



PHYSICS

Detailed Chapter-wise Analysis

1. Units and Measurements

Topic	2020	2021	2022	2023	2024	2025	Total	Easy	Medium	Hard
Measuring Instruments (Reading of Screw Gauge)	1	1	0	0	0	0	2	1	1	0
Dimensions of Physical Quantities	1	0	1	0	1	0	3	3	0	0
Significant Figures (Rule to Find Significant Figures or Digit)	1	0	0	0	0	0	1	1	0	0
Dimensional Analysis and its Applications (Finding Unknowns)	0	2	0	0	0	0	2	0	2	0
Rules for Arithmetic Operations with Significant Figures	0	0	1	0	0	0	1	0	1	0
Errors in Measurement (Systematic/Random/Gross Error)	0	0	0	1	0	0	1	1	0	0
Errors in Measurement (Combination of Errors)	0	0	0	1	0	1	2	1	1	0
Measuring Instruments (Least Count of Vernier Callipers)	0	0	0	0	1	0	1	0	1	0
Dimensional Constants	0	0	0	0	1	0	1	0	1	0
Dimensional Analysis and its Applications (Deducing Relation)	0	0	0	0	0	1	1	1	0	0
Measuring Instruments (Reading a Vernier Callipers)	0	0	0	0	0	1	1	0	1	0
Total	3	3	2	2	3	3	16	8	8	0

Summary: This chapter accounted for **16 questions**, evenly split between **Easy (8 questions)** and **Medium (8 questions)** difficulties. Key topics include **measuring instruments (screw gauge, vernier callipers)**, **dimensions of physical quantities**, **significant figures**, and **errors in measurement**.



Insights:

- **Measuring Instruments** (e.g., Screw Gauge, Vernier Callipers) and their readings are frequently tested.
 - **Dimensions of Physical Quantities and Dimensional Analysis** are consistently important.
 - Concepts related to **Significant Figures and Errors in Measurement** are also recurring themes.
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2. Motion in a straight line

Topic	2020	2021	2022	2023	2024	2025	Total	Easy	Medium	Hard
Motion under gravity (Free fall motion) (Calculation of Time of flight, max height, and velocity)	1	0	1	0	0	0	2	0	2	0
Displacement of Particle in nth Second	0	1	0	0	0	0	1	0	1	0
Graphs in Motion in One Dimension (Motion Diagram)	0	0	1	0	0	0	1	0	1	0
Average Velocity and Average Speed	0	0	0	1	0	0	1	0	1	0
Equations of Motion (Application of Equations of Motion)	0	0	0	1	0	0	1	0	1	0
Motion under gravity (Free fall motion) (Height to ground projection)	0	0	0	1	0	0	1	0	1	0
Kinematical Quantities or Graphs (Velocity(v) - Time(t) Graph)	0	0	0	0	1	0	1	0	1	0
Acceleration (Instantaneous Acceleration)	0	0	0	0	0	1	1	0	0	1
Relative velocity in One Dimension (Relative Velocity)	0	0	0	0	0	1	1	0	1	0
Total	1	1	2	3	1	2	10	0	9	1

Summary: The "Motion in a Straight Line" chapter accounted for **10 questions** over the years. Questions were predominantly of **Medium difficulty (9 questions)**, with one **Hard question**. Key areas include **motion under gravity, displacement, graphs, and basic kinematical equations**.



Insights:

- **Motion under gravity (Free Fall Motion)** is a consistently tested topic, covering calculations of time, height, and velocity.
 - Concepts like **Displacement in nth Second, Motion Graphs, and Equations of Motion** are also important, typically appearing as Medium difficulty.
 - **Instantaneous Acceleration** has been tested at a **Hard** difficulty level.
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3. Motion in a plane

Topic	2020	2021	2022	2023	2024	2025	Total	Easy	Medium	Hard
Motion in a Plane with Constant Acceleration	0	1	0	0	0	0	1	1	0	0
Projectile Motion (Maximum Height of a Projectile)	0	1	0	1	0	0	2	1	1	0
Projectile Motion (Analysis of Projectile Motion)	0	0	1	0	0	0	1	0	1	0
Total	0	2	1	1	0	0	4	2	2	0

Summary: The "Motion in a Plane" chapter generated **4 questions**, with an **equal distribution between Easy (2 questions) and Medium (2 questions)** difficulties. Key topics include **motion with constant acceleration and projectile motion**.

