



HEM SHEELA MODEL SCHOOL DURGAPUR

ASSIGNMENT [2019-2020]

PHYSICS

CLASS-X

- 1 Write the laws of reflection of light. Differentiate between regular reflection of light and irregular reflection of light. Give at least each of two practical examples of regular reflection of light and irregular reflection of light.
- 2 Write the relation between u , v , and r for a concave mirror.
- 3 Take a large shining spoon. Try to view your face in its curved surface.
Do you get the image? Is it smaller or larger?
Move the spoon slowly away from your face. Observe the image.
How does it change?
Reverse the spoon and repeat the Activity. How does the image look like now?
Compare the characteristics of the image on the two surfaces.
- 4 Show the New Cartesian Sign Convention for spherical mirrors drawing diagram.
- 5 Write the Nature, position and relative size of the image formed by a convex mirror, when the object is (i) at infinity (ii) between infinity and the pole of the mirror. Draw the ray diagram for each.
- 6 Write the Nature, position and relative size of the image formed by a concave mirror, when the object is (i) at infinity (ii) between F and $2F$ of the mirror (iii) at $2F$. Draw the ray diagram for each.
- 7 You have been given a convex mirror. Hold it in one hand. ☐ Hold a pencil in the upright position in the other hand. ☐ Observe the image of the pencil in the mirror. Is the image erect or inverted? Is it diminished or enlarged? ☐ Move the pencil away from the mirror slowly. Does the image become smaller or larger? ☐ Repeat this Activity carefully. State whether the image will move closer to or farther away from the focus as the object is moved away from the mirror?
- 8 A convex mirror used for rear-view on an automobile has a radius of curvature of 4.00 m. If a bus is located at 10.00 m from this mirror, find the position, nature and size of the image.
- 9 An object, 4.0 cm in size, is placed at 25.0 cm in front of a concave mirror of focal length 15.0 cm. At what distance from the mirror should a screen be placed in order to obtain a sharp image? Find the nature and the size of the image.
- 10 (a) Draw a thick straight line in ink, over a sheet of white paper placed on a Table.
Place a glass slab over the line in such a way that one of its edges makes an angle with the line. Look at the portion of the line under the slab from the sides. What do you observe? Does the line under the glass slab appear to be bent at the edges?
Next, place the glass slab such that it is normal to the line. What do you observe now? Does the part of the line under the glass slab appear bent?
Look at the line from the top of the glass slab. Does the part of the line, beneath the slab, appear to be raised? Why does this happen?
(b) State the laws of refraction of light. Explain with diagram.

- 11 (a) 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?
 (b). Light enters from air to glass having refractive index 1.50. What is the speed of light in the glass? The speed of light in vacuum is 3×10^8 m/s.
- 12 Write the Nature, position and relative size of the image formed by a concave lens, when the object is (i) at infinity (ii) between F and 2F of the lens (iii) at 2 F. Draw the ray diagram for each.
- 13 Write the Nature, position and relative size of the image formed by a convex lens, when the object is (i) at infinity (ii) between F and 2F of the lens (iii) at 2 F. (iv) beyond 2F. Draw the ray diagram for each.
- 14 Write the lens formula with magnification.
- 15 A concave lens has focal length of 20 cm. At what distance should the object from the lens be placed so that it forms an image at 15 cm from the lens? Also, find the magnification produced by the lens.
- 16 A 4.0 cm tall object is placed perpendicular to the principal axis of a convex lens of focal length 15 cm. The distance of the object from the lens is 25 cm. Find the nature, position and size of the image. Also find its magnification.
- 17 a). Define 1 dioptre of power of a lens.
 b) A convex lens forms a real and inverted image of a needle at a distance of 50 cm from it. Where is the needle placed in front of the convex lens if the image is equal to the size of the object? Also, find the power of the lens.
- 18 A spherical mirror and a thin spherical lens have each a focal length of -15 cm. The mirror and the lens are 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.
- 19 One-half of a convex lens is covered with a black paper. Will this lens produce a complete image of the object? Verify your answer experimentally. Explain your observations.
- 20 An object of size 7.0 cm is placed at 27 cm in front of a concave mirror of focal length 18 cm. At what distance from the mirror should a screen be placed, so that a sharp focused image can be obtained? Find the size and the nature of the image.
- 21 Name the type of mirror used in the following situations.
 (a) Headlights of a car.
 (b) Side/rear-view mirror of a vehicle.
 (c) Solar furnace.
 Support your answer with reason.
- 22 Find the two possible positions of an object kept in front of a concave mirror of focal length 20 cm so that the image formed in each case is two times enlarged.
- 23 The distance of an object from a concave mirror is reduced from 60cm to 30cm. If the image formed in the second case is 3 times magnified than that in the first case, find the focal length of the mirror.
- 24 For the same angle of incidence, the angles of refraction in three different media A, B and C are

