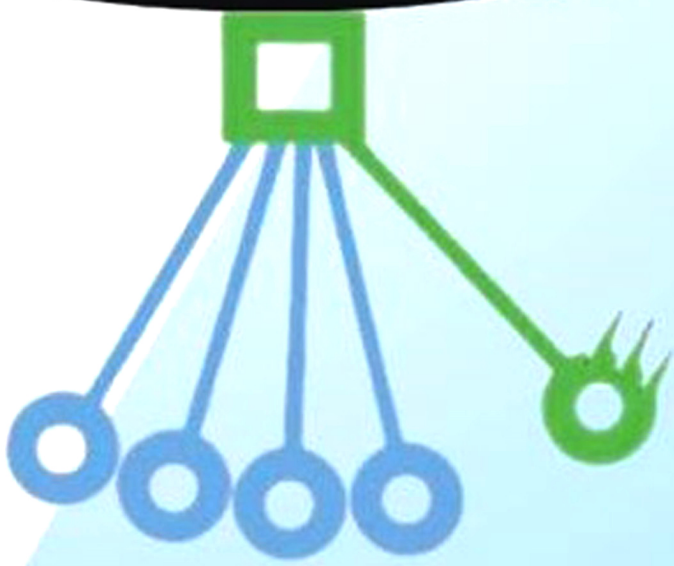
NABONEX
Curiosity Meets Clarity

CLASS X

Physics

Based on new syllabus

- Short Notes
- Model Questions
- Diagrams
- Equations



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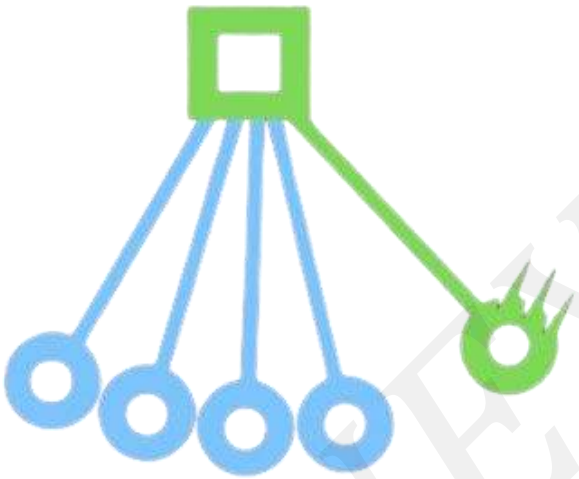

PHYSICS

Class X

Part I

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1. SOUND WAVES

Oscillation

It is the periodic motion in which an object moves to and fro at equal interval of time about its equilibrium position.

Example: -

Motion of a swing.

Motion of the pendulum in pendulum clock.

Terms related with oscillation

1.Amplitude (a)

The maximum displacement to one side from its equilibrium position.

The SI unit of amplitude is meter (m).

2.Period (T)

It is the time taken to complete one complete oscillation.

Its unit is second(s).

$$\text{Period} = \frac{\text{time taken to complete oscillations}}{\text{Total number of oscillations}}$$

$$T = \frac{t}{n}$$

3.Frequency (f)

The number of oscillations in one second.

The SI unit of frequency is Hertz (Hz).

$$frequency = \frac{number\ of\ oscillations}{time\ taken}$$

$$f = \frac{n}{t}$$

$$f = \frac{1}{t/n} = \frac{1}{T}$$

- Frequency is the reciprocal of period
- As the length of the simple pendulum increases, frequency decreases, period increases.

Natural frequency

If an object is allowed to oscillate, freely then its frequency is called natural frequency.

- The factors influencing the natural frequency are;
  - The length of the object.
  - Elasticity
  - nature of the material.
  - size of the object

Forced vibration

It is the vibration of an object induced by an external vibrating object.

Example: if a mixer grinder placed on a table works, the table also vibrates.

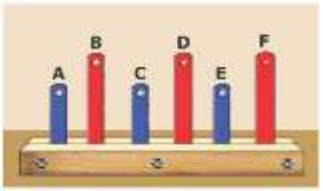
Resonance

If the natural frequency of the forcing object and that of the forced objects are equal, the objects are said to be in resonance

Example: when there is thunder, some window glasses vibrate.

Applications of forced vibration

- MRI scanning
- Radio tuning
- Musical instruments
- Stethoscope



Wave motion

Transfer of energy from one part to another part of a medium.
Examples: -

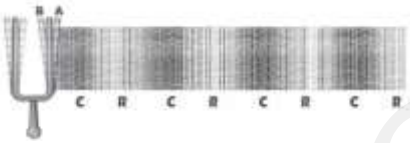
Radio wave, light wave, sound wave, seismic wave, ripples on the water.