Insights:

- **Projectile Motion**, including maximum height and general analysis, is a **recurring and important topic**.
- **Motion in a Plane with Constant Acceleration** is also a fundamental concept tested in this chapter.



4. Laws of motion

Topic	2020	2021	2022	2023	2024	2025	Total	Easy	Medium	Hard
Newton's Second Law of Motion (Application of Newton's Second Law of Motion)	1	0	0	0	0	0	1	0	1	0
Friction (Friction as a Contact Force and Friction Constant)	0	0	1	0	0	0	1	0	1	0
Application of Laws of Motion (Various Forces in Nature)	0	0	0	1	0	0	1	0	1	0
Applications of Friction Force (Problems Involving Frictional Forces)	0	0	0	1	0	1	2	1	0	1
Newton's Second Law of Motion	0	0	0	0	1	0	1	1	0	0
Total	1	0	1	2	1	1	6	2	3	1

Summary: The "Laws of Motion" chapter contributed **6 questions**, with a focus on **Medium difficulty (3 questions)**, and some **Easy (2 questions)** and **Hard (1 question) questions**. Key topics include **Newton's Second Law** and different aspects of friction.

Insights:

- **Newton's Second Law of Motion and its applications** are fundamental and consistently tested.
 - **Friction**, both as a concept and in problem-solving, is an important recurring topic, sometimes appearing as Hard.
 - Understanding **various forces in nature** as described by laws of motion is also relevant.
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5. Work, energy and power

Topic	2020	2021	2022	2023	2024	2025	Total	Easy	Medium	Hard
Power (Efficiency)	0	1	0	0	0	0	1	0	1	0
Power (Definition)	0	0	2	0	0	0	2	1	1	0
The Concept of Potential Energy (Energy in Case of Spring)	0	0	0	1	0	0	1	1	0	0
Power (Instantaneous power)	0	0	0	0	1	0	1	0	1	0
Calculation of Work (Work Done by Constant Force (Including Work Done by Gravity))	0	0	0	0	0	1	1	0	1	0
Total	0	1	2	1	1	1	6	2	4	0

Summary: The "Work Energy and Power" chapter contributed **6 questions**, with a notable focus on **Medium difficulty (4 questions)**, and some **Easy (2 questions)** questions. Key topics include **power, potential energy in springs, and work done by forces**.

Insights:

- Concepts related to **Power (efficiency, definition, instantaneous)** are **consistently tested**.
 - The **Concept of Potential Energy**, particularly in the context of springs, is important.
 - Questions mainly revolve around **fundamental definitions and calculations** related to work, energy, and power.
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6. Circular Motion

Topic	2020	2021	2022	2023	2024	2025	Total	Easy	Medium	Hard
Non-Uniform Circular Motion	0	0	0	1	0	0	1	1	0	0
Uniform Circular Motion (Expression for Centripetal Acceleration, Angular Displacement, Angular Speed, Time Period, and Frequency)	0	0	0	0	1	0	1	1	0	0
Dynamics of Circular Motion	0	0	0	0	1	0	1	0	1	0
Vertical Circular Motion	0	0	0	0	0	1	1	0	0	1
Total	0	0	0	1	2	1	4	2	1	1

Summary: The "Circular Motion" chapter contributed **4 questions**, with a mix of Easy (2 questions), Medium (1 question), and Hard (1 question) difficulties. Topics covered included non-uniform, uniform, and vertical circular motion.

Insights:

- Both **Uniform and Non-Uniform Circular Motion** are important concepts.
- **Dynamics of Circular Motion** is also a tested area.
- **Vertical Circular Motion** has appeared as a Hard difficulty question.



7. Centre of mass and System of Particles

Topic	2020	2021	2022	2023	2024	2025	Total	Easy	Medium	Hard
Centre of Mass (of Two Bodies System)	1	0	1	0	0	0	2	1	1	0
Collisions (Collision in One Dimensions)	0	1	0	0	0	1	2	0	2	0
Conservation of Momentum (Applications of Law of Conservation of Linear Momentum)	0	0	1	0	0	0	1	0	1	0
Collisions (Inelastic Collision)	0	0	0	0	1	0	1	0	1	0
Total	1	1	2	0	1	1	6	1	5	0

Summary: This chapter generated **6 questions**, with a strong focus on **Medium difficulty (5 questions)** and some **Easy (1 question)** content. Key areas include the **center of mass and different types of collisions**.