25°, 35° and 45° respectively. In which medium will the velocity of light be minimum?

- 25 (a). A ray of light travelling in air enters obliquely into a glass slab. Does the light ray bend towards the normal or away from the normal? Why?
(b). Light enters from air to another medium having refractive index 1.80. What is the speed of light in that medium? The speed of light in vacuum is 3×10^8 m/s. If the angle of incidence is 45°, find value of angle of refraction (approximately) and angle of emergence.
- 26 An object 10 cm in length is held 27 cm away from a converging lens of focal length 18 cm. Draw the ray diagram and find the position, size and the nature of the image formed
- 27 (a) Write four characteristics of the image formed by a plane mirror
(b) Differentiate between real image and virtual image.

28. The image of an object formed by a mirror is real, inverted and is of magnification -1. If the image is at the distance of 30 cm from the mirror, where is the object placed? Find the position of the image if the object is now moved 20 cm towards the mirror. What is the nature of the image obtained? Justify your answer with the help of ray diagram.

29. What is meant by power of a lens? You have three lenses L_1 , L_2 and L_3 of powers +10D, +5D and -10D respectively. State the nature and focal length of each lens. Explain which of the three lenses will form a virtual and magnified image of an object placed at 15 cm from the lens. Draw the ray diagram in support of your answer.

30.(a) Define the far point and near-point of the human eye with normal vision.

(b) The far point of a myopic person is 80 cm in front of the eye. What is the nature and power of the lens required to correct the problem?

31. A child while playing with his father's spectacles burnt a hole in a piece of white paper by focusing a small image of the sun on it. a) Mention the defect of vision his father is suffering from? b) Write two causes for this defect. c) Draw a ray diagram showing corrected eye using proper lens.

32. (a) What is meant by the term 'power of accommodation'? Name the component of eye that is responsible for the power of accommodation.

b) A student sitting at the back bench in a class has difficulty in reading. What could be his defect of vision? Draw ray diagrams to illustrate the image formation of the blackboard when he is seated at the (i) back seat (ii) front seat. State two possible causes of this defect. Explain the method of correcting this defect with the help of a ray diagram.

33.(a) What is dispersion of light? Write the cause of dispersion of light.

(b) What is a rainbow? How it is formed?

(c) Planets do not twinkle-why?

(d) How can we explain the reddish appearance of sun at sunrise or sunset? Why does it not appear red at noon?

e) What is Tindal effect?

d). Why does the sun appear reddish early in the morning? Will this phenomenon be observed by an astronaut on the moon ? give reason to justify your answer.

CURRENT ELECTRICITY AND MAGNETIC EFFEC OF CURRENT

1. State Ohm s law, how can you verify experimentally this law

The value of current I flowing in a given resistor for the corresponding values of potential difference V across the resistor are given below

I(amperes)	0.5	1	2	3	4
V(volts)	1.6	3.4	6.7	10.2	13.2

Plot a graph between current (I) and potential difference (V) and determine the resistance (R) of the resistor

2. State how would you join three resistors, each of resistance 9Ω so that the equivalent resistance of the combination is i. 13.5Ω and ii. 6Ω

3) Define 1 coulomb charge. State the relationship between the electric current, the charge moving through a conductor and the time of flow.

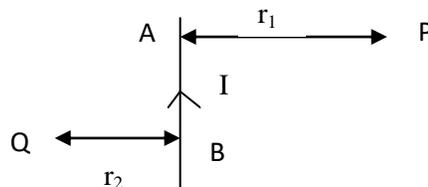
Calculate the charge passing through an electric bulb in 20 minutes if the value of current is 200 mA.

