CLASSROOM PROGRAMME

CLASS 10 CBSE – PHYSICS

SHORT NOTES

CONTENTS

CHAPTER 9

LIGHT - REFLECTION AND REFRACTION

Reflection of light

Reflection of Light: The phenomenon of bouncing back of light into the same medium by the smooth surface is called reflection.

Laws of Reflection of light

- The angle of reflection is equal to the angle of incidence.
- The incident ray, the normal to the mirror at the point of incidence and the reflected ray, all lie in the same plane.

Incident ray: Ray of light coming from a source towards the reflecting surface

Reflected ray: Ray of light which is reflected back by a reflection surface.

Normal: Perpendicular drawn to the reflecting surface.

Angle of incidence: The angle between incident ray and normal at the point of incidence.

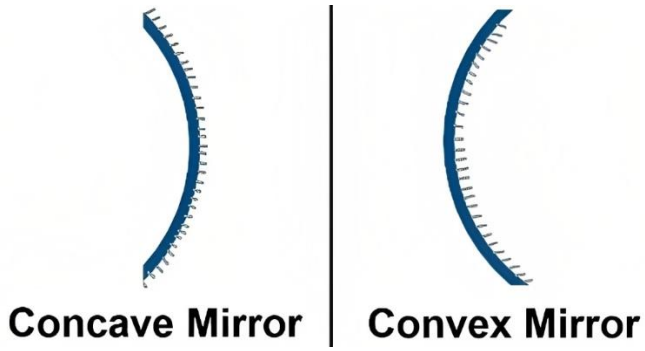
Angle of reflection: The angle between reflected ray and normal at the point of reflection

Image formed by a mirror is always virtual and erect. The size of the image is equal to that of the object.

Spherical mirrors

A spherical mirror whose reflecting surface is curved inwards, that is, faces towards the centre of the sphere is called a concave mirror.

A spherical mirror whose reflecting surface is curved outwards is called a convex mirror.



- The centre of the reflecting surface of a spherical mirror is a point called the pole.
- The reflecting surface of a spherical mirror forms a part of a sphere. This sphere has a centre. This point is called the centre of curvature.
- The radius of the sphere of which the reflecting surface of a spherical mirror forms a part, is called the radius of curvature of the mirror.
- Imagine a straight line passing through the pole and the centre of curvature of a spherical mirror. This line is called the principal axis.
- The distance between the pole and the principal focus of a spherical mirror is called the focal length.
- The diameter of the reflecting surface of spherical mirror is called its aperture.
- The radius of curvature is found to be equal to twice the focal length. We put this as R = 2f

- A number of rays parallel to the principal axis are falling on a concave mirror. Observe the reflected rays. They are all meeting/intersecting at a point on the principal axis of the mirror. This point is called the principal focus of the concave mirror.
- In the case of convex mirror, the reflected rays appear to come from a point on the principal axis. This point is called the principal focus of the convex mirror.

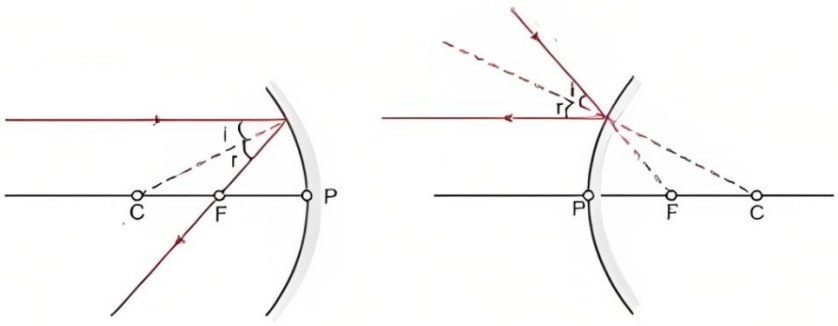
Real Image	Virtual Image
• When rays of light after reflection meets at a point, real image is formed. • Real image can be obtained on screen. • Real image is formed in front of mirror. • Real image is always inverted.	• When rays of light do not actually meet but appear to meet at a point after reflection, virtual image is formed. • Virtual image cannot be obtained on screen. • Virtual image is formed behind the mirror. • Virtual image is always erect.

Image formation by a concave mirror

Position of the object	Position of the image	Size of the image	Nature of the image
At infinity	At the focus F	Highly diminished, point-sized	Real and inverted
Beyond C	Between F and C	Diminished	Real and inverted
At C	At C	Same size	Real and inverted
Between C and F	Beyond C	Enlarged	Real and inverted
At F	At infinity	Highly enlarged	Real and inverted
Between P and F	Behind the mirror	Enlarged	Virtual and erect

Representation of image formed by spherical mirrors

A ray parallel to the principal axis, after reflection, will pass through the principal focus in case of a concave mirror or appear to diverge from the principal focus in case of a convex mirror.