Insights:

- Concepts related to the **Centre of Mass, especially for two-body systems**, are important.
 - **Collisions (both in one dimension and inelastic collisions)** are frequently tested.
 - **Conservation of Linear Momentum** is a fundamental principle often applied in these problems.
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8. Rotational Motion

Topic	2020	2021	2022	2023	2024	2025	Total	Easy	Medium	Hard
Torque of a Force About a Point	1	0	0	0	0	0	1	1	0	0
Moment of Inertia (Some Important Cases)	0	1	0	0	0	1	2	0	0	2
Equilibrium of a Rigid Body (Principle of Moments)	0	1	0	0	0	1	2	0	1	1
Moment of Inertia (Radius of Gyration)	0	0	1	1	0	0	2	1	1	0
Analogue of Newton's Second law of Motion for Pure Rotation	0	0	1	0	0	0	1	0	1	0
Moment of Inertia (Uniform Rectangular Lamina)	0	0	0	0	1	0	1	1	0	0
Rolling Motion (Pure Rolling on a Horizontal Plane)	0	0	0	0	1	0	1	1	0	0
Torque and Angular Momentum (Conservation of Angular Momentum)	0	0	0	0	0	1	1	0	1	0
Total	1	2	2	1	2	3	11	4	4	3

Summary: The "Rotational Motion" chapter accounted for 11 questions across the years. Questions were distributed across **Easy (4)**, **Medium (4)**, and **Hard (3)** difficulties. Key areas include **Moment of Inertia**, **Torque**, **Equilibrium of Rigid Bodies**, and **Conservation of Angular Momentum**.

Insights:

- **Moment of Inertia**, including its calculation for various shapes and the concept of radius of gyration, is a **significant topic, sometimes leading to Hard questions**.
- **Torque and Angular Momentum**, especially their **conservation**, are crucial.
- **Equilibrium of a Rigid Body and Rolling Motion** are also important aspects of this chapter.



9. Gravitation

Topic	2020	2021	2022	2023	2024	2025	Total	Easy	Medium	Hard
Acceleration Due to Gravity (Variation due to Height)	1	0	0	0	0	1	2	1	1	0
Gravitational Potential Energy	0	1	0	0	0	0	1	0	1	0
Escape Speed or Escape Energy	0	2	0	0	0	0	2	1	0	1
Gravitational Field (Due to Bodies of Different Shapes)	0	0	1	0	0	0	1	0	1	0
Gravitational Field Intensity Due to a Particle (Point - Mass)	0	0	0	1	0	0	1	0	1	0
Satellite Motion (Time Period of a Satellite)	0	0	0	1	0	0	1	0	0	1
Acceleration Due to Gravity (Variation by Mass and Density of the Earth)	0	0	0	0	1	0	1	0	1	0
Earth Satellite, Energy of an Orbiting Satellite (Geostationary and Polar Satellites)	0	0	0	0	1	0	1	0	0	1
Kepler's Laws (Law of Periods)	0	0	0	0	0	1	1	0	1	0
Total	1	3	1	2	2	2	11	2	6	3

Summary: The "Gravitation" chapter generated **11 questions**, with a notable concentration of **Medium difficulty (6 questions)**, alongside some **Easy (2 questions)** and **Hard (3 questions)** questions. Key recurring themes include **acceleration due to gravity, escape speed, and satellite motion**.

Insights:

- **Acceleration Due to Gravity** and its variations due to height, mass, and density are **consistently tested**.
- **Escape Speed/Energy** is an **important topic**, which can appear with varying difficulty, including **Hard**.
- **Satellite Motion and Kepler's Laws** are also crucial, with satellite time period appearing as **Hard**.



