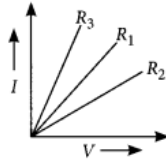


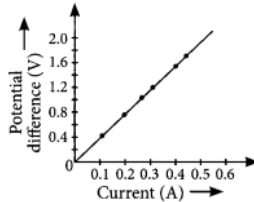
PHYSICS CLASS-X

ELECTRICITY

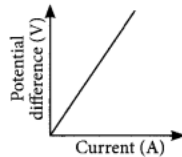
- A current of 10 A flows through a conductor for two minutes.
 - Calculate the amount of charge passed through any area of cross section of the conductor.
 - If the charge of an electron is 1.6×10^{-19} C, then calculate the total number of electrons flowing.
- Name a device that you can use to maintain a potential difference between the ends of a conductor. Explain the process by which this device does so.
- A student plots I-V graphs for three samples of nichrome wire with resistances R_1 , R_2 and R_3 . Choose from the following the statements that holds true for this graph.



- (a) $R_1 = R_2 = R_3$ (b) $R_1 > R_2 > R_3$ (c) $R_3 > R_2 > R_1$ (d) $R_2 > R_1 > R_3$
- A V-I graph for a nichrome wire is given below. What do you infer from this graph? Draw a labelled circuit diagram to obtain such a graph.



- V-I graph for a conductor is as shown in the figure



- What do you infer from this graph?
 - State the law expressed here.
- State Ohm's law. Draw a labeled circuit diagram to verify this law in the laboratory. If you draw a graph between the potential difference and current flowing through a metallic conductor, what kind of curve will you get? Explain how would you use this graph to determine the resistance of the conductor.
 - A cylindrical conductor of length 'l' and uniform area of cross section 'A' has resistance 'R'. The area of cross section of another conductor of same material and same resistance but of length '2l' is (2020)
 - $A/2$
 - $3A/2$
 - $2A$
 - $3A$
 - List three factors on which the resistance of a conductor depends.
 - Write the SI unit of resistivity.
 - List the factors on which the resistance of a conductor in the shape of a wire depends.
 - Why are metals good conductors of electricity whereas glass is a bad conductor of electricity? Give reason.
 - Why are alloys commonly used in electrical heating devices?
 - Calculate the resistivity of the material of a wire of length 1 m, radius 0.01 cm and resistance 20 ohms.
 - A wire has a resistance of 16Ω . It is melted and drawn into a wire of half its original length. Calculate the resistance of the new wire. What is the percentage change in its resistance?
 - If the radius of a current carrying conductor is halved, how does current through it change?