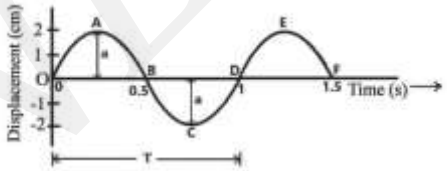
Mechanical Wave	**Electro Magnetic wave**
• Waves that require a medium for transmission.	• Doesn't require a medium for propagation.
Examples: Seismic wave Sound wave	Examples: Radio wave Light wave

Mechanical waves can be classified into two types;

Longitudinal wave	Transverse wave
• Particles in the medium vibrates parallel to the direction of propagation of wave.	• Particles the medium vibrate perpendicular to the direction of propagation of the wave.
• Compressions and rarefactions are formed.	• Crests and trough are formed.
• Pressure variations occur in the medium.	• no pressure variations occur in the medium.
• It transmits through solids, liquids and gases.	• It transmits along the surface of solids and liquids.
• E g: - Sound wave, seismic wave, waves formed in a slinky.	• E g: - Waves formed in a rope, waves formed on the surface of water.

Characteristics of waves





1. **Amplitude (a)**
   It is the maximum displacement of the vibrating particle from its mean position.
2. **Period (T)**
   It is the time taken to complete one vibration(cycle).
   $$T = \frac{t}{n}$$
3. **Frequency (f)**
   It is the number of vibrations in one second.
   $$f = \frac{n}{t}$$
   $$f = \frac{1}{T}$$
4. **Wave length (λ)**
   - Distance between two consecutive particles which are in the same phase of vibration.
   - The total distance travelled by the wave in one cycle.
   - It is the distance between two consecutive troughs or crests.
   - Its SI unit is meter (m).

Note

As the wave length increases, frequency decreases.

5. Speed of wave (v)

It is the distance travelled by the wave in unit time.

$v = \frac{distance}{time} = \frac{\lambda}{T}$

$v = \lambda \times \frac{1}{T} = \lambda \times f$

$\boxed{v = \lambda f}$

- If the speed remains constant, the frequency is inversely proportional to wave length.

Reflection of sound

Sound also gets reflected when it is incidents on smooth surfaces.

Multiple reflection of sound

Reflected sound waves get reflected again

- It is used in many musical instruments
- The reason behind echo is multiple reflection.

Persistence of hearing

The sense of sound remains in our ear for about $\frac{1}{10}$ of a second. It is called persistence of hearing.

Reverberation

It is the boom of sound, even after original sound has ceases. It is due to multiple reflection occur within the time limit $\frac{1}{10}$ of second.

Echo

It is the sound heard after a while due to the reflection of the initial sound.

The distance travelled by the sound in one second = 350 m

The distance in $\frac{1}{10}$ second = 35 m

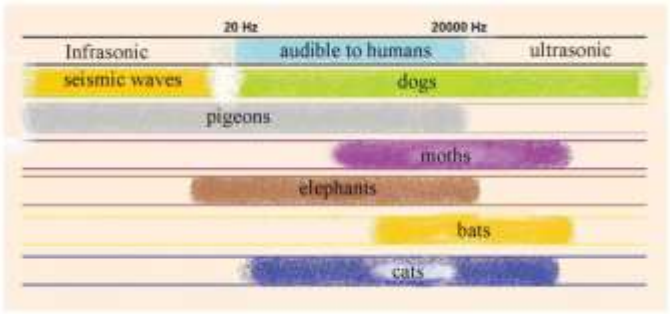
Note

The minimum distance from the listener to the reflecting surface to hear an echo is 17.5 m.

To get clear sound

- Wall of large halls made rough.
- Use more windows and curtains.

Limits of audibility



- Human being cannot hear all types of sound. It has a limit of range of frequency to hear.
- The limit of frequency for hearing is from 20 Hz to 20000 Hz (20 kHz).
- The sound below the frequency 20 Hz is called **infrasonic sound**.
  E g: - seismic wave
- The sound of frequency above 20000 Hz is called **ultrasonic sound**.
  E g: - sound produced by Galton whistle.

Uses of ultrasonic sound

- To crush stones in kidney.
- In physiotherapy.
- Ultra sound scanning.
- For cleaning, spiral tubes, electronic boards.
- SONAR.

Seismic waves

The wave produced as the result of earthquakes or volcanic explosions.

- The study about seismic waves is called seismology.
- The intensity of earthquake is determined by the Richter scale.
- Tsunami is a series of gigantic ocean waves caused by the displacement of large volumes of water in the sea.

ADDITIONAL QUESTIONS

1.If the frequency of simple pendulum is 0.5 Hz. Find its time period?

Ans) $T = \frac{1}{f} = \frac{1}{0.5} = 2$ s

2.If the length of a pendulum is increased from 20 cm to 30 cm. Then its frequency is _____.

[Increases, Decreases, remains the same]

Ans) Decreases, because period increases.

3.Find out the odd one

[Radio wave, Seismic wave, Sound wave]

Ans) Radio wave, no medium is required for transmission.

4.A person makes a sound from a corner of a room of length 16 m. what will be the sense of sound hearing in his ear?

Ans) Reverberation

5.In which of the following, does a human being cannot hear?