Concave Mirror Convex Mirror

Uses of concave mirrors

- Concave mirrors are commonly used in torches, search-lights and vehicles headlights to get powerful parallel beams of light.
- They are often used as shaving mirrors to see a larger image of the face.
- The dentists use concave mirrors to see large images of the teeth of patients.
- Large concave mirrors are used to concentrate sunlight to produce heat in solar furnaces.

Image formed by a convex mirror

Position of the object	Position of the image	Size of the image	Nature of the image
At infinity	At the focus F, behind the mirror	Highly diminished, point-sized	Virtual and erect
Between infinity and the pole P of the mirror	Between P and F, behind the mirror	Diminished	Virtual and erect

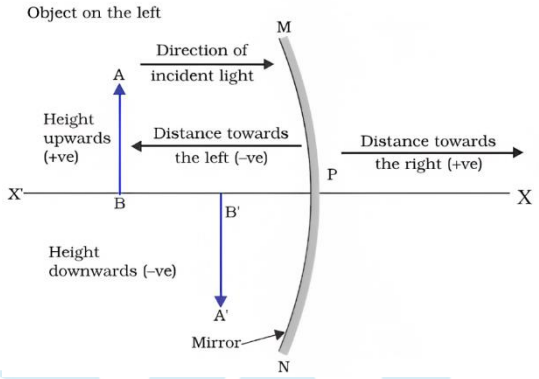
Uses of convex mirrors

- Convex mirrors are commonly used as rear-view (wing) mirrors in vehicles. These mirrors are fitted on the sides of the vehicle, enabling the driver to see traffic behind him/her to facilitate safe driving.
- Convex mirrors are preferred because they always give an erect, though diminished, image. Also, they have a wider field of view as they are curved

outwards. Thus, convex mirrors enable the driver to view much larger area than would be possible with a plane mirror.

Sign Convention for Reflection by Spherical Mirrors

The object is always placed to the left of the mirror. This implies that the light from the object falls on the mirror from the left-hand side.



- All distances parallel to the principal axis are measured from the pole of the mirror.
- All the distances measured to the right of the origin (along + x-axis) are taken as positive while those measured to the left of the origin (along – x-axis) are taken as negative.
- Distances measured perpendicular to and above the principal axis (along + y-axis) are taken as positive.
- Distances measured perpendicular to and below the principal axis (along –y-axis) are taken as negative.

Mirror Formula and Magnification

In a spherical mirror, the distance of the object from its pole is called the object distance (u). The distance of the image from the pole of the mirror is called the image distance (v). The distance of the principal focus from the pole is called the focal length (f).

$\frac{1}{v} + \frac{1}{u} = \frac{1}{F}$ This formula is called the mirror formula.

Magnification

Magnification produced by a spherical mirror gives the relative extent to which the image of an object is magnified with respect to the object size. It is expressed as the ratio of the height of the image to the height of the object.

m = Height of the image (h')/Height of the object (h)

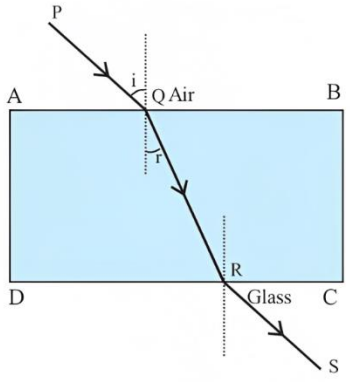
$$m = \frac{h'}{h}$$

Do you know?

Total internal reflection: Total internal reflection is the phenomenon of complete reflection of light back into the same medium when it strikes the boundary of a denser medium at an angle greater than the critical angle. It is used in optical fibers and prisms.

Refraction of light

Refraction of light is the phenomenon of change in the path of light in going from one medium to another.



Laws of refraction of light

- The incident ray, the refracted ray and the normal to the interface of two transparent media at the point of incidence, all lie in the same plane.
- The ratio of sine of angle of incidence to the sine of angle of refraction is a constant, for the light of a given colour and for the given pair of media. This law is also known as Snell's law of refraction. (This is true for angle $0 < i < 90^0$) If i is the angle of incidence and r is the angle of refraction, then, Sin i / sin r= constant.

This constant value is called the refractive index of the second medium with respect to the first.

Absolute refractive index(n) of a medium is the ratio of speed of light in vacuum or air(c) to the speed of light in the medium(v), $n = c/v$

- In going from a rarer to a denser medium, the ray of light bends towards normal and in going from a denser to a rarer medium, the ray of light bends away from normal.

Some application of refraction

- Bottom of a tank or a pond containing water appears to be raised due to refraction.
- When a thick glass slab is placed over some printed matter, the letters appear raised when viewed through the glass slab.

Do you know?

Mirage: A mirage is a naturally occurring optical illusion in which the image of an object appears displaced or distorted due to the refraction of light by air of varying densities. It is commonly observed in deserts and on hot roads.