13. The maximum resistance which can be made using four resistors each of $2\ \Omega$ is
(a) $2\ \Omega$ (b) $4\ \Omega$ (c) $8\ \Omega$ (d) $16\ \Omega$
14. List the advantages of connecting electrical devices in parallel with an electrical source instead of connecting them in series.
15. Show how would you join three resistors, each of resistance $9\ \Omega$ so that the equivalent resistance of the combination is (i) $13.5\ \Omega$, (ii) $6\ \Omega$
16. Draw a schematic diagram of a circuit consisting of a battery of 3 cells of $2\ \text{V}$ each, a combination of three resistors of $10\ \Omega$, $20\ \Omega$ and $30\ \Omega$ connected in parallel, a plug key and an ammeter, all connected in series. Use this circuit to find the value of the following :
- (a) Current through each resistor
(b) Total current in the circuit
(c) Total effective resistance of the circuit.
17. (a) With the help of a suitable circuit diagram prove that the reciprocal of the equivalent resistance of a group of resistances joined in parallel is equal to the sum of the reciprocals of the individual resistances.
(b) In an electric circuit two resistors of $12\ \Omega$ each are joined in parallel to a $6\ \text{V}$ battery. Find the current drawn from the battery.
18. Draw a labelled circuit diagram showing three resistors R_1 , R_2 and R_3 connected in series with a battery (E), a rheostat (Rh), a plug key (K) and an ammeter (A) using standard circuit symbols. Use this circuit to show that the same current flows through every part of the circuit. List two precautions you would observe while performing the experiment.
19. The resistance of a resistor is reduced to half of its initial value. In doing so, if other parameters of the circuit remain unchanged, the heating effects in the resistor will become
(a) two times (b) half (c) one-fourth (d) four times
20. (a) Write the mathematical expression for Joules law of heating.
(b) Compute the heat generated while transferring 96000 coulomb of charge in two hours through a potential difference of $40\ \text{V}$.
21. Explain the use of an electric fuse. What type of material is used for fuse wire and why?
22. (a) Why is tungsten used for making bulb filaments of incandescent lamps?
(b) Name any two electric devices based on heating effect of electric current.
23. What is heating effect of current? List two electrical appliances which work on this effect.
24. Two lamps, one rated $100\ \text{W}; 220\ \text{V}$, and the other $60\ \text{W}; 220\ \text{V}$, are connected in parallel to electric mains supply. Find the current drawn by two bulbs from the line, if the supply voltage is $220\ \text{V}$.
25. How much current will an electric iron draw from a $220\ \text{V}$ source if the resistance of its element when hot is $55\ \text{ohms}$? Calculate the wattage of the electric iron when it operates on $220\ \text{volts}$.
26. (a) Define power and state its SI unit.
(b) A torch bulb is rated $5\ \text{V}$ and $500\ \text{mA}$. Calculate its
(i) power (ii) resistance (iii) energy consumed when it is lighted for 2.5 hours.
27. A bulb is rated $40\ \text{W}; 220\ \text{V}$. Find the current drawn by it, when it is connected to a $220\ \text{V}$ supply. Also find its resistance. If the given bulb is replaced by a bulb of rating $25\ \text{W}; 220\ \text{V}$, will there be any change in the value of current and resistance? Justify your answer and determine the change.
28. (a) An electric bulb is connected to a $220\ \text{V}$ generator. If the current drawn by the bulb is $0.50\ \text{A}$, find its power.
(b) An electric refrigerator rated $400\ \text{W}$ operates 8 hours a day. Calculate the energy per day in kWh.
(c) State the difference between kilowatt and kilowatt hour.

LIGHT (REFLECTION & REFRACTION)

1- The angle between an incident ray and the plane mirror is 30degree. The total angle between the incident ray and reflected ray will be :

- [a] 30degree
- [b] 60degree
- [c] 90degree
- [d] 120degree

2- The image formed by a plane mirror is :

- [a] virtual, behind the mirror and enlarged
- [b] virtual , behind the mirror and of same size as the object
- [c] real, at the surface of mirror and enlarged
- [d] real, behind the mirror and of same size as the object

3- An object is placed 20cm in front of a plane mirror. The mirror is moved 2 cm towards the object. The distance between the position of the original and the final image see in the mirror is :

- [a] 2 cm
- [b] 4 cm
- [c] 10 cm
- [d] 22 cm

4- A diverging mirror is:

- [a] a plane mirror
- [b] a concave mirror
- [c] a convex mirror
- [d] a shaving mirror

5- The angle of incident for a ray of light passing through the centre of curvature of a concave mirror is:

- [a] 45degree
- [b] 90degree
- [c] 0degree
- [d] 180degree

6- The focal length of a small concave mirror which produces an upright image [erect image]. The radius of curvature of mirror is:

- [a] 2.5 cm
- [b] 1.5 cm

[c] 4.5 cm

[d] 3.5 cm

7- An object is placed at the following distance from a concave mirror of focal length 15 cm, turn by turn

[a] 35 cm

[b] 30 cm

[c] 20 cm

[d] 10 cm

8- An object is placed at a large distance in front of a concave mirror of radius of curvature 40 cm. The image will be formed in front of the mirror at the distance of:

[a] 20 cm

[b] 30 cm

[c] 40 cm

[d] 50 cm

9- Linear magnification [m] produced by a rear view mirror fitted in vehicle:

[a] is equal to one

[b] is less than one

[c] is more than one

[d] can be more or less than one depending on the position of object

10- A concave mirror cannot be used as:

[a] a magnifying mirror

[b] a torch reflector

[c] a dentist's mirror

[d] a rear view mirror

11- Consider two statements A and B given below:

A: real image is always inverted

B: virtual image is always erect

[a] only A is true

[b] only B is true

[c] both A and B are true

[d] none is true

12- A ray of light travelling in water falls at right angles to the boundary of a parallel-sided glass block. The ray of light:

[a] is refracted toward the normal

[b]is refracted away from the normal

[c] does not get refracted

[d]is reflected along the same path

13- A ray of light passes from a medium X to another medium Y. No refraction of light occurs if the ray of light hits the boundary of medium Y at an angle of:

[a] 0degree

[b]45degree

[c] 90 degree

[d]120 degree

14- The refractive indices of water, sulphuric acid glass and carbon disulphide are 1.33,1.43,1.53 and 1.63 respectively. The light travels slowest in:

[a] sulphuric acid

[b]water

[c]glass

[d]carbon disulphide

15- A diverging lens is used in:

[a] a magnifying glass

[b] a car to see object on rear side

[c] spectacles for the correction of short sight

[d] a simple camera

16- Which of the following can form a virtual image which is always smaller than object?

[a] a plane mirror

[b]a convex lens

[c]a concave lens

[d] a concave mirror

17- The power of a lens is +2.0D. Its focal length will be:

[a]100 cm

[b]50 cm

[c]25 cm

[d]40 cm

18- The power of a converging lens is 4.5D and that of a diverging lens is 3D.The power of this combination of lens placed closed together is:

[a] +1.5D

[b] +7.5D

[c] -7.5D

[d] -1.5D

LONG QUESTIONS

1- Define [a] centre of curvature. [b] Radius of curvature. [c] Pole. [d] Principal axis, and [e] aperture, of a spherical mirror with the help of a labelled diagram.

2 When a spherical mirror is held toward the sun and its shape image is formed on a piece of carbon paper for sometime, a hole is burnt in the carbon paper.

[a] What is the nature of spherical mirror.

[b] Why is a hole burnt in the carbon paper.

[c] At which point of spherical mirror the carbon paper is placed.

[d] What name is given to the spherical mirror and the carbon paper?

[e] What is advantage of using the carbon paper rather than a white paper?

3 Make labelled ray diagram to illustrate the formation of:

[a] a real image by a converging mirror.

[b] a virtual image by a converging mirror.

4- Briefly describe how you would find the focal length of a concave mirror quickly but approximately.

5- Draw ray diagram to show the information of image when the object is placed in front of a concave mirror [converging mirror]:

[i] between its pole and focus

[ii] between its centre of curvature and focus

Describe nature, size and position of the image formed in each case.

6- describe the new Cartesian sign Convention used in optics. Draw a labelled diagram to illustrate this sign convention.

7- An object of 5.0 cm size is placed at a distance of 20.0 cm from a converging mirror of focal length 15.0 cm. At what distance from the mirror should a screen be placed to get the shape image? Also calculate the size of the image.

8- How far should an object be placed from the pole of the converging mirror of focal length 20 cm to form a real image of the size exactly $\frac{1}{4}$ th the size of the object.

9- How will you distinguish between a plane mirror, a concave mirror and a convex mirror without touching them?

10- An object is placed at a distance of 6 cm from a convex mirror of focal length 12cm. Find the position and Nature of the image.

11- An object 20 cm from a spherical mirror give rise to virtual image 15 cm behind the mirror. Determine the magnification of image and the type of mirror used.

12- [a] Explain why, a stick half immersed in water appears to be bent at the surface.

Draw a labelled diagram to illustrate your answer.

[b] A coin in a glass tumbler appears to rise as the glass tumbler is slowly filled with water. Name the phenomenon responsible for this glass.

13- [a] With the help of the labelled diagram, explain why a tank full of water appears less deep than it actually is.
[b] Name the phenomenon due to which a pencil partly immersed in water and held obliquely appears to be bent at the water surface.

14- [a] With the help of a diagram, show how when light falls obliquely on the side of a rectangular glass slab, the emergent ray is parallel to the incident ray.

[b] Show the lateral displacement of the ray on the diagram.