[30 Hz, 300 Hz, 3000 Hz, 300 kHz]

Ans) 300 kHz

6.tuning fork of frequency 256 Hz is excited and its stem is pressed on a table.

a) Does the table vibrate in this situation?
b) What is this phenomenon known as?

Ans)

a) Yes, 256 Hz
b) Forced vibration

7.A sound wave travels through air with a speed of 350 m/s, if its frequency is 70 Hz,

a) what will be the distance between two consecutive compressions of this wave.
b) Is the sound wave transverse or longitudinal?

Ans)

a) wave length, $\lambda = \frac{v}{f} = \frac{350}{70} = 5$ m
b) Longitudinal

8.What should be the minimum distance between the source and the reflecting surface to hear the echo in water? [The speed of the sound in water as 1480 m/s]

Ans) $v = \frac{2d}{t}$

$d = \frac{v \times t}{2} = \frac{1480 \times 1}{2} = 740$ m

2. LENSES

A lens isa transparent medium in which each refracting surface is part of the spheres. Lenses are used in many practical applications.

Camera, telescope, microscope, spectacles, toys.

Lenses are of two types.

Convex lens	Concave lens
• Thicker in the middle. • Thinner at the edges. • Light converges. • Forms magnified as well as diminished image. 	• Thinner in the middle. • Thicker at the edges. • Light diverges. • Forms only diminished image. 

TERMS RELATED TO THE LENSES

Optic Centre(O)

The midpoint of a lens is the optic center.

Centre of curvature(C)

The Centre of the sphere in which the refracting surface is its part.

Optic axis

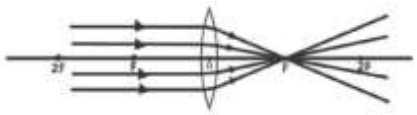
The straight line passing through the centers of curvature and the optic center of a lens.

Aperture

The area of the lens through which light passes is called aperture.

Principal focus of convex lens(F)

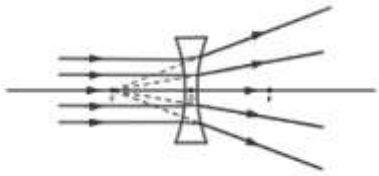
light rays coming parallel to the optic axis converges at a point on the optic axis after refraction. This point is the principal focus of a convex lens.

The principal focus is real for convex lens. 

Principal focus of a concave lens

Light rays coming parallel to the optic axis, diverges from a point on the optic axis after refraction.

The principal focus of concave lens is virtual.



Focal length

It is the distance from the optic center of the lens to the principal focus.

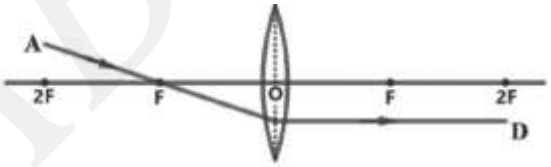
Image formation in lenses

Real image	Virtual image
• Inverted image.	• Erect image.
• Obtains in a screen.	• Cannot obtain in screen.
• In cameras, cinema screens	• Microscope.

If a light coming parallel to the optic center, it passes through principal focus on the other side.

A ray of light passing through the optic center, it passes without refraction.

A ray of light passing through the focus on the same side, it refracts parallel to the optic center.



Convex lens image formation

Object beyond 2F

Image is in between F & 2F

Real, inverted Diminished

Object at 2F

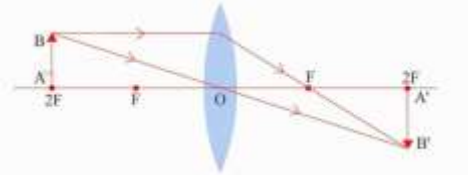


Image is at 2F on other side

Real, inverted

Same size of the object

Object between F & 2F

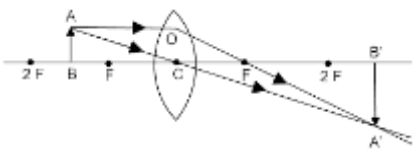
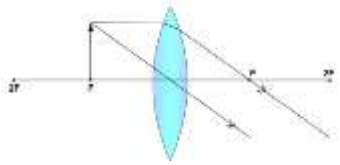
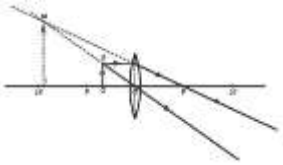


Image is beyond 2F Real, inverted Enlarged

Object at 2F Image is at infinity Real, inverted Enlarged



Object between F and the lens On the same side of the object Erect, virtual, Enlarged



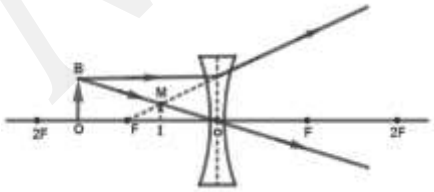
Concave lens – image formation

- Light parallel to the optic axis appear to be refracting from the focus on the same side.
- Light coming towards the focus, refracts parallel to the axis.
- Light passing through the optic center, goes through the same path without refraction.