- When a pencil is partly immersed in water, it appears to be displaced at the interface of air and water.
- A lemon kept in water in a glass tumbler appears to be bigger than its actual size, when viewed from sides.

Image formed by a convex lens

Position of the object	Position of the image	Relative size of the image	Nature of the image
At infinity	At focus F_2	Highly diminished, point-sized	Real and inverted
Beyond $2F_1$	Between F_2 and $2F_2$	Diminished	Real and inverted
At $2F_1$	At $2F_2$	Same size	Real and inverted
Between F_1 and $2F_1$	Beyond $2F_2$	Enlarged	Real and inverted
At focus F_1	At infinity	Infinitely large or highly enlarged	Real and inverted
Between focus F_1 and optical centre O	On the same side of the lens as the Object	Enlarged	Virtual and erect

Image formed by a concave lens

Position of the object	Position of the image	Relative size of the image	Nature of the image
At infinity	At focus F_1	Highly diminished, point-sized	Virtual and erect
Between infinity and optical centre O of the lens	Between focus F_1 and optical centre O	Diminished	Virtual and erect

Lens Formula

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$$

u = object distance

v = image distance

f= focal length

Power of a Lens

The power of a lens is defined as the reciprocal of its focal length. It is represented by the letter P. The SI unit of power of a lens is 'dioptre' (D).

$$P = \frac{1}{f}$$

power of a convex lens is positive and that of a concave lens is negative.

Points to remember

- Reflection: Reflection is the bouncing back of light rays from a surface.
- The laws of reflection state that the incident ray, reflected ray and normal to the surface at the point of incidence, all lie in the same plane. The angle of incidence is equal to the angle of reflection.
- Types of mirrors: There are two types of mirrors - plane mirrors and spherical mirrors. Plane mirrors produce virtual and erect images of the object whereas spherical mirrors can produce both real and virtual images depending on the position of the object.
- Image formation by plane mirrors: The image formed by a plane mirror is virtual, erect, and of the same size as the object. It is located behind the mirror at the same distance as the object is in front of the mirror.
- Refraction: Refraction is the bending of light rays as they pass from one medium to another of different optical densities. The amount of bending depends on the angle of incidence and the refractive indices of the two media.
- Refractive index: The refractive index of a medium is the ratio of the speed of light in vacuum to the speed of light in that medium. It is a measure of the optical density of the medium.
- Total internal reflection: When a light ray passes from a denser medium to a rarer medium, it bends away from the normal. At a certain angle of incidence, called the critical angle, the light ray refracts along the surface. At angles greater than the critical angle, total internal reflection occurs.
- Lens: A lens is a transparent material with at least one curved surface. There are two types of lenses - convex and concave. Convex lenses converge light rays while concave lenses diverge them.

- Image formation by lenses: The image formed by a convex lens can be real or virtual depending on the position of the object. The image formed by a concave lens is always virtual, erect, and smaller than the object.
- Power of a lens: The power of a lens is a measure of its ability to converge or diverge light rays. It is defined as the reciprocal of the focal length in meters.
- Magnification: Magnification is the ratio of the size of the image to the size of the object. It is a dimensionless quantity and can be positive, negative or unity.

CHAPTER 10

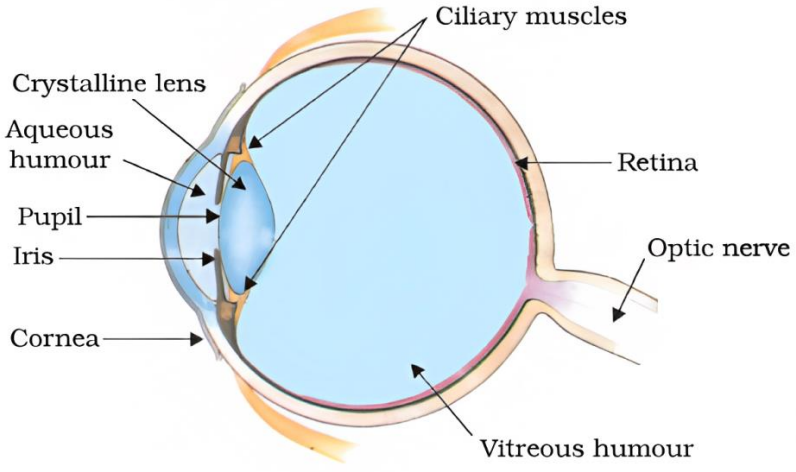
THE HUMAN EYE AND THE COLOURFUL WORLD

The Human Eye

The human eye an extremely valuable and a sensitive sense organ which enables us to see objects and colours around us.