10. Mechanical Properties of Solids

Topic	2020	2021	2022	2023	2024	2025	Total	Easy	Medium	Hard
Hooke's Law	1	0	0	0	0	0	1	1	0	0
Types of Elasticity Coefficients (Shear Modulus or Modulus of Rigidity)	0	0	1	0	0	0	1	0	0	1
Stress and Strain (Tensile and Compressive Strain)	0	0	0	1	0	0	1	1	0	0
Types of Elasticity Coefficients (Determination of Young's Modulus of the Material of the Wire)	0	0	0	0	2	0	2	1	1	0
Total	1	0	1	1	2	0	5	3	1	1

Summary: This chapter provided **5 questions** across the years. Topics included **Hooke's Law**, **types of elasticity coefficients (shear modulus, Young's modulus)**, and **stress-strain concepts**. Difficulty was predominantly **Easy (3 questions)**, with one Medium and one Hard question.

Insights:

- **Hooke's Law** is a basic concept tested in this chapter.
 - Understanding **Elasticity Coefficients**, such as **Shear Modulus** and **Young's Modulus**, is important, with **Shear Modulus appearing as Hard**.
 - Basic concepts of **Stress and Strain** are also relevant.
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11. Mechanical Properties of Fluids

Topic	2020	2021	2022	2023	2024	2025	Total	Easy	Medium	Hard
Surface Tension (Capillary Rise)	1	0	0	0	0	0	1	0	1	0
Viscosity (Terminal Velocity)	0	1	1	0	0	0	2	1	0	1
Surface Tension (Bubbles Excess Pressure)	0	0	1	0	0	0	1	0	1	0
Surface Tension (Surface Energy)	0	0	0	1	0	0	1	0	1	0
Bernoulli's Equation (Pitot Tube)	0	0	0	1	0	0	1	1	0	0
Surface Tension	0	0	0	0	1	1	2	0	1	1
Total	1	1	2	2	1	1	8	2	5	1

Summary: This chapter generated **8 questions**, with a focus on **Medium difficulty (5 questions)**, and some **Easy (2 questions)** and **Hard (1 question)** questions. Key areas include **surface tension and viscosity**.

Insights:

- **Surface Tension** is a **consistently tested topic**, covering aspects like capillary rise, excess pressure in bubbles, and surface energy, and can result in **Hard questions**.
 - **Viscosity, particularly Terminal Velocity**, is also important and can be challenging.
 - **Bernoulli's Equation** has appeared as an **Easy question**.
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12.Thermal Properties of Matter

Topic	2020	2021	2022	2023	2024	2025	Total	Easy	Medium	Hard
Heat Transfer (Conduction)	1	0	0	0	0	1	2	0	2	0
Calorimetry (Principle Of Calorimetry)	0	1	0	0	0	0	1	0	1	0
Total	1	1	0	0	0	1	3	0	3	0

Summary: The "Thermal Properties of Matter" chapter contributed **3 questions**, all of **Medium** difficulty. Topics included **heat transfer (conduction)** and **calorimetry**.

Insights:

- **Heat Transfer, specifically Conduction**, is a recurring topic.
 - The **Principle of Calorimetry** has also been tested.
 - Questions from this chapter have **consistently been of Medium difficulty**.
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13.Kinetic Theory

Topic	2020	2021	2022	2023	2024	2025	Total	Easy	Medium	Hard
Mean Free Path	1	0	0	0	0	0	1	1	0	0
Kinetic Theory of an Ideal Gas (Average Kinetic Energy of a Gas Molecule)	1	1	0	0	0	0	2	1	1	0
Kinetic Theory of an Ideal Gas (RMS Speed)	0	1	0	0	0	0	1	0	1	0
Behaviour of Gases (Ideal Gas Equation)	0	0	1	0	0	0	1	0	1	0
Kinetic Theory of an Ideal Gas (Mean Square Speed)	0	0	0	1	0	0	1	1	0	0
Behaviour of Gases (Charles Law)	0	0	0	0	1	0	1	0	1	0
Kinetic Theory of an Ideal Gas	0	0	0	0	0	1	1	0	0	1
Total	2	3	1	1	1	1	9	3	4	1

Summary: The "Kinetic Theory" chapter provided **9 questions** over the years. Questions covered **mean free path, kinetic energy of gas molecules, RMS speed, and gas laws**. Difficulty was mainly **Medium (4 questions)**, with some Easy (3 questions) and a few Hard (1 question).