Image at same side of the object

Virtual, erect

Diminished



Lens equation

f – focal length

u – distance to the object

v – distance to the image

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

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

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

$$v = \frac{uf}{u+f}$$

Cartesian sign convention

- All distance should be measured from the optic center of the lens.
- Distances measured to right of the lens is taken as positive and left as negative.

- Distances measured above the optic axis considered as positive and those below as negative.

Magnification

It is the ratio of the height of the image to the height of the object.

$$\mathbf{m} = \frac{hi}{ho} = \frac{v}{u}$$

convex lens;

m = 1(object and image are of same size)

m < 1 (smaller image)

m > 1 (larger image)

} Real/ inverted

m is negative (-) for real/inverted image.

m > 2 ← Virtual /erect

concave lens;

m < 1 ← Virtual /erect

m is positive (+) for virtual/erect image.

Power of lens

It is the reciprocal of focal length, measured in metre.

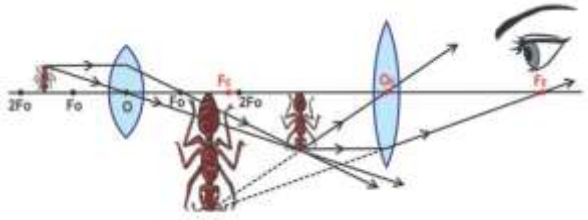
The unit of power of lens is dioptre(D).

$$\mathbf{P} = \frac{1}{f_{(m)}} = \frac{100}{f_{(cm)}}$$

- As the focal length decreases, power increases.

-D ⇒ concave lens, +D ⇒ convex lens

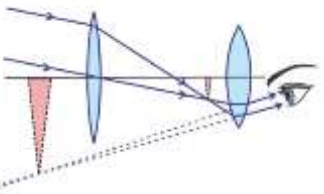
Compound microscope



It is a device to see magnified image of an object by adjusting two convex lenses such as eyepiece and objective.

- Object is placed in between F and 2F of objective lens. Its focal length should be small. An enlarged image is formed outside the lens.
- This image acts as the object for the eyepiece. Then a large and virtual image is formed through the eyepiece.

Refracting telescope



- The instrument to see distant objects clearly.
- There are different types of telescopes that make use of reflection and refraction.
- The objective lens of small focal length forms a small, real and inverted image of a distant object.
- Since the position of this image is between the focus of the eyepiece and the optic centre, we can see the virtual image formed by the eyepiece

ADDITIONAL QUESTIONS

1.When an object is placed in front of a lens, the image is formed outside a screen.

a) Which type of lens it is?
b) Is it real or virtual?

Ans)

a) Convex
b) Real

2.Find out the incorrect equation.

a) $\frac{1}{v} = \frac{1}{u} + \frac{1}{f}$ b) $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$ c) $f = \frac{uv}{u+v}$ d) $f = \frac{uv}{u-v}$

Ans) $f = \frac{uv}{u+v}$

3.The power of a lens is given as +4.

a) What kind of lens is this?

b) Find its focal length.

Ans)

a) Convex lens
b) $f = \frac{1}{p} = \frac{100}{4} = 25$ cm

4.The magnification of lens is given as m = -1.

a) What kind of lens is this?
b) Is the image real or virtual?
c) What is the position of the object?
d) What is the position of the image?

Ans)

a) Convex lens
b) Real
c) At 2F
d) At 2F

5.An object of height 2 cm is placed at 20 cm away from convex lens of focal length 10 cm. if so,

a) Find the distance to the image.
b) Find magnification.
c) Find the height of the image.

Ans)

a) u = -20 cm, f = +10 cm, ho = 2 cm

v = $\frac{uf}{u+f} = \frac{-20\times10}{-20+10} = \frac{-200}{-10}$ = +20 cm

b) m = $\frac{\boldsymbol{v}}{\boldsymbol{u}} = \frac{+20}{-20}$ = -1

c) ho = hi = -2 cm

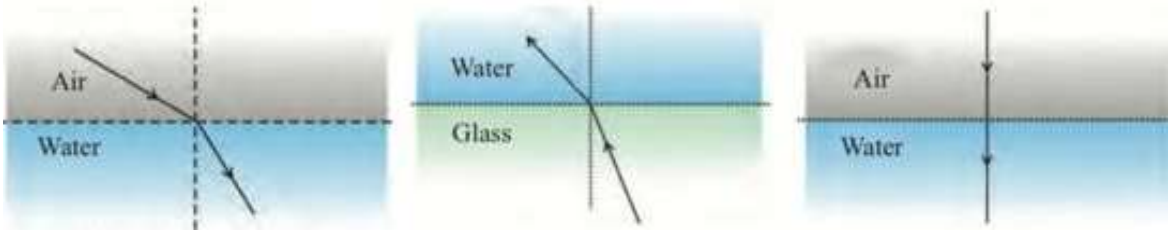
6.Find out the correct statements from the following.

a) The focal length of objective of compound microscope is more.
b) The focal length of objective of telescope is more.
c) The focal length of objective of compound microscope is less.
d) The focal length of objective of telescope is less.

