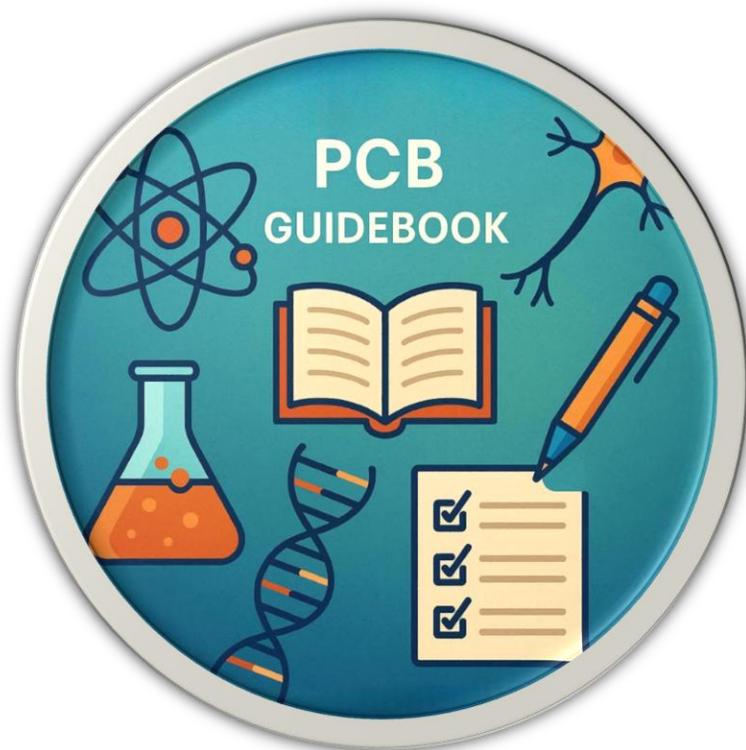# CBSE Class 12 PCB Previous Year Question Papers (2016–2025) with Solutions

Complete Practice Guide for Board Exam 2026 | Physics • Chemistry • • Biology | Latest CBSE Pattern & Competency-Based Questions

Published By: **SWAN India Publication**

🩵 Dedication

This book is lovingly dedicated to —

📘 All the students,
who strive each day with passion, curiosity, and determination
to achieve excellence in their board examinations.
Your hard work gives true meaning to education
and lights the path to a brighter future.

🔬 The teachers,
who inspire, guide, and nurture young minds —
turning challenges into learning and doubts into understanding.
Your dedication is the foundation of every student's success.

👥👥 And the parents,
whose constant support, patience, and encouragement
strengthen every learner's journey.

Without your love, faith, and motivation,
this effort would not have been possible.

— ✍ With heartfelt gratitude
Published By: SWAN India Publication

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📑 Table of Contents

Acknowledgment

The creation of this book has been a journey of dedication, collaboration, and constant learning.

I take this opportunity to express my heartfelt gratitude to all those who contributed directly or indirectly to make this book possible.

First and foremost, I thank the **students** whose curiosity and enthusiasm inspired this work. Your determination to learn and excel encouraged me to prepare this comprehensive practice guide.

A special note of appreciation goes to the **teachers, educators, and subject experts** who have continuously guided, reviewed, and shared valuable insights to ensure the accuracy and clarity of the content. Their expertise has shaped this book into a reliable learning companion.

I extend my sincere gratitude to the **CBSE Board and academic community**, whose guidelines and evolving exam patterns motivated the inclusion of competency-based and application-oriented questions for holistic exam preparation.

My deepest thanks to **SWAN India Publication** for believing in this vision and for their tireless efforts in bringing this book to life with precision, quality, and care.

Last but not least, heartfelt thanks to my **family and well-wishers** — for their constant support, patience, and encouragement throughout the journey of writing and compilation.

This book is not just a collection of question papers — it is a sincere effort to help students build confidence, clarity, and conceptual strength for their board exams.

🕊 About SWAN India Publication

SWAN India Publication is a rapidly emerging educational publisher dedicated to empowering students through high-quality, exam-oriented, and concept-driven learning resources.

Founded with the vision of making **education simple, accessible, and effective**, SWAN India Publication focuses on publishing well-structured academic materials that align with the latest **CBSE curriculum, NEP guidelines, and competency-based education system**.

Our mission is to bridge the gap between classroom learning and exam success by providing students with reliable, updated, and easy-to-understand study resources — designed by experienced educators and subject experts.

We take pride in creating books that not only help students **score better** but also **understand better**.

Each title is carefully crafted with clarity, accuracy, and student-friendly presentation — making learning both engaging and purposeful.

At SWAN India Publication, we believe that **every learner deserves the best guidance**, and every book we publish is a step toward fulfilling that promise.

From **previous year question papers**, **practice guides**, and **sample papers** to **competency-based assessments**, our publications serve as trusted companions for CBSE and competitive exam aspirants across India.