Parts of the human eye

- Cornea: A thin membrane through which light enters the eye, maximum refraction occurs at the outer surface of corned
- Iris: A dark muscular membrane which controls size of pupil.
- Pupil: Regulates and controls the amount of light entering the eye.
- Eye lens: Composed of fibrous, jelly-like material, with adjustable curvature, forms an inverted and real image of object on retina.
- Retina: It is a light sensitive screen on which image is formed.



Power of accommodation

The ability of the eye lens to adjust its focal length is called power of accommodation.

The minimum distance, at which objects can be seen most distinctly without strain, is called the least distance of distinct vision. It is also called the near point of the eye. For a young adult with normal vision, the near point is about 25 cm.

- The farthest point upto which the eye can see objects clearly is called the far point of the eye. It is infinity for a normal eye.

Do you know?

Binocular vision: Binocular vision is the ability of the eye to perceive depth and 3D objects by using both eyes together. It is the reason why we can see the world in three dimensions.

Defects of vision and their correction

Myopia

Myopia is also known as near-sightedness. A person with myopia can see nearby objects clearly but cannot see distant objects distinctly. A person with this defect has the far point nearer than infinity. Such a person may see clearly upto a distance of a few metres.

This defect may arise due to

- Excessive curvature of the eye lens
- Elongation of the eyeball

This defect can be corrected by using a concave lens of suitable power.

Hypermetropia

Hypermetropia is also known as far-sightedness. A person with hypermetropia can see distant objects clearly but cannot see nearby objects distinctly. The near point, for the person, is farther away from the normal near point (25 cm).

This defect arises either because

- The focal length of the eye lens is too long, or
- The eyeball has become too small.

This defect can be corrected by using a convex lens of appropriate power.

Presbyopia

The power of accommodation of the eye usually decreases with ageing. For most people, the near point gradually recedes away. They find it difficult to see nearby objects comfortably and distinctly without corrective eye-glasses. This defect is called Presbyopia.

It arises due to the gradual weakening of the ciliary muscles and diminishing flexibility of the eye lens. Sometimes, a person may suffer from both myopia and hypermetropia. Such people often require bi-focal lenses. A common type of bi-focal lenses consists of both concave and convex lenses. The upper portion consists of a concave lens. It facilitates distant vision. The lower part is a convex lens. It facilitates near vision.

Do you know?

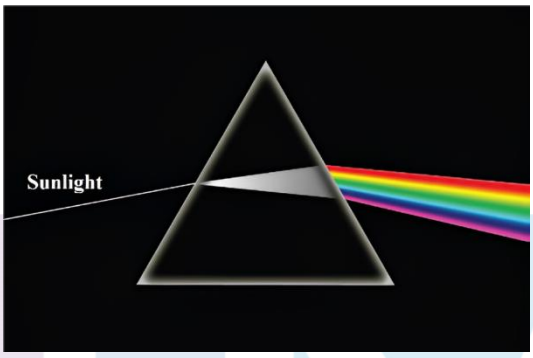
Optical illusions: Optical illusions are images that can trick the brain into perceiving something that is not actually there. They can be created using a variety of techniques, including perspective, shading, and color.

Refraction of light through a prism

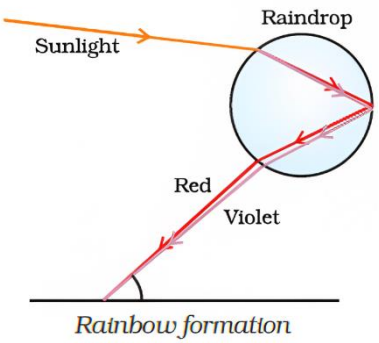
When a ray of light is incident on a rectangular glass slab, after refracting through the slab, it gets displaced laterally. As a result, the emergent ray comes out parallel to the incident ray.

Unlike a rectangular slab, the side of a glass prism are inclined at an angle called the angle of prism.

Dispersion of light



- The splitting of light into its component colours is called dispersion.
- The band of the coloured components of a light beam is called its spectrum.
- A rainbow is a natural spectrum appearing in the sky after a rain shower. It is caused by dispersion of sunlight by tiny water droplets present in the atmosphere.



Rainbow formation

Atmospheric Refraction

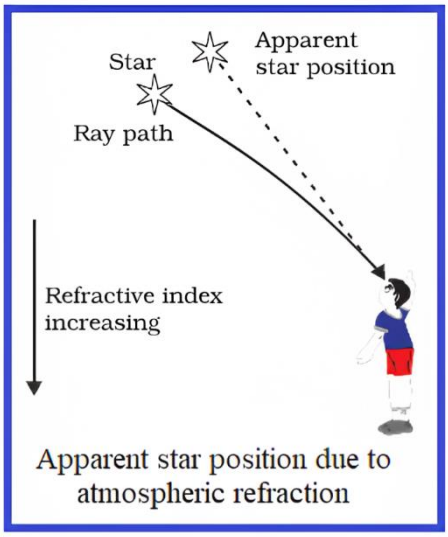
The refraction of light caused by the Earth's atmosphere (having air layers of varying optical densities) is called Atmospheric Refraction.