Ans) b, d

3. THE WORLD OF COLOURS AND VISION

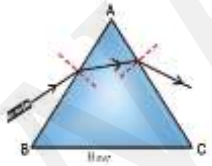
Refraction



If a ray of light enters from one medium to another medium of different optical density, its path undergoes a deviation. It is called refraction.

- If light enters from a medium of lower optical density to higher optical density, the refracted ray bends towards the normal.
- If light enters from a medium of higher optical density to lower optical density, the refracted ray bends away from the normal.

Refraction through a glass prism



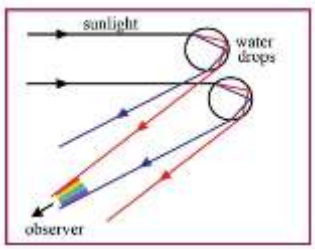
when light ray enters and leaves a prism, it deviates towards the base of the prism due to refraction.

Dispersion

The splitting up of a composite light into its component colours.

- When light passes through a prism, it undergoes refraction at the two faces of the prism. The extent of deviation depends on the wavelength of light.
- Red deviates the least, because of its longer wavelength.
- Violet deviates most, because of its shorter wavelength.
- Other colours arranged between red and violet.

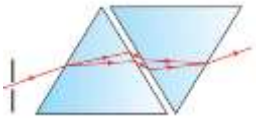
Rainbow



A ray of sunlight passing through a water droplet undergoes refraction twice and internal reflection once.

A rainbow is formed as a result of the combined effect of refraction, dispersion and internal reflection.

- A rainbow is always formed in a direction opposite to the sun.
- If the rainbow is seen in the east, the sun will be at west.

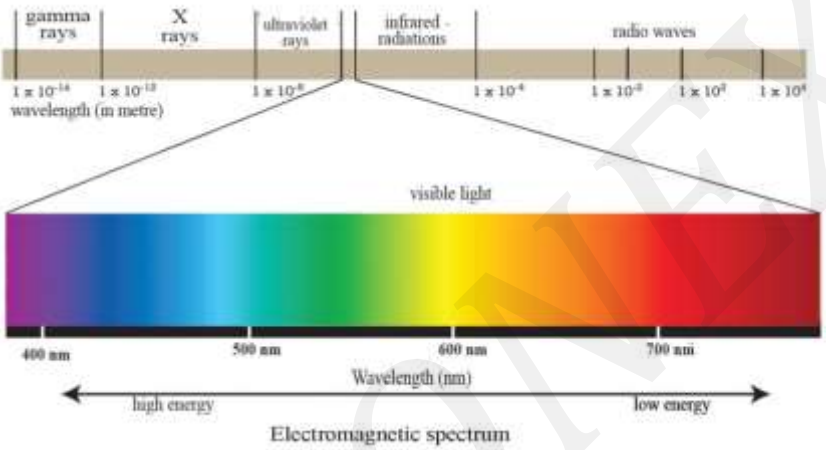


Recombination of light

If the sunlight can be split up into its constituent colours, it is also possible to form white light by recombining seven colours.

Electromagnetic spectrum

There are other radiations present in sunlight besides visible light.



Gamma ray, x ray, ultra violet, visible light, infrared, micro wave, radio wave

- The arrangement of electromagnetic radiations in the order of wavelength or frequency is called electromagnetic spectrum.
- EM waves do not require any medium to travel.
- The speed of EM waves is 3×10^8 m/s.
- IR is the reason behind heat content in the sunlight.
- UV radiation helps to produce vitamin D in our body.

Primary colours

The colours which are independent of each other and combination of these colours make white colour.

- Red, green, blue are the primary colours.

Secondary colours

Primary colours	Secondary colour
Red + Green	Yellow
Red + Blue	Magenta
Green + Blue	Cyan

R+G+B= White

The colour formed by combining any two primary colours is a secondary colour of light.

Persistence of vision

The visual experience of an object remains in our eyes for a time about $\frac{1}{16}$ of a second. This phenomenon is called persistence of vision.

E g: 1. When a burning incense stick is rotated very fast, a circular fire ring can be seen.