Insights:

- **Kinetic Theory of an Ideal Gas**, including average kinetic energy, RMS speed, and mean square speed, is a **consistent topic**.
 - **Mean Free Path** is also a basic, recurring concept.
 - **Behaviour of Gases and ideal gas equations** are important.
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14.Thermodynamics

Topic	2020	2021	2022	2023	2024	2025	Total	Easy	Medium	Hard
Thermodynamic State Variables	1	0	0	0	0	0	1	1	0	0
Thermodynamic Processes (Adiabatic Process)	1	0	1	0	0	0	2	1	0	1
Carnot's Engine	0	0	0	1	0	0	1	0	1	0
Internal Energy (Internal Energy and its Change)	0	0	0	0	0	1	1	0	0	1
First Law of Thermodynamics	0	0	0	0	0	1	1	0	1	0
Calculation of Work (Work Done in P-V Curve)	0	0	0	0	1	0	1	1	0	0
Total	2	0	1	1	1	2	7	3	2	2

Summary: The "Thermodynamics" chapter accounted for **7 questions**, with a notable presence of **Easy (3 questions)** and **Hard (2 questions)** content. Key topics include **thermodynamic processes, Carnot's engine, and the first law of thermodynamics**.

Insights:

- **Thermodynamic Processes**, particularly the **Adiabatic Process**, are **regularly tested**, sometimes appearing with **Hard difficulty**.
 - **Carnot's Engine, Internal Energy, and the First Law of Thermodynamics** are **fundamental concepts** that have also been questioned.
 - Questions tend to cover both **theoretical aspects (state variables) and practical applications (work done in P-V curves)**.
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15. Oscillations

Topic	2020	2021	2022	2023	2024	2025	Total	Easy	Medium	Hard
Simple Harmonic Motion (Phase (\ddot{x}))	1	0	0	0	0	0	1	0	1	0
Oscillations Due to a Spring	0	1	0	0	0	2	3	1	1	1
Energy in Simple Harmonic Motion	0	1	0	0	0	0	1	1	0	0
Some Systems Executing Simple Harmonic Motion (The Simple Pendulum)	0	0	1	0	0	0	1	0	0	1
Velocity and Acceleration in Simple Harmonic Motion	0	0	0	1	0	0	1	0	0	1
Simple Harmonic Motion (Time Period and Frequency)	0	0	0	0	2	0	2	1	1	0
Total	1	2	1	1	2	2	9	3	3	3

Summary: The "Oscillations" chapter contributed **9 questions** over the years, with a **balanced distribution** across **Easy (3)**, **Medium (3)**, and **Hard (3)** difficulties. Key areas include **Simple Harmonic Motion (SHM)** and oscillations of spring systems.

Insights:

- **Simple Harmonic Motion (SHM) concepts, including phase, energy, velocity, acceleration, time period, and frequency, are frequently tested.**
 - **Oscillations due to a spring are a recurring topic, sometimes appearing with Hard difficulty.**
 - **The Simple Pendulum can also be a source of Hard questions.**
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16. Waves

Topic	2020	2021	2022	2023	2024	2025	Total	Easy	Medium	Hard
Beats	1	0	0	0	0	0	1	0	1	0
String Waves (Speed of Transverse Wave on a Stretched String)	0	0	1	0	0	0	1	0	1	0
Standing or Stationary Waves (Standing Waves and Normal Modes in Open Organ Pipe)	0	0	0	1	0	1	2	0	2	0
Total	1	0	1	1	0	1	4	0	4	0

Summary: The "Waves" chapter provided **4 questions**, all of **Medium difficulty**. Topics included **Beats, String Waves, and Standing/Stationary Waves**.

Insights:

- **Beats and the speed of transverse waves on a stretched string** are tested topics.
- **Standing or Stationary Waves, particularly in open organ pipes**, is a recurring theme.
- This chapter primarily focuses on **fundamental wave phenomena at a Medium difficulty level**.



17. Electric Charges and Fields

Topic	2020	2021	2022	2023	2024	2025	Total	Easy	Medium	Hard
Electric Field	1	0	0	0	0	0	1	0	1	0
Dipole in a Non Uniform External Field (Force and Torque on a Finite Dipole)	0	1	0	0	0	0	1	0	1	0
Electric Field (Electric Field Due to Point Charge and a System of Charges)	0	0	1	0	0	0	1	0	1	0
Electric Dipole (For Points on the Axis)	0	0	0	1	0	0	1	0	0	1
Electric Flux	0	0	0	1	0	0	1	0	1	0
Electric Field Electric Field	0	0	0	1	0	0	1	0	0	1
Charging Methods (Charging by Induction, Friction and Conduction)	0	0	0	0	0	1	1	0	0	1
Total	1	1	1	3	0	1	7	0	4	3

Summary: The "Electric Charges and Fields" chapter contributed **7 questions**, with a leaning towards **Medium (4 questions) and Hard (3 questions) difficulties**. Key topics include **electric fields, electric dipoles, electric flux, and charging methods**.