Twinkling of stars

The twinkling of a star is due to atmospheric refraction of starlight.

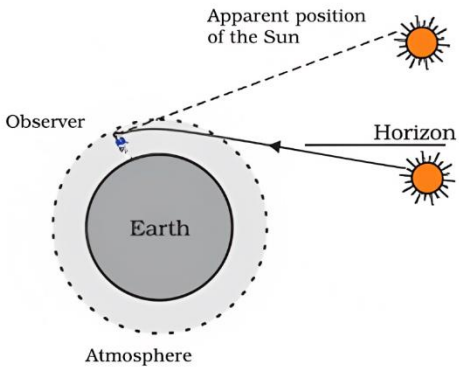
Distant star act like a point source of light. As the beam of starlight keeps deviating from its path, the apparent position of star keeps on changing because physical condition of earth's atmosphere is not stationary.

Hence, the amount of light enters our eyes fluctuate sometimes bright and sometime dim. This is the "Twinkling effect of star".



Apparent star position due to atmospheric refraction

Advance sunrise and delayed sunset



Advance sunrise and delayed sunset is due to atmospheric refraction. When the sun is slightly below the horizon, the sunlight coming from the less dense (vacuum) to the more dense (air) medium is refracted downwards. Therefore, the Sun appears to be above the horizon. Similarly, even after sunset, the Sun can be seen for sometime due to refraction of sunlight.

Scattering of light

Scattering is the change in direction brought out by the irregular and partial reflection of light when it hits the particles of the medium.

Tyndall Effect

When rays of light pass through a colloidal fluid or suspension, the tiny particles get illuminated due to scattering. Because of this, the path of light is made visible. This phenomenon is Tyndal Effect.

It can be observed when sunlight passes through a canopy of a dense forest.

The colour of the scattered light depends on the size of the scattering particles.

Why is the colour of the clear Sky Blue?

The red light has a wavelength about 1.8 times greater than blue light. Thus, when sunlight passes through the atmosphere, the fine particles in air scatter the blue color (shorter wavelengths) more strongly than red. The scattered blue light enters our eyes.

Points to remember

- The human eye: The human eye is a sensitive organ that detects light and converts it into electrical signals that are sent to the brain. It consists of several parts, including the cornea, iris, pupil, lens, retina, and optic nerve.
- Defects of vision: The defects of vision include myopia, hypermetropia, and presbyopia. Myopia, or nearsightedness, is a condition where distant objects appear blurred. Hypermetropia, or farsightedness, is a condition where near objects appear blurred. Presbyopia is an age-related condition where the eye loses its ability to focus on near objects.
- Dispersion of light: The white light is made up of different colours of light. When white light passes through a prism, it gets dispersed into its component colours - violet, indigo, blue, green, yellow, orange, and red (VIBGYOR).
- Formation of a rainbow: A rainbow is formed when the sunlight is refracted and dispersed by water droplets in the atmosphere. The different colours of the rainbow are formed due to the different angles of refraction and the wavelengths of light.
- Scattering of light: Scattering of light is the phenomenon in which light gets scattered in all directions when it passes through a medium.
- Tyndall effect: The Tyndall effect is the scattering of light by colloidal particles in a medium.

CHAPTER 11

ELECTRICITY

- A continuous and closed path of an electric current is called an electric circuit.
- Electric current is expressed by the amount of charge flowing through a particular area in unit time.
- If a net charge Q, flows across any cross-section of a conductor in time t, then the current I, through the cross-section is

$$I=Q/t$$

Where, Q = Amount of charge and

t = Time interval

The unit of current is Ampere.

One ampere is constituted by the flow of one coulomb of charge per second, that is,

1A = 1C / 1s.

Small quantities of current are expressed in milliampere (1 mA = 10^{-3} A) or in microampere (1 μA = 10^{-6} A). An instrument called ammeter measures electric current in a circuit. It is always connected in series in a circuit through which the current is to be measured.

Electric Potential and Potential difference

The potential difference between two separate points is defined as the work done to move a unit positive charge from one point to another.

Therefore, Voltage = Workdone/Charge

Voltage or electric potential difference is denoted by V'. Therefore,

$$V = W/Q$$

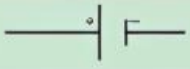
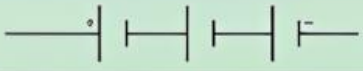
The unit of potential difference is Volt.

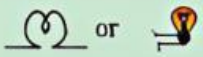
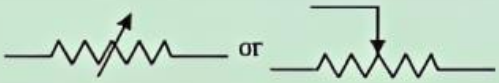
- One volt is the potential difference between two points in a current carrying conductor when 1 joule of work is done to move a charge of 1 coulomb from one point to the other.