4) In a household electric circuit different appliances are connected in parallel to one another. Give two advantages of this type of connection.

5) An electrician puts a fuse of rating 5A in that part of domestic electrical circuit in which an electrical heater of rating 1.5 kW, 220 V is operating. What is likely to happen in this case and why? What change, if any, needs to be made?

6)a) AB is a current-carrying conductor in the plane of the paper as shown in figure. What are the directions of magnetic fields produced by it at points P and Q?

Given $r_1 > r_2$, where will the strength of the magnetic field be larger and why?



b) Shruti draws magnetic field lines close to the axis of a current carrying circular loop. As she moves away from the centre of circular loop, she observes that the lines keep on diverging. Explain the reason

for her observation.

Write two properties of magnetic field lines.

Why two field lines can never intersect each other?

7) a) Define electromagnetic induction. State two ways to induce current in a coil.

Two coils P and S are wound over the same iron core. Coil P is connected to battery and key and the coil S is connected to galvanometer. Draw a suitable diagram of this arrangement and write your observations when:

- i. Current in the coil P is started by closing the key.
- ii. Current continues to flow in coil P.
- iii. Current in coil P is stopped by removing the key.

Explain the reason for such observations.

b) In a voltmeter there are 20 divisions between the 0 mark and 0.5 V mark. Calculate the least count of the voltmeter.

8) A millimeter had graduation marked 0, 100, 200, 300, 400 and 500. Each of the space between two consecutive graduation marks is divided into 20 divisions. If the pointer of the instrument is indicating the seventh graduation after 300 mark, the current flowing in the circuit is

- (a) 307 mA (b) 335 mA (c) 370 mA (d) 375 mA

9) (i) What is the function of earth wire in electrical instruments?

(ii) Explain what is short circuiting in an electric supply. (iii) What is the usual current rating of the fuse wire in the line to feed (a) lights and fans? (b) appliances of 2 kW and more power? iv) Write the function of a fuse wire.

10. (i) What is heating effect of current? List two electrical appliances which work on this effect.

(ii) An electric bulb is connected to a 220 V generator. If the current drawn by the bulb is 0.50 A, find its power.

(iii) An electric refrigerator rated 400 W operates 8 hours a day. Calculate the energy consumed per day in kWh. (iv) State the difference between kilowatt and kilowatt hour.

11. (i) How will you connect a given set of resistors so that the equivalent resistance is increased? Give reason for your answer.

(ii) Three resistors of resistances 5 Ω , 10 Ω and 30 Ω are connected in parallel across a potential difference of 3V. Calculate: (a) the value of current through each resistor.

(a) the total current in the circuit. (c) the total effective resistance of the circuit.

12. A current through a horizontal power line flows in east to west direction. What is the direction of magnetic field at a point directly below it and at a point directly above it?

13. Consider a circular loop of wire lying in the plane of the table. Let the current pass through the loop clockwise. Apply the right-hand rule to find out the direction of the magnetic field inside and outside the loop. The magnetic field in a given region is uniform. Draw a diagram to represent it.

14. Choose the correct option.

The magnetic field inside a long straight solenoid-carrying current

(a) is zero. (b) decreases as we move towards its end.

(c) increases as we move towards its end. (d) is the same at all points.

15. Which of the following property of a proton can change while it moves freely in a magnetic field? (There may be more than one correct answer.)

(a) mass

(b) speed

(c) velocity

(d) momentum

15. A positively-charged particle (alpha-particle) projected towards west is deflected towards north by a magnetic field. The direction of magnetic field is (a) towards south (b) towards east (c) downward (d) upward

16. a) State Fleming's left-hand rule. b). What is the principle of an electric motor? c) What is the role of the split ring in an electric motor?

17. Explain two different ways to induce current in a coil.

18. a) State the principle of an electric generator.

b). Name some sources of direct current. c. Which sources produce alternating current?

19. Choose the correct option.

A rectangular coil of copper wires is rotated in a magnetic field. The direction of the induced current changes once in each

(a) two revolutions (b) one revolution (c) half revolution (d) one-fourth revolution

20. How does a solenoid behave like a magnet? Can you determine the north and south poles of a current-carrying solenoid with the help of a bar magnet? Explain.