2. Newton's colour disc appears as white when it is rotating very fast.

Colour of transparent object

Transparent filters transmit only the colour of the filter and its component colours from the white light, and block the other colours.

filter	Light falling on the filter	Colours passing
Red	Red	Red
	Green	No light
	Blue	No light
	Magenta	Red
	Yellow	Red
	Cyan	No light
	White	Red
Green	Green	Green
	Red	No light
	Blue	No light
	Magenta	No light
	Yellow	Green
	Cyan	Green
	White	Green
Blue	White	Blue
	Blue	Blue
	Cyan	Blue
	Magenta	Blue

Colour of opaque object

Objects	light	Colour of the object seen
Red flower	Red Green Yellow Blue	Red Dark Red Dark
Green leaf	Red Green Blue Yellow	Dark Green Dark green
Blue shirt	Red Green Yellow Blue	Dark Dark Dark blue
Yellow flower	Red Green Blue Yellow	Red Green Dark Yellow
White paper	Green Red Blue Yellow	Green Red Blue Yellow

- When sunlight falls on an opaque object, it reflects the colour of the object.
- An opaque object of a secondary colour can reflect light of its colour and its component colours.
- A surface that reflects all colours will appear white in white light.
- A surface that absorbs all colours appears dark.

Scattering of light

The irregular and partial reflection of light is called scattering.

- The shorter wavelengths like violet, indigo and blue colours undergo more scattering.
- The longer wavelengths like orange, red colours undergo less scattering. Hence red can travel a longer distance through atmosphere.
- As the size of the particles increases, rate of scattering also increases.
- If the size of the particle is greater than the wavelength of the light, the scattering will be same for all colours.

  Eg: 1. Usually sky appears blue colour.
  2. Sun appears as red colour during sun rise and sun set.

Tyndall effect

When light rays pass through a colloidal liquid or suspension, they get scattered, making the path of light visible. This phenomenon is called Tyndall effect.

Eg: in winter, path of light through the gaps of the branches of trees can be seen clearly due to scattering.

Blue colour of the sky

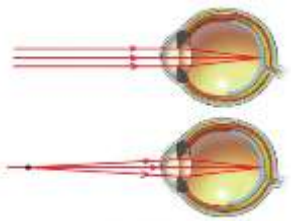
When sun light travels through atmosphere to reach the earth, shorter wavelengths like violet, indigo and blue undergo scattering. It spreads in the sky and the resultant colour will be blue.

Colour of setting and rising sun

During sun rise and sun set, light has to be travel long distance to reach the observer. The shorter wavelengths like violet, indigo and blue colours will be scattered out. So the larger wavelength red colour reaches the eye without scattering.

Eye and vision

- Convex lens present in our eyes help to view the images.
- The image should be formed in the retina of the eye to get the clear image.
- The focal length of the convex lens has to be changed in accordance with the distance of the objects
- Focal length of the lens is adjusted by changing the curvature of lens.
- If the ciliary muscles contract, the curvature of the lens increases and focal length decreases.
- If the ciliary muscles expand, the curvature decreases and focal length increases.



Power of accommodation

The ability of the eye to change the curvature of the lens and adjust the focal length so that the image can be seen clearly regardless of the position of the object is the power of accommodation.

Near point

The nearest point at which an object can be seen clearly.

- For healthy eyes, the minimum distance for clear vision is **25 cm**.

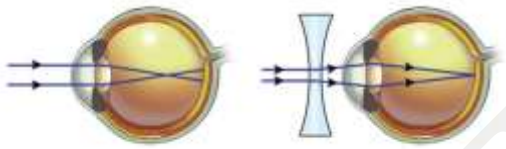
Far point

The farthest point at which an object can be seen clearly.

- Far point is considered as **infinity**.

Defects of eye

1. **Short sightedness/myopia**
   Some people can see nearby objects clearly but cannot see distant objects. This defect of the eye is short sightedness.



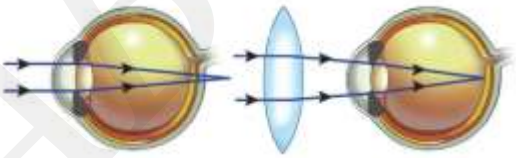
Reason:

- Focal length of the lens is less.
- Power of the lens is more.
- Size of the eyeball is larger.
- Far point will be at infinity.

Solution:

- by using a **concave lens** of suitable power.

2. **Long sightedness/hypermetropia**



Some people can see distant objects clearly but cannot see nearby objects clearly.
The near point of a person with long sightedness will be more than 25 cm.

Reason:

- focal length is more.
- Power of the lens is less.
- Size of the eyeball is less.

Solution:

by using **convex lens** of suitable power.

3. **Presbyopia**
   For aged people, the efficiency of ciliary muscles decreases and near point increases. This is presbyopia.

Solution:

By using **convex lens** of suitable power.

Consequences of light pollution

1) Causes difficulty during night drive.
2) The light from multi- storeyed flats misleads migratory birds.

ADDITIONAL QUESTIONS

1.In a prism, the emergent ray bends towards the _____ of the prism.

Ans) Base

2.A rainbow is formed due to the combination of which optical phenomena?

a) Reflection and refraction.

b) Refraction and diffraction.

c) Refraction and internal reflection.

d) refraction and scattering.

Ans) Refraction and internal reflection.

3.Which of the following wavelengths of visible light is scattered the most by air molecules.

a) Red b) Green c) Yellow d) Blue

Ans) Blue

4.Tyndall effect is due to,

a) scattering b) dispersion c) Reflection d) Refraction

Ans) Scattering

5.Presbyopia can be corrected using,

a) Convex lens b) Concave lens

c) Cylindrical lens d) Bifocal lens

Ans) Convex lens.

