8. What is meant by the power of a lens? What is its S.I. unit? Name the type of lens whose power is positive.

The image of an object formed by a lens is real, inverted and of the same size as the object. If the image is at a distance of 40 cm from the lens, what is the nature and power of the lens? Draw ray diagram to justify your answer.

Q.9. (i) Draw a ray diagram to show the formation of image by a convex lens when an object is placed in front of the lens between its optical centre and principal focus.

(ii) In the above ray diagram mark the object-distance (u) and the image-distance (v) with their proper signs (+ ve or – ve as per the new Cartesian sign convention) and state how these distances are related to the focal length (f) of the convex lens in this case.

(iii) Find the power of a convex lens which forms a real, and inverted image of magnification – 1 of an object placed at a distance of 20 cm from its optical centre.

Q.10. (i) Draw a ray diagram to show the formation of image by a concave lens when an object is placed in front of it.

(ii) In the above diagram mark the object – distance (u) and the image distance (v) with their proper signs (+ ve or – ve as per the new Cartesian sign convention) and state how these distances are related to the focal length (f) of the concave lens in this case.

(iii) Find the nature and power of a lens which forms a real and inverted image of magnification – 1 at a distance of 40 cm from its optical centre.

Q.11. At what distance from a concave lens of focal length 20 cm a 6 m tall object be placed so as to obtain its image at 15 cm from the lens? Also calculate the size of the image formed.

Draw a ray diagram to justify your answer for the above situation and label it.

Q.12. A student wants to project the image of a candle flame on the walls of school laboratory by using a lens:

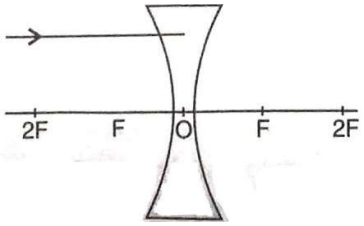
(i) Which type of lens should he use and why?

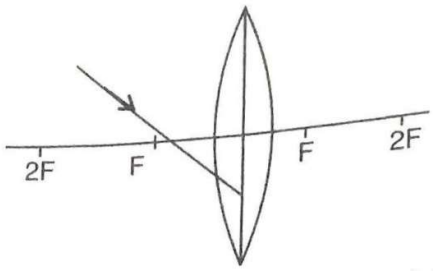
(ii) At what distance in terms of focal length 'F' of the lens should he place the candle flame so as to get (i) a magnified, and (ii) a diminished image respectively on the wall?

(iii) Draw ray diagram to show the formation of the image in each case?

Q.13. (i) The refractive index of diamond is 2.42. What is the meaning of this statement?

(ii) Redraw the diagram given below in your answer book and complete the path of the ray.





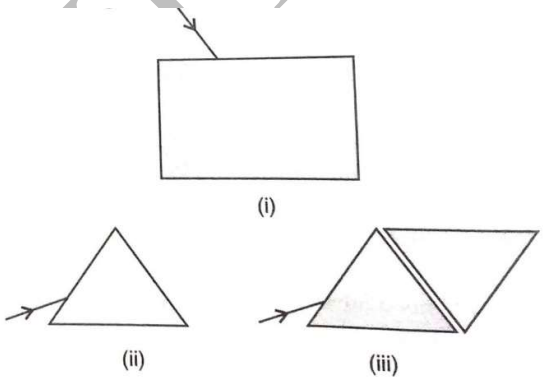
(iii) What is the difference between virtual images produced by concave, plane and convex mirrors?

(iv) What does the negative sign in the value of magnification produced by a mirror indicates about a image?

Q.14. (i) Two convex lenses A and B have powers P_1 and P_2, respectively and P_2 is greater than P_1. Draw a ray diagram for each lens to show which one will be more converging. Give reason for your answer.

(ii) A 2.0 cm tall object is placed perpendicular to the principal axis of a convex lens of focal length 10 cm. The distance of the object from the lens is 15 cm. Find the nature, position and size of the image. Also find its magnification.

Q.15. A very thin narrow beam of white light is made incident on three glass objects shown below. Comment on the nature and behavior of the emergent beam in all the three cases.



There is a similarity between two of the emergent beams. Identify the two. When light enters from air to glass, the angles of incidence and refraction in air and glass are 45° and 30°, respectively. Find the refractive index of glass. (Given that $\sin 45° = \frac{1}{\sqrt{2}}$; $\sin 30° \frac{1}{2}$).