Insights:

- Understanding **Electric Field concepts, including due to point charges and general electric field properties**, is consistently tested.
- **Electric Dipoles**, including forces and torques in fields and axial points, can be a source of **Hard questions**.
- **Electric Flux and Charging Methods** are also important aspects of this chapter.



18.Electrostatic Potential and Capacitance

Topic	2020	2021	2022	2023	2024	2025	Total	Easy	Medium	Hard
Equipotential Surfaces (Relation Between Electric Field and Potential)	1	0	1	0	0	0	2	1	1	0
Effect of Dielectric on Capacitance	1	0	0	0	0	1	2	0	1	1
Potential due to a Point Charge & Electric Dipole	1	1	0	0	0	0	2	0	2	0
Sharing of Charge and Common Potential	0	1	0	0	0	0	1	0	1	0
Potential Energy in an External Field (Potential Energy of a Dipole)	0	1	0	0	0	0	1	0	1	0
Energy Stored in a Capacitor (and Energy Density)	0	1	1	0	1	0	3	1	1	1
Combination of Capacitors (Series, Parallel Grouping)	0	1	0	1	1	0	3	3	0	0
Electrostatic Potential (and Potential Difference)	0	0	1	0	0	0	1	1	0	0
Capacitors and Capacitance (Types and Capacitance)	0	0	1	0	0	0	1	0	0	1
Potential due to a Point Charge and Electric Dipole (Longitudinal/End on Position)	0	0	0	0	1	0	1	1	0	0
Potential Due to a Continuous Charge Distribution (Spherical Shell)	0	0	0	0	1	0	1	0	1	0



Work Done to Move a Electric Dipole in a Electrostatic Field and Potential Energy	0	0	0	0	0	1	1	0	1	0
Total	3	5	4	1	4	2	19	7	9	3

Summary: This chapter is **highly significant, contributing 19 questions** over the six years. Questions are well-distributed across **Easy (7), Medium (9), and Hard (3) difficulties**. Key areas include **equipotential surfaces, capacitors (energy, combinations), and electric potential concepts**.

Insights:

- **Combinations of Capacitors (series, parallel) and Energy Stored in a Capacitor** are consistently tested and foundational.
 - **Equipotential Surfaces and the Effect of Dielectrics on Capacitance** are recurring topics, with dielectric effects sometimes appearing as Hard.
 - Understanding **Electric Potential due to point charges, dipoles, and continuous distributions** is crucial, with some topics like capacitor types yielding **Hard questions**.
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19. Current Electricity

Topic	2020	2021	2022	2023	2024	2025	Total	Easy	Medium	Hard
Electrical Resistance in Conductors (Temperature Dependence & Resistivity)	2	0	1	0	0	0	3	1	2	0
Electrical Resistance in Conductors (Colour Coding of Resistances)	1	0	0	0	0	0	1	0	1	0
Electric Current (Mobility)	1	0	0	0	0	0	1	0	1	0
Electric Current (Drift Velocity)	1	1	0	0	0	0	2	1	1	0
Meter Bridge	1	0	0	0	0	0	1	0	1	0
Current Density	0	1	1	0	0	0	2	0	2	0
Electrical Resistance in Conductors (Resistivity & Conductivity)	0	1	1	0	0	0	2	0	2	0
Combination of resistors (Series and Parallel)	0	1	0	0	1	1	3	0	3	0
Potentiometer (Application of Potentiometer)	0	1	0	0	0	0	1	1	0	0
Equivalent Resistance (Complex Circuits)	0	1	0	0	0	0	1	1	0	0
Electrical Energy, Power	0	0	1	0	1	0	2	0	2	0
Wheatstone Bridge (Balanced and Unbalanced)	0	0	1	0	0	1	2	0	1	1
Kirchhoff's Rules (Voltage Law: Loop Rule)	0	0	0	2	0	0	2	0	2	0
Miscellaneous	0	0	0	1	0	0	1	1	0	0
Heating Effect of Current	0	0	0	1	0	0	1	0	1	0