Together, we aim to inspire confidence, nurture curiosity, and contribute to a stronger, more informed generation of learners.

📖 Introduction

Education is not just about learning facts — it is about understanding concepts, applying knowledge, and building the confidence to face challenges.

For every student appearing in the **CBSE Class 12 Board Examination**, success begins with clarity, consistency, and the right preparation strategy.

This book, **"CBSE Class 12 PCB Previous Year Question Papers (2016–2025) with Solutions"**, has been carefully compiled to serve as a **complete practice companion** for students of **Physics, Chemistry, and Biology**.

Through this edition, we bring together a decade of **previous year question papers (2016–2025)**, each accompanied by **detailed and step-by-step solutions** — designed to help students understand exam trends, question patterns, and the logic behind every answer.

In alignment with the **latest CBSE syllabus, exam pattern, and competency-based question format**, this book aims to:

✦ Provide **comprehensive coverage** of all important topics from Class 12 Physics, Chemistry, and Biology.

✦ Help students analyze **question trends and weightage** across years.

✦ Strengthen **conceptual clarity** with accurate and explanatory solutions.

✦ Build **exam confidence** through real board-level practice.

✦ Encourage **self-assessment** and **time management** during preparation.

Every solution and explanation has been prepared with great care to ensure accuracy, simplicity, and relevance. Whether you are revising key concepts or attempting board-style questions, this book serves as your trusted guide to perform at your best.

We hope that this book not only helps you **achieve excellent marks** but also nurtures your curiosity, analytical thinking, and love for science.

Wishing you success, growth, and confidence in your academic journey!

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📄 CBSE Class 12 2025

Physics

Time: 3 Hours | Maximum Marks: 70

⚡ General Instructions:

1. All questions are compulsory.
2. Internal choices are provided where applicable.
3. Use of scientific calculator is allowed.
4. Draw labeled diagrams wherever necessary.
5. Show all steps clearly for numerical questions.

Section A (1 Mark Each)
(Each question carries 1 mark)

Q1. Define electric flux. Write its SI unit.

Answer:
Electric flux (Φ) is the measure of the number of electric field lines passing normally through a given surface.
SI Unit: **N·m²/C**

Q2. What happens to the capacitance of a parallel plate capacitor when a dielectric slab is inserted?

Answer:
When a dielectric slab is inserted, capacitance **increases by a factor of K** (dielectric constant).
New capacitance, **C' = K × C**

Q3. State one advantage of alternating current (AC) over direct current (DC).

Answer:
AC can be **easily transmitted over long distances** with low power loss using transformers, while DC cannot be transformed easily.

Q4. What is the effect of increasing slit separation in Young's Double Slit Experiment on fringe width?

Answer:
Fringe width (β) is inversely proportional to slit separation (d). So, if slit separation increases, **fringe width decreases**.

Formula: **β = λD/d**

Q5. Write one application of infrared rays.

Answer:
Infrared rays are used in **remote controls, night vision cameras**, and **medical therapy** for muscle pain relief.

Q6. What is the relationship between the radii of curvature of mirrors in an astronomical telescope?

Answer:
In a reflecting telescope, **focal length of objective > focal length of eyepiece**.
Thus, $R_1 > R_2$ (since f = R/2).

Q7. Define modulation in communication systems.

Answer:
Modulation is the process of **superimposing a low-frequency signal (information)** onto a **high-frequency carrier wave** for transmission over long distances.

Section B (2 Marks Each)

Q8. State Gauss's theorem and apply it to determine the electric field due to an infinitely long straight uniformly charged wire.

Answer:
Gauss's Theorem: The total electric flux through a closed surface is equal to $1/\varepsilon_0$ times the total charge enclosed by the surface.

Formula: $\Phi = q / \varepsilon_0$

For an infinite wire with charge per unit length λ:
Electric field at a distance r is given by:
E × (2πrL) = λL / ε₀
So, **E = λ / (2π ε₀ r)**

Q9. A cell of emf 2.5 V and internal resistance 0.5 Ω is connected to a 4 Ω resistor. Find:
(a) Current in the circuit
(b) Terminal voltage of the cell

Answer:

(a) I = E / (R + r)
= 2.5 / (4 + 0.5)
= 0.555 A

(b) V = E - I × r
= 2.5 - 0.555 × 0.5
= 2.22 V

Q10. Derive the expression for the force experienced by a current-carrying conductor placed in a uniform magnetic field.

Answer:
Force on a current-carrying conductor:
F = B × I × L × sinθ
where:
B = magnetic field strength,
I = current,
L = length of conductor,
θ = angle between field and conductor.

When θ = 90°, F = BIL (maximum).

Q11. Write any two differences between step-up and step-down transformers.