[c] State two factors on which the lateral displacement of the emergent ray depends.

15- Define Snell's law of refraction. A ray of light is incident on a glass slab at an angle of incidence of 60 degrees if the angle of refraction be 32.7 degrees, calculate the refractive index of glass. (Given: $\sin 60^\circ = 0.866$, and $\sin 32.7^\circ = 0.540$)

16- The refractive index of glass is 1.5. Calculate the speed of light in glass. The speed of light in air is $3.0 \times 10^8 \text{ ms}^{-1}$.

17 - A lens of focal length 12 cm forms an erect image three times the size of the object. The distance between the object and image is -

(a) 8 cm (b) 16 cm (c) 24 cm (d) 36 cm

18- [a] Draw a diagram to show how a converging lens focusses parallel rays of light

[b] How would you alter the above diagram to show how a converging lens can produce a parallel beam of light.

[a] An object 3 cm high is placed 24 cm away from a convex lens of focal length 8 cm. Find by calculation, the position, height and nature of the image.

[b] If the object is moved to a point only 3 cm away from the lens, what is the new position, height and nature of the image.

[c] Which of the above two cases illustrates the working of a magnifying glass

19 A lens forms a real image 3 cm high of an object 1 cm high. If the separation of object and image is 15 cm, find the focal length of the lens.

20 What kind of lens can form:

[a] an inverted magnified image

[b] an erect magnified image

[c] an inverted diminished image

[d] an erect diminished image

21 An object 60 cm from a lens gives a virtual image at a distance of 20 cm in front of the lens. What is the focal length of the lens? Is the lens converging or diverging? Give reason for your answer.

22 A concave lens of 20 cm focal length forms an image 15 cm from the lens. Compute the object distance.

HUMAN EYE AND THE COLORFUL WORLD

A.MCQ

1. The muscular diaphragm that controls the size of the pupil is

- (a) cornea
- (b) ciliary muscles
- (c) iris
- (d) retina

2. Having two eyes facilitates in

- A: Increasing the field of view
- B: Bringing three dimensional view
- C: Developing the concept of distance/size

Then the correct option is/are

- (a) A only
- (b) A and B only
- (c) B only
- (d) A, B and C

3. Dispersion is due to

- (a) refractive variation shown by the material
- (b) reflecting variation shown by the material
- (c) splitting of light into its constituent colours
- (d) non-parallel surfaces only.

4. Red light is used for danger signal as

- (a) it has higher wavelength
- (b) it can travel large distance
- (c) it scatters the least
- (d) it scatters the longest.

5. Cataract is due to

- (a) growth of membrane
- (b) milky image
- (c) cloudy image

(d) weakening of ciliary muscles.

6. A person cannot see distinctly any object placed beyond 40 cm from his eye. The power of the lens required to correct the problem is

(a) -0.5 dioptre

(b) -2.5 dioptre

(c) 0.5 dioptre

(d) 0.025 dioptre

7. Ships are seen floating in space in cold places. The phenomena is called

(a) mirage

(b) refraction

(c) looming

(d) dispersion

8. The photographic film equivalent of our eye is

(a) iris

(b) retina

(c) pupil

(d) ciliary muscle

9. Bi-focal lens are required to correct

(a) astigmatism

(b) coma

(c) myopia

(d) presbyopia

10. When white light enters a plane of inverted prisms, the emergent light is rich of

(a) blue

(b) violet

(c) red

(d) white

11. On the surface of moon, Rainbows

(a) are never formed.

(b) are formed.

(c) are seen with inverted colours.

(d) are of two kinds.

12. Total internal reflection as a phenomena is useful in various optical instruments as

(a) it requires only a pair of media

(b) it is a simple reflection

(c) it is based on refraction

(d) it does not lead to loss of energy.