Electric Current (Equation of Current)	0	0	0	1	0	0	1	0	1	0
Emf of Cell (Equivalent Emf and Internal Resistance)	0	0	0	0	1	0	1	1	0	0
Combination of resistors (Voltage Division and Current Division Rule)	0	0	0	0	0	1	1	0	0	1
Total	6	6	5	5	3	3	28	6	20	2

Summary: This is a **highly significant chapter**, with **28 questions** asked across the six years. Questions were **predominantly of Medium difficulty (20 questions)**, with some Easy (6 questions) and Hard (2 questions) questions. Key areas include **electrical resistance**, **electric current properties**, **combinations of resistors**, and **Kirchhoff's Rules**.

Insights:

- **Electrical Resistance** (temperature dependence, resistivity, conductivity, color coding) and **Electric Current** (mobility, drift velocity) are **fundamental and frequently tested**.
 - **Combination of resistors** (series and parallel) is a **recurring topic**.
 - **Kirchhoff's Rules** are important for solving circuit problems.
 - Topics like **Wheatstone Bridge** and **Voltage/Current Division Rule** can include **Hard difficulty questions**.
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20.Moving Charges and Magnetism

Topic	2020	2021	2022	2023	2024	2025	Total	Easy	Medium	Hard
The Solenoid and the Toroid (Solenoid)	1	0	1	0	0	0	2	0	2	0
Magnetic Force (Direction of Magnetic Force, Properties of Magnetic Force on Charge)	0	2	0	0	0	0	2	0	2	0
Magnetic Field due to Various Current Carrying Conductors (Magnetic Field Surrounding a Thin Straight Current Carrying Conductor)	0	1	0	0	0	0	1	0	1	0
Current Loop as a Magnetic Dipole	0	1	0	0	0	2	3	1	1	1
Magnetic Field Due to a Current Element: Biot-Savart Law	0	0	1	0	0	0	1	0	1	0
Ampere's Circuital Law (Magnetic Field Inside a Long Straight Current Carrying Conductor)	0	0	1	0	0	0	1	0	1	0
Magnetic Field at Centre of a Circular Current Carrying Arc	0	0	0	1	1	0	2	1	0	1
Magnetic Force on a Current-Carrying Conductor (Effective Length Concept)	0	0	0	0	1	0	1	1	0	0
Motion in Combined Electric and Magnetic Fields (Velocity Selector, the Cyclotron)	0	0	0	0	0	1	1	0	1	0
Total	1	4	3	1	2	4	15	3	9	2



Summary: This chapter is **significant**, contributing **15 questions** across the years. Questions were predominantly of **Medium difficulty** (**9 questions**), with some Easy (3 questions) and Hard (2 questions) questions. Key areas include **solenoids, magnetic force, current-carrying conductors, and magnetic dipoles**.

Insights:

- **Magnetic Force on moving charges and current-carrying conductors** is a **highly frequent and important topic**.
 - **Current Loops as Magnetic Dipoles and Solenoids** are **recurring themes**.
 - **Biot-Savart Law and Ampere's Circuital Law** are fundamental for calculating magnetic fields.
 - Topics like **Magnetic Field at the Centre of a Circular Current Carrying Arc** can be **challenging (Hard)**.
-



21. Magnetism and Matter

Topic	2020	2021	2022	2023	2024	2025	Total	Easy	Medium	Hard
Magnetisation and Magnetic Intensity (Magnetic Susceptibility (χ))	1	0	0	0	0	0	1	0	1	0
Magnetisation and Magnetic Intensity (Magnetic Permeability (μ)), Relative Permeability (μ_r))	0	0	1	0	0	0	1	0	1	0
Magnetism and Gauss's Law	0	0	0	1	0	0	1	1	0	0
Magnetic Properties of Materials (Diamagnetism, Paramagnetism, Ferromagnetism)	0	0	0	0	1	0	1	1	0	0
Bar Magnet (Angular SHM, Tangent Law)	0	0	0	0	1	0	1	0	1	0
Bar Magnet (