Answer:

Step-Up Transformer	Step-Down Transformer
Increases voltage	Decreases voltage
Secondary turns > Primary turns	Secondary turns < Primary turns

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Section C (3 Marks Each)

Q12. A circular coil of radius 10 cm and 50 turns carries a current of 3 A. Calculate the magnetic field at its center.

Answer:
Formula: $B = \mu_0 \times N \times I / (2R)$

Substitute values:
$B = (4\pi \times 10^{-7} \times 50 \times 3) / (2 \times 0.1)$
$B = 9.42 \times 10^{-4}$ T

Q13. State Faraday's laws of electromagnetic induction. Explain how emf is induced when magnetic flux linked with a coil changes.

Answer:
First Law: Whenever magnetic flux linked with a coil changes, an emf is induced.
Second Law: The magnitude of induced emf is directly proportional to the rate of change of magnetic flux.

Formula: $e = - d\Phi / dt$

The negative sign shows the induced emf opposes the change (Lenz's Law).

Q14. Write the principle of a moving coil galvanometer. Why is a radial magnetic field used in it?

Answer:
Principle: It works on the principle that a current-carrying coil placed in a magnetic field experiences a torque.

Radial magnetic field is used so that **the torque remains proportional to current (uniform rotation)** at all positions of the coil.

Section D (5 Marks Each)

Q15. (a) Explain the working of a transformer with the help of a labeled diagram.
(b) Mention two sources of energy loss in a transformer and suggest methods to minimize them.

Answer:
Working: Based on **mutual induction**, a transformer transfers energy between two coils without direct contact.

Losses:

1. **Eddy Current Loss:** Reduced by laminating iron core.
2. **Hysteresis Loss:** Reduced by using soft iron.
3. **Copper Loss:** Reduced by using thick, low-resistance wires.

Q16. Using a ray diagram, derive the mirror formula for a concave mirror.

Answer:
Consider object AB, image A'B', mirror M.

Using geometry:
1/f = 1/u + 1/v
where:
f = focal length,
u = object distance,
v = image distance.

Q17. (a) What are semiconductors? Explain intrinsic and extrinsic types.
(b) With a diagram, explain the working of a p-n junction diode in forward bias condition.

Answer:
(a) Substances whose conductivity lies between conductors and insulators.

- **Intrinsic:** Pure semiconductor (Si or Ge).
- **Extrinsic:** Doped semiconductor to increase conductivity.

(b) **Forward Bias:** p-side connected to positive terminal.
Barrier decreases → current flows.

Section E (Numerical – 5 Marks Each)

Q18. A parallel plate capacitor with air as dielectric has plate area 0.2 m² and separation 0.01 m. It is connected to a 200 V supply.
Find:
(a) Capacitance
(b) Charge stored
(c) Energy stored
(d) Energy after inserting dielectric constant K = 5

Answer:

$C = \varepsilon_0 \times A / d$
$= 8.85 \times 10^{-12} \times 0.2 / 0.01$
$= 1.77 \times 10^{-10}$ F

$Q = C \times V = 1.77 \times 10^{-10} \times 200 = 3.54 \times 10^{-8}$ C

$U = 0.5 \times C \times V^2 = 0.5 \times 1.77 \times 10^{-10} \times 200^2 = 3.54 \times 10^{-6}$ J

With dielectric,
$C' = K \times C = 5 \times 1.77 \times 10^{-10} = 8.85 \times 10^{-10}$ F

$U' = 0.5 \times C' \times V^2 = 0.5 \times 8.85 \times 10^{-10} \times 200^2 = 1.77 \times 10^{-5}$ J

Section F (Case Study – 4 Marks)

Q19. A student constructs an optical fiber communication system to transfer data signals using light.

(a) Explain the principle of total internal reflection used in optical fibers.
(b) Write two advantages of optical fiber communication.
(c) What will happen if the refractive indices of the core and cladding are equal?

Answer:
(a) When light enters at an angle greater than the critical angle, it undergoes **total internal reflection**, allowing signal transmission.
(b) Advantages: **High speed, minimum signal loss, noise-free transmission.**
(c) If refractive indices are equal, **no reflection occurs**, hence signal fails.

Thank You Note

With the successful completion of this book, I take a moment to express my deepest gratitude to everyone who played a part — directly or indirectly — in bringing this effort to life.

First and foremost, **to the students**, thank you for your trust and enthusiasm. Your curiosity and dedication are the real inspiration behind this work. Every page of this book has been written keeping your success in mind.

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To my **family and friends**, thank you for your unwavering encouragement, patience, and understanding throughout the writing and compilation journey. Your support gave me strength to turn this idea into reality.

Finally, to every reader — thank you for choosing this book as a part of your preparation. May it guide you, motivate you, and help you achieve your goals with confidence and clarity.

Your feedback and suggestions are always welcome and will help us improve in future editions. Together, we continue to learn, grow, and make education meaningful.

With warm regards and best wishes for your bright future,

— ✍ *Author*
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