B. Short answer type questions .

1. What is the role of retina?

2. Name the cells that respond to intensity of light.

3. Which cell is responsible for colour perception ?

4. What is the main function of ciliary muscles?

5. What is the value of least distance of distinct vision for a young adult with normal vision?

6. Give the role of iris.

7. What is the role of Pupil ?

8. What do you mean by "near point"?

9. What is scattering of light ? Which colour of the visible spectrum scatters the most ?

10. The stars appear to twinkle while the planets do not. Why ?

11. How many frames per second are to be projected for clear view of motion pictures ?

12. How long does the light from an event stay in our eye ?

13. Is it possible to correct the problem of cataract ?

14. Name the four common defects of vision.

15. What is the problem in Hypermetropia ? How can it be corrected ?

16. How will you correct myopic eye ?

17. How can you overcome Presbyopia ?

18. Where do we use cylindrical lenses ?

19. What is a contact lens ?

20. Where do we see (i) Concave and (ii) Convex lens in bifocal lenses?

21. 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 enable him to see very distant objects distinctly?

22. Why does it take some time to see objects in dim light when you enter the room from bright sunlight outside ?
23. How is the amount of light entering the eye controlled? What change is made in the eye to enable it to focus on object situated at different distances ?
24. What is short-sightedness and long-sightedness? How can these defects be corrected ?
25. Explain the least distance of distinct vision.
26. How does ciliary muscle of human eye help in the normal functioning of the eye ?
27. How does a normal eye see distant objects clearly ? What is the cause for short-sightedness ?
28. What is Presbyopia ? What is the cause of presbyopia? How will you correct the same ?
29. What is Astigmatism? What is the cause of Astigmatism? How will you correct it?
30. Name any one common defect of vision and the type of lens used to remove it.
31. If an eye has near point at distance of 0.5 m, what is the power of lens required to correct it?
32. If the far point of eye lens is 10 metre, find the power required to reflect only the red light.

C. Assertion-Reason Questions

The following questions consist of two statements-Assertion and Reason. Answer these questions by selecting the appropriate answers out of the options given below. (A) and

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true but R is not the correct explanation of A
- (c) A is true but R is false.
- (d) A is false but R is true.

1. Assertion: There slab, no dispersion of light emerging through a rectangular glass

Reason: Splitting of white light into its constituent colours is called dispersion.

2. Assertion : The medium with highest refractive index is optically most dense.

Reason : Air has the highest refractive index.

3. Assertion : We observe the twinkling stars in the sky but not the twinkling planets.

Reason: The stars are much bigger in size compared to the planets.

4. Assertion : When monochromatic light is incident on air-water interface, the frequency of partially refracted and reflected components are same.

Reason: Frequency of light waves changes due to change in medium.

5. Assertion : The earth's sky appears blue due to dispersion of light. The intensity of scattered

Reason: The intensity of scattered light is inversely proportional to the fourth power of its wavelength.

6. Assertion : Dispersion does not occur during reflection of light.

Reason : Law of reflection does not depend on wavelength.

7. Assertion : The process of splitting of white light into its constituent colours is called dispersion.

Reason: A rectangular glass slab cannot produce spectrum.

8. Assertion : Dispersion of light does not occur in vacuum.

Reason : All constituent colours of white light travel with the same speed in vacuum.

9. Assertion : The spread of spectrum of white light by a glass prism placed in air is more than that when immersed in water.

Reason: Deviation of constituent colours of white light depends on the relative refractive index of the two media.

10. Assertion: Violet moves faster in glass than red.

Reason: Violet has shorter wavelength than red.

11. Assertion: White light is polychromatic.

Reason: Formation of rainbow shows that white light has seven colours.

12. Assertion : Air is more dispersive than water.

Reason: All components of white light travel with different speeds in water.

D.Long answer type questions.

1.(a) Name the defect of vision he is suffering from.

(b) With the help of labelled ray diagrams show how this

(c) Name the type of lens used to correct this defect.

2. Describe with the neat diagram how near sightedness (myopia) can be corrected by using appropriate lenses.

3. (i) During its passages from one medium to another, when does a light ray change its path?

(ii) Define the term absolute refractive index of a medium.

(iii) With the help of a ray diagram, explain the term 'critical angle'.

4.(1) Explain the following terms used in relation to defects in vision and correction provided by them:

(a) Myopia

(b) Astigmatism

(d) Far sightedness.

(c) Bifocal lenses