SCERT Kerala · Class 10 · Physics

Physics Part 1

PADIKAM
PHYSICS
PART I
Complete Study Notes | Standard X | English Medium
SCERT Kerala 2025 syllabus coverage
Original explanations, revision tools, exam focus and practice

PADIKAM | CLASS 10 PHYSICS - PART I
Contents
Four chapters connect vibrations and waves with light, vision and the magnetic action of electric current.
Equations follow SCERT notation, with every symbol and SI unit stated beside its use.
Chapter 1 | Sound Waves
Chapter 2 | Lenses
Chapter 3 | The World of Colours and Vision
Chapter 4 | Magnetic Effect of Electric Current
How to use this book
• Read the chapter mission first to understand the learning target.
• Study the core notes and pause at every table, formula or process map.
• Use the exam focus list for last-minute revision.
• Answer the practice questions without looking back, then revise weak areas.
Official textbook links
SCERT Kerala Class 10 PART I
SCERT Kerala Standard 10 textbook catalogue

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CHAPTER 1
Sound Waves
Chapter mission: describe oscillations and waves, use textbook symbols confidently, and apply sound reflection and frequency ideas.
Oscillation and its measures
• An oscillation is repeated motion on either side of an equilibrium position. Amplitude is the maximum displacement from equilibrium.
• Period is the time for one complete oscillation; frequency is the number of oscillations completed in one second.
T = total time / number of oscillations
f = 1/T
Symbols and SI units
Symbol Meaning SI unit
T period second (s)
f frequency hertz (Hz)
A amplitude metre (m)
v wave speed metre per second (m s-1)
λ wavelength (lambda) metre (m)
Wave motion
• A mechanical wave transfers energy through a material medium without permanent transfer of matter.
• In a longitudinal wave, particles vibrate parallel to propagation and form compressions and rarefactions. In a transverse wave, particles vibrate perpendicular to propagation and form crests and troughs.
• Wavelength λ is the distance between two nearest points in the same phase, such as successive

compressions or successive crests.
$v = f\lambda$
$\lambda = v/f$
$f = v/\lambda$
Sound, hearing and applications
• Audible sound for a healthy young human is approximately 20 Hz to 20 000 Hz. Below this is infrasonic and above it is ultrasonic.

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• Reflection of sound produces an echo when the reflected sound is heard separately. Multiple reflections that prolong sound in a hall cause reverberation.
• SONAR uses ultrasonic pulses and echoes to find distance or depth. Ultrasound is also used in imaging, cleaning and flaw detection.
Distance to reflector = $vt/2$
Resonance and natural frequency
• Every vibrating system has one or more natural frequencies. A periodic external force produces forced vibration.
• Resonance occurs when the driving frequency equals a natural frequency, causing a large amplitude. It can be useful in musical instruments and harmful in structures.
Exam focus
• Say the name lambda when reading λ.
• Write the formula before substitution and keep SI units in every numerical answer.
• In an echo calculation, divide the pulse's total travel distance by two.
Practice
1. A wave has frequency 50 Hz and wavelength 6 m. Find its speed.
2. Explain compression and rarefaction.
3. Why is resonance sometimes dangerous?

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CHAPTER 2
Lenses
Chapter mission: use ray rules, sign conventions and lens equations to predict images and solve optical problems.
Refraction through lenses
• A convex lens is thicker at the centre and usually converges parallel rays. A concave lens is thinner at the centre and diverges parallel rays.
• The principal axis passes through the optical centre. Principal focus F is the point where rays parallel to the axis meet, or appear to diverge from.
• A ray through the optical centre travels nearly undeviated; a ray parallel to the principal axis refracts through the focus for a convex lens.
Textbook equations
$1/f = 1/v - 1/u$
$m = h/h_o = v/u$
i
$P = 1/f$ (when f is in metre)
Symbols and SI units
Symbol Meaning SI unit
u object distance metre (m)
v image distance metre (m)
f focal length metre (m)
h_o object height metre (m)
h image height metre (m)
i
m linear magnification no unit
P power of lens dioptre (D)

Images and power

• A convex lens can form real inverted images or a virtual erect magnified image, depending on object position. A concave lens forms a virtual, erect and diminished image for a real object.

• Use the Cartesian sign convention consistently. A negative image height indicates an inverted image.

• Lens power is positive for a converging lens and negative for a diverging lens. Powers add for thin lenses in contact.

P = P + P

1 2

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A reliable numerical method

• List the given values with signs and convert centimetres to metres before calculating power.

• Choose the lens formula or magnification relation, substitute once, and state whether the image is real or virtual, erect or inverted, and enlarged or diminished.