Circuit diagram

A circuit is a simplified systematic representation of the components of an electrical circuit.

Symbols of some commonly used components in circuit diagrams

Sl. No.	Components	Symbols
1	An electric cell	
2	A battery or a combination of cells	
3	Plug key or switch (open)	
4	Plug key or switch (closed)	
5	A wire joint	

6	Wires crossing without joining	
7	Electric bulb	
8	A resistor of resistance R	
9	Variable resistance or rheostat	
10	Ammeter	
11	Voltmeter	

Ohm's law

The potential difference (V) across the ends of a given metallic wire in an electric circuit is directly proportional to the current flowing through it, provided its temperature remains the same. In other words –

$$V \propto I$$

$$\text{or } V/I = \text{constant} = R$$

$$\text{or } V = IR$$

where, R = Resistance

The unit of resistance is Ohm (Ω)

If the potential difference across the two ends of a conductor is 1 V and the current through it is 1 A, then the resistance R, of the conductor is 1 Ω. That is,

$$1 \text{ ohm} = 1 \text{ volt}/1 \text{ ampere}$$

the current through a resistor is inversely proportional to its resistance. If the resistance is doubled the current gets halved.

- A component used to regulate current without changing the voltage source is called variable resistance.
- In an electric circuit, rheostat is often used to change the resistance in the circuit.

Factors affecting resistance of a conductor

Resistance of the conductor depends

i) on its length,
ii) on its area of cross-section, and
iii) on the nature of its material.

The resistance of a uniform metallic conductor is directly proportional to its length (l) and inversely proportional to the area of cross-section (A).

$$R \propto l$$

$$R \propto 1/A$$

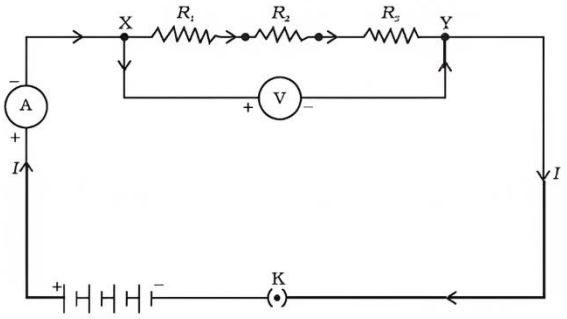
$$R \propto l/A$$

$$R = \rho l / A, \text{ where } \rho = \text{resistivity}$$

Resistivity of a substance is equal to the resistance of a unit square of that substance.

Combination of Resistors

Resistors in series

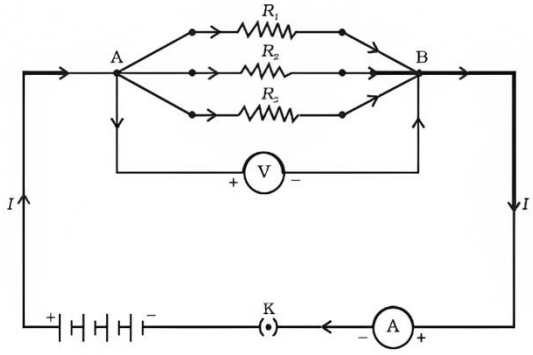


The total potential difference across a combination of resistors in series is equal to the sum of potential difference across the individual resistors.

$V = V_1 + V_2 + V_3$

equivalent resistance $R_S = R_1 + R_2 + R_3$

Resistors in parallel



The total current I, is equal to the sum of the separate currents through each branch of the combination.

$I = I_1 + I_2 + I_3$

equivalent resistance, $\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}$

Heating Effect of Electric Current

When electric current is supplied to a purely resistive conductor, the energy of electric current is dissipated entirely in the form of heat and as a result, resistor gets heated. The heating of resistor because of dissipation of electrical energy is commonly known as Heating Effect of Electric Current.

This is known as the heating effect of electric current. This effect is utilised in devices such as electric heater, electric iron etc.

Joule's Law

The heat generated in a current carrying conductor is directly proportional to the product of the square of the current in the conductor, the resistance of the conductor and the time of flow.

$$H = I^2Rt$$

The electric laundry iron, electric toaster, electric oven, electric kettle and electric heater are some of the familiar devices based on Joule's heating.

Electric power

The amount of energy consumed by an electrical appliance in unit time is its power.

$$P = W/t$$

The unit of power is watt (W)

Derivation of formula for electric power

We know that electric work done, $W = V \times I \times t$ or $P = \frac{VIt}{t}$

$P = VI$

Electric power in watts = Volts × ampere

Do you know?

Electric power quality: Electric power quality is a measure of the reliability and consistency of electrical power delivery. Factors that affect power quality include voltage fluctuations, harmonics, and electrical noise.