6.In myopia the image of a distant object is formed,

a) Behind the retina b) Infront of the retina

c) Directly on the retina d) On the retina

Ans) Infront of the retina

7.Fill in the blanks correctly

a) Magenta + ____ = white light

b) Yellow + Blue = _____

Ans) a) Green

b) White

8.Which colour is used as tail lamps in vehicles? Why?

Ans) Red. Because it has longer wavelength, it can travel longer distance without scattering.

9.A doctor prescribed a lens of power +1.2 D to a patient,

a) Which type of lens it is?

b) What may be the defect?

Ans) a) Convex lens

b) Hypermetropia

10. Complete the table.

Colour of the object	Light			
	Green	Blue	Red	Yellow
Yellow flower	Green	Dark	Red	Yellow
Blue paper	Dark	Blue	Dark	Dark

4. MAGNETIC EFFECT OF ELECTRIC CURRENT

Magnetic field intensity

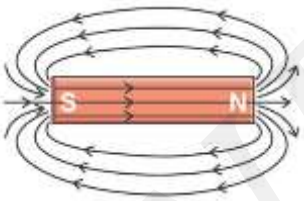
The strength of a magnet to attract or repel another magnetic field.

The unit of magnetic field is Tesla(T).

Magnetic field lines

The imaginary lines which visualize the strength of magnetic field are called magnetic field lines.

- The direction of magnetic field lines is always from **North to South.**
- But inside the magnet, the direction of magnetic field lines is from **South to North.**



Current carrying conductor and magnetic field

A current carrying conductor produces a magnetic field around it.

- The direction of magnetic field depends on the direction of current.
- The method of finding the direction of the magnetic field around a current carrying conductor is known as the **righthand thumb rule.**

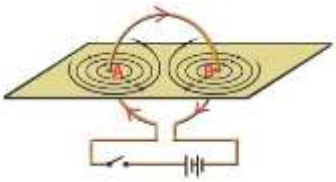
Right hand thumb rule

if we hold a conductor with right hand in such a way that the thumb points in the direction of the electric current, the fingers curled around the conductor will indicate the direction of the magnetic field.

Current carrying circular coil

- If the current in the coil is clockwise, the direction of the flux lines will be inward into the coil.

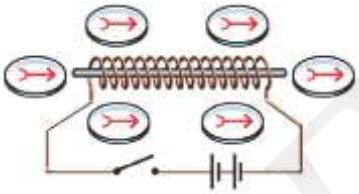
- If the current is anti-clockwise, the direction of the flux lines will be outward.
- Strength of magnetic field can be increased by
  i) Increasing the current.
  ii) Increasing the number of turns.



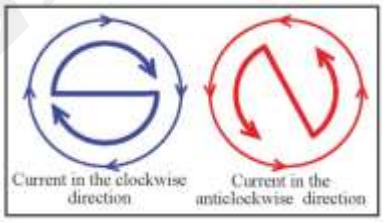
Solenoid

A current carrying solenoid produces a magnetic field similar to the magnetic field of a bar magnet.

- The magnetic field produced by a current carrying solenoid is similar to the magnetic field of a barmagnet



- If the current flows in **clockwise direction** at one end of the solenoid, the polarity at that end will be **South**.
- If the current is in **anti-clockwise direction**, that end will be **North**.



Another method

If you hold a current carrying solenoid with your right hand in such a way that your four fingers curl the coil in the direction of the current, the thumb points towards the north pole of the solenoid.

Method to increase strength of magnetic field

- Increase the intensity of current.
- Increase the number of turns.
- Insert a soft iron core.
- Increase the area of cross-section of coils.

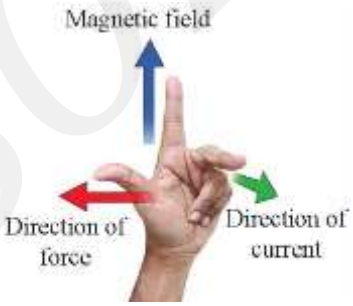
Bar magnet	Current carrying solenoid
Magnetism is permanent.	Magnetism is temporary.
Strength cannot be varied.	Strength can be varied.
Polarity cannot be changed.	Polarity can be changed.

- Current carrying solenoid are used to create electromagnets in some electrical devices.
  Eg: MRI scanner, electric cranes, Maglev train, electric motor

Motor principle

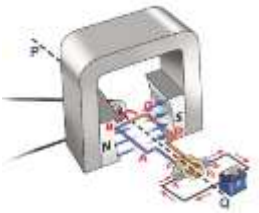
- A current carrying conductor placed in a magnetic field experiences a force.
- The factors influencing the direction of force are;
  - Direction of current
  - Direction of magnetic field.
- If the direction of the current and the magnetic field are reversed, the conductor will move in the same direction as before.
- The direction of force, electric current and magnetic field are mutually perpendicular.