Exam focus

• Draw principal rays with arrows and label F, 2F and O.

• Do not mix centimetres and metres in a power calculation.

• Interpret the signs of v, h and m after solving.

i

Practice

1. A convex lens has focal length 0.20 m. Find its power.

2. Describe the image formed by a concave lens.

3. Use the lens formula for a stated object distance and interpret the result.

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CHAPTER 3

The World of Colours and Vision

Chapter mission: explain colour, dispersion, scattering and common defects of vision using light behaviour.

Colour and wavelength

• Visible light contains a continuous range of wavelengths. Violet has shorter wavelength and red has longer wavelength within the visible range.

• An opaque object appears coloured because it reflects selected wavelengths and absorbs others. A white surface reflects most visible wavelengths; a black surface absorbs most.

• Additive mixing of red, green and blue light can produce other colours and white light.

v = fλ

Symbols and SI units

Symbol	Meaning	SI unit
v	speed of light in the medium	metre per second (m s-1)
f	frequency	hertz (Hz)
λ	wavelength	metre (m), often nanometre (nm)
P	power of correcting lens	dioptre (D)

Dispersion and scattering

• Dispersion is the separation of white light into colours because refractive index varies with wavelength. A prism deviates violet more than red.

• A rainbow forms through refraction, dispersion and internal reflection in water droplets.

• Small atmospheric particles scatter shorter wavelengths more strongly, helping explain the blue sky and reddish sunrise or sunset.

-9

1 nm = 10 m

Human eye

• The cornea and eye lens focus light on the retina. Accommodation changes lens curvature to focus objects at different distances.

• Myopia makes distant objects unclear and is corrected using a concave lens. Hypermetropia makes near objects unclear and is corrected using a convex lens.

• Presbyopia results from reduced accommodation with age. Cataract is clouding of the eye lens and needs medical care.
P = 1/f

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Safe observation
• Never look directly at the Sun or intense light through a lens. Vision defects and eye disease require professional examination rather than self-selected lenses.
Exam focus
• Keep dispersion, scattering and reflection distinct.
• Write the colour order by wavelength, not by memory of position alone.
• Name the defect, its optical cause and the correcting lens together.
Practice
1. Why does a prism separate white light?
2. Explain why the sky appears blue.
3. Compare myopia and hypermetropia.

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CHAPTER 4
Magnetic Effect of Electric Current
Chapter mission: connect current with magnetic fields and apply field rules to conductors, coils and electromagnets.
Magnetic field around current
• An electric current produces a magnetic field. Field lines around a straight conductor are concentric circles.
• The right-hand thumb rule gives field direction: point the right thumb along conventional current; curled fingers show magnetic-field direction.
• Field strength increases with current and decreases with distance from the conductor.
Coils and solenoids
• A current-carrying circular coil produces a field similar to a small magnet. More turns and greater current strengthen it.
• A solenoid is a long coil whose internal field is nearly uniform. A soft-iron core makes a strong temporary electromagnet.
• Electromagnets are used in relays, cranes, bells, speakers and many control devices.
For the same coil: $B \propto I$
For the same current: $B \propto N$
Force on a conductor
• A current-carrying conductor placed in a magnetic field experiences force when current is not parallel to the field.
• Fleming's left-hand rule gives the directions of magnetic field, current and force. This is the motor principle.
• Reversing either current or magnetic field reverses the force; reversing both keeps the force direction unchanged.
$F = BIl \sin\theta$
Symbols and SI units

Symbol	Meaning	SI unit
B	magnetic flux density	tesla (T)
I	electric current	ampere (A)
l	active conductor length	metre (m)
F	magnetic force	newton (N)
θ	angle between field and current	radian or degree
N	number of turns	no unit

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Motor action
• A motor converts electrical energy into mechanical energy. A split-ring commutator reverses coil current every half turn so torque continues in the same rotational sense.

• Use field direction, current direction and force direction as three separate steps in diagrams.

Exam focus

• Conventional current direction is opposite to electron flow.

• Use the right-hand thumb rule for field and Fleming's left-hand rule for force.

• State the energy conversion in every device answer.

Practice

1. Sketch the field around a straight current-carrying conductor.
2. Explain how a solenoid becomes stronger.
3. State the motor principle and energy conversion.

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Final Revision Checklist

• I can read λ as lambda and use v = fλ with SI units.

• I can apply lens sign conventions and interpret image properties.

• I can explain dispersion, scattering and vision correction.

• I can use magnetic-field and force-direction rules accurately.

Padikam Learning Content

Prepared as an independent learning companion using the SCERT textbook only as the syllabus and notation reference.