Also V = IR … [According to Ohm's Law]

So P = IR × I

$P = I^2R$

We know that $I = \frac{V}{R}$

$P = (\frac{V}{R})^2 \times R = \frac{V^2}{R}$ Watt

Points to remember

- Electric current: Electric current is the flow of electric charges through a conductor. It is measured in amperes (A).
- Electric circuit: An electric circuit is a complete path through which the electric current can flow.
- Electric potential difference: Electric potential difference, or voltage, is the amount of work done to move a unit electric charge from one point to another in an electric circuit. It is measured in volts (V).
- Ohm's law: Ohm's law states that the current flowing through a conductor is directly proportional to the potential difference across it, provided the temperature and other physical conditions remain constant.
- Resistors: Resistors are devices that offer resistance to the flow of electric current. They are used to control the amount of current in a circuit. Resistors are measured in ohms (Ω).

- Series circuit: A series circuit is a circuit in which the components are connected one after the other. In a series circuit, the same current flows through all the components.
- Parallel circuit: A parallel circuit is a circuit in which the components are connected in parallel to each other. In a parallel circuit, the potential difference across each component is the same.
- Joule's law: The heat generated in a current carrying conductor is directly proportional to the product of the square of the current in the conductor, the resistance of the conductor and the time of flow.
- Electric power: Electric power is the rate at which electrical energy is transferred. It is measured in watts (W). The formula for electric power is P = VI, where P is the power, V is the voltage and I is the current.

CHAPTER 12

MAGNETIC EFFECTS OF ELECTRIC CURRENT

Magnetic Field

- Magnetic field is the region around a magnet in which the force of attraction or repulsion produced by magnet can be detected.
- Magnetic field is a quantity that has both direction and magnitude.
- Magnet has two poles, North pole and South pole. Like poles repel and unlike poles attract.

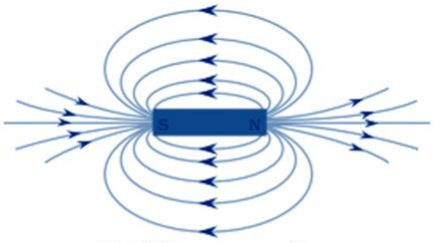
Magnetic field lines

Magnetic field lines are the imaginary lines along which the iron fillings align themselves.

By convention, the field lines emerge from the north pole and merge at the south pole. Inside the magnet, the direction of field lines is from the south pole to the north pole.

Properties of Magnetic field lines

- Magnetic field lines are closed curves.
- The relative strength of the magnetic field is shown by the degree of closeness of the field lines.



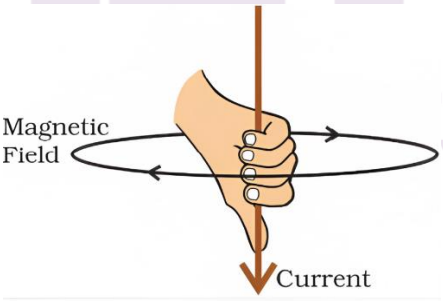
Field lines around a bar magnet

- No two field lines can cross each other as at the point of intersection the compass needle would point towards two directions, which is not possible.

Magnetic Field due to a Current Carrying Conductor

- The magnetic field around a current carrying conductors forms a pattern of concentric circles.
- The magnitude of the magnetic field produced at a given point increases as the current through the wire increases.
- The magnetic field produced by a given current decreases as the distance from it increases.

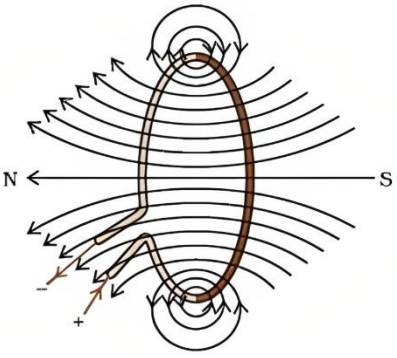
Right-Hand Thumb Rule



Imagine that you are holding a current-carrying straight conductor in your right hand such that the thumb points towards the direction of current. Then your fingers will wrap around the conductor in the direction of the field lines of the magnetic field. This is known as the right-hand thumb rule.

Magnetic Field due to a Current through a Circular Loop

In case of a circular current carrying conductor, the magnetic field lines would be in the form of iron concentric circles around every part of the periphery of the conductor. Since, magnetic field lines tend to

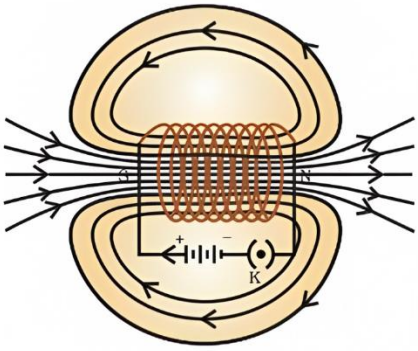


remain closer when near to the conductor, so the magnetic field would be stronger near the periphery of the loop. On the other hand, the magnetic field lines would be distant from each other when we move towards the centre of the current carrying loop. Finally, at the centre, the arcs of big circles would appear as a straight line.

Magnetic Field due to a Current in a Solenoid

A coil of many circular turns of insulated copper wire wrapped closely in the shape of a cylinder is called a solenoid.

- One end of the solenoid behaves as a magnetic north pole, while the other behaves as the south pole.
- The field lines inside the solenoid are in the form of parallel straight lines. This indicates that the magnetic field is the same at all points inside the solenoid. That is, the field is uniform inside the solenoid.

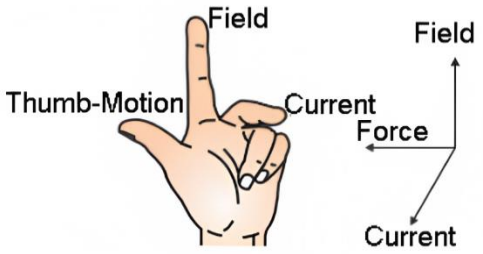


Field lines of the magnetic filed through and around a current carrying solenoid

- Magnetic field produced by a solenoid similar to bar magnet.
- Strength of magnetic field is proportional to number of turns and magnitude of current.

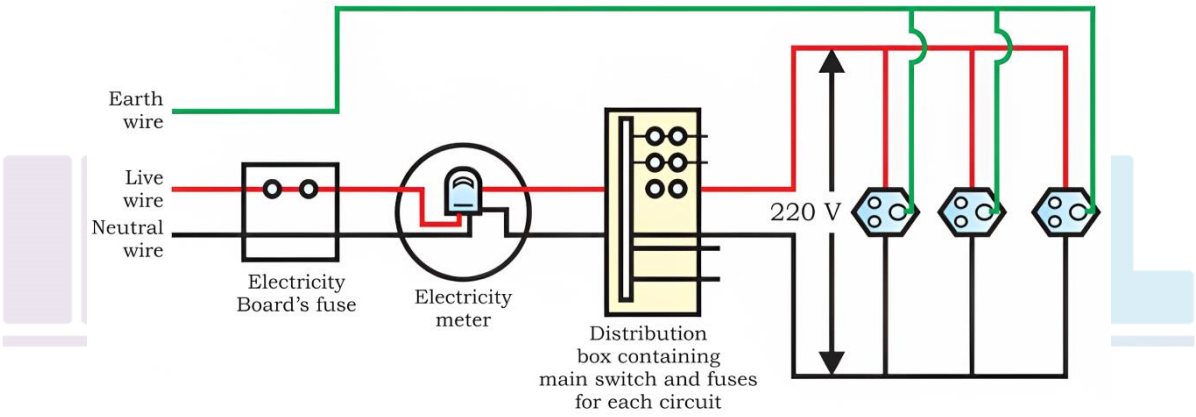
Electromagnets: An electromagnet consists of a long coil of insulated copper wire wound on a soft iron core.

Fleming's left-hand rule



Stretch the thumb, forefinger and middle finger of your left hand such that they are mutually perpendicular. If the first finger points in the direction of magnetic field and the second finger in the direction of current, then the thumb will point in the direction of motion or the force acting on the conductor.

Domestic electric circuits



In our homes, we receive supply of electric power through a main supply (also called mains), either supported through overhead electric poles or by underground cables. One of the wires in this supply, usually with red insulation cover, is called live wire (or positive). Another wire, with black insulation, is called neutral wire (or negative). In our country, the potential difference between the two is 220 V.

- Electric fuse in a circuit prevents damage to the appliances and the circuit due to overloading.
- Overloading can occur when the live wire and the neutral wire come into direct contact.
- In such a situation, the current in the circuit abruptly increases. This is called short-circuiting.

Do you know?

Load shedding: Load shedding is the deliberate reduction of electric power to certain areas or consumers during times of high demand. This is done to prevent the electrical grid from becoming overloaded and causing blackouts or brownouts.

Points to remember

- Magnetic field: A magnetic field is a region around a magnet or a current-carrying conductor where a magnetic force can be experienced by a magnetic material.
- Magnetic field due to a current-carrying conductor: When an electric current flows through a conductor, a magnetic field is produced around it. The direction of the magnetic field can be determined using the right-hand rule.
- Right-hand thumb rule
- Magnetic field due to a straight current-carrying conductor: The magnetic field produced by a straight current-carrying conductor is in the form of concentric circles around the conductor. The strength of the magnetic field is directly proportional to the current flowing through the conductor.
- Magnetic field due to a current-carrying coil: A current-carrying coil produces a magnetic field similar to that of a bar magnet. The direction of the magnetic field can be determined using the right-hand rule.
- Fleming's left-hand rule
- Fuse: A fuse is a safety device that is used to protect an electrical circuit from excessive current.