Fleming's lefthand rule



Hold the thumb, fore finger and middle finger of your left finger perpendicular to each other. If the fore finger points in the direction of the magnetic field and the middle finger in the direction of the electric current, then the thumb will indicate the direction of the force.

Electric motor



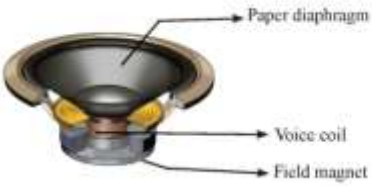
- The working principle of electric motor is motor principle.
- Motor converts electric energy into mechanical energy.
- The main components are field magnet, armature, split rings and brushes.

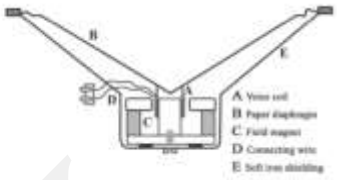
Working

As the current passes through the armature, its opposite sides experience force in opposite direction. It causes w

In the next half rotation brushes and rings are inter changed. thus, the direction of the current is the same in the parts of the armature. Hence armature rotates continuously in the same direction.

Moving coil loudspeaker





- Moving coil loudspeaker works based on the motor principle.
- It also converts electrical energy into mechanical energy.
- The strength of audio signal is increased by an amplifier.

Working

The electrical signal coming from microphone passes through voice coil which is placed in a magnetic field. So the coil experiences a force and vibrates.it also vibrates the diaphragm, thus sound is produced.

ADDITIONAL QUESTIONS

1.Who discovered that a current carrying conductor produces magnetic field around it?

Ans) Hans Christian Oersted

2.The magnetic field produced by a current carrying solenoid is similar to the magnetic field of a _____.

Ans) Bar magnet.

3.Find out the odd one

[electric fan, electric heater, electric motor]

Ans) Electric heater.

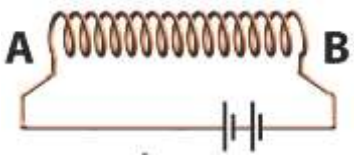
4.The working principle behind a moving coil loudspeaker is _____.

Ans) Motor principle

5.Which mechanism is used to change the direction of the current in a DC motor?

Ans) split ring commutator

6.Observe the figure



a) What is the polarity of A?
b) What is the polarity of B?

Ans)

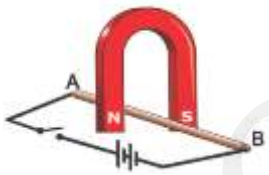
a) A - South pole
b) B – North pole

7.Arrange the following boxes in correct order.

a) Voice coil vibrates.
b) Electric signals received from microphone.
c) Reproduce the sound.
d) Voice coil experiences force.

Ans) b, d, a, c

8.In figure, AB is a conducting rod that is free to move.



a) When the switch is turned on, in which direction will the metal rod AB move?
b) What should be done to keep the direction of motion of the rod unchanged while changing the direction of the current?

Ans)

a) In upward direction.
b) Reverse the direction of magnetic field.

MCQ Questions

1. What type of wave is a sound wave in air?

A) Transverse wave B) Longitudinal wave

C) Electromagnetic wave D) Surface wave

2. Which of the following affects the speed of sound in a medium?

A) Color of the medium B) Temperature of the medium

C) Loudness of the sound D) Wavelength only

3. What is the unit of frequency of a sound wave?

A) m/s B) dB C) Hertz (Hz) D) Newton

4. In which medium does sound travel fastest?

A) Air B) Water C) Steel D) Vacuum

5. What characteristic of a sound wave determines its pitch?

A) Amplitude B) Frequency C) Wavelength D) Speed

6. Which lens can form a real and inverted image?

A) Convex lens B) Concave lens

C) Biconcave lens D) None of the above

7. The principal focus of a lens is:

A) The center of the lens B) A point on the optical axis

C) The point where light rays parallel to the principal axis converge or appear to diverge

D) Always virtual

8. Which of the following is used to correct long-sightedness (hypermetropia)?

A) Concave lens B) Convex lens C) Plane mirror D) Prism

9. What is the defect of vision where nearby objects appear clear but distant objects appear blurred?

A) Hypermetropia B) Myopia C) Astigmatism D) Presbyopia

10. The rule used to determine the direction of the magnetic field around a conductor is:

A) Fleming's Left-Hand Rule B) Lenz's Law

C) Right-Hand Thumb Rule D) Faraday's Law

11. What is the shape of the magnetic field lines around a straight current-carrying conductor?

A) Straight lines B) Circular lines C) Elliptical lines D) Parabolic lines

12. A current-carrying conductor placed in a magnetic field experiences a:

A) Voltage B) Force C) Pressure D) Resistance

ANSWER KEY

1.B 2.B 3.C 4.C 5.B 6.A 7.C 8.B 9.B 10.C 11.B 12.B