21. Two circular coils A and B are placed closed to each other. If the current in the coil A is changed, will some current be induced in the coil B? Give reason.

22. State the rule to determine the direction of a (i) magnetic field produced around a straight conductor-carrying current, (ii) force experienced by a current-carrying straight conductor placed in a

magnetic field which is perpendicular to it, and (iii) current induced in a coil due to its rotation in a magnetic field.

18. What is the function of an earth wire? Why is it necessary to earth metallic appliances?

19. Name a device that helps to maintain a potential difference across a conductor. a. What is meant by saying that the potential difference between two points is 1 V? b. How much energy is given to each coulomb of charge passing through a 6 V battery?

20 a. On what factors does the resistance of a conductor depend? b. Will current flow more easily through a thick wire or a thin wire of the same material, when connected to the same source? Why? c. Let the resistance of an electrical component remains constant while the potential difference across the two ends of the component decreases to half of its former value. What change will occur in the current through it

21. Draw a schematic diagram of a circuit consisting of a battery of three cells of 2 V each, a 5 Ω resistor, an 8 Ω resistor, and a 12 Ω resistor, and a plug key, all connected in series.

22. An electric lamp of 100 Ω , a toaster of resistance 50 Ω , and a water filter of resistance 500 Ω are connected in parallel to a 220 V source. What is the resistance of an electric iron connected to the same source that takes as much current as all three appliances, and what is the current through it?

23. a. Why does the cord of an electric heater not glow while the heating element does? b. Compute the heat generated while transferring 96000 coulomb of charge in one hour through a potential difference of 50 V. c. An electric iron of resistance 20 Ω takes a current of 5 A. Calculate the heat developed in 30 s.

24 a. What determines the rate at which energy is delivered by a current? b. An electric motor takes 5 A from a 220 V line. Determine the power of the motor and the energy consumed in 2 h.

25 . ALSO READ QUESTIONS/ANSWERS FROM PHYSICS LAB MANUAL.

26. List four forms of energy that you use from morning, when you wake up, till you reach the school. ☐ From where do we get these different forms of energy? ☐ Can we call these 'sources of energy? Why or why not?

27 What are the criteria you would consider when trying to categorise something as a good fuel? ☐ Would your choice be different if you lived (a) in a forest? (b) in a remote mountain village or small island? (c) in New Delhi? (d) lived five centuries ago? ☐ How are the factors different in each case?

28 What is a good source of energy? . What is a good fuel? Give example.

29. a. What are the disadvantages of fossil fuels? b. Why are we looking at alternate sources of energy? c. How has the traditional use of wind and water energy been modified for our convenience?

30 a. What kind of mirror – concave, convex or plain – would be best suited for use in a solar cooker? Why? b. What are the limitations of the energy that can be obtained from the oceans? c. What is geothermal energy? d. What are the advantages of nuclear energy?

31. Hydrogen has been used as a rocket fuel. Would you consider it a cleaner fuel than CNG? Why or why not?

32a. Name two energy sources that you would

consider to be renewable. Give reasons for your choices. b. Give the names of two energy sources that you would consider to be exhaustible. Give reasons for your choices

33 Which of the following is not an example of a bio-mass energy source? (a) wood (b) gobar-gas (c) nuclear energy (d) coal

34. Most of the sources of energy we use represent stored solar energy. Which of the following is not ultimately derived from the Sun's energy? (a) Geothermal energy (b) wind energy (c) nuclear energy (d) bio-mass.

35. a. Compare and contrast fossil fuels and the Sun as direct sources of energy. b. Compare and contrast bio-mass and hydro electricity as sources of energy.

36. On what basis would you classify energy sources as (a) renewable and non-renewable? (b) exhaustible and inexhaustible? Are the options given in (a) and (b) the same?

37. What are the advantages and disadvantages of using a solar cooker? Are there places where solar cookers would have limited utility?

38. What are the environmental consequences of the increasing demand for energy? What steps would you suggest to reduce energy consumption?

39.a. Write the advantages and disadvantages of hydroelectric power plant. Two points each.

b. Write the advantages and disadvantages of thermal power plant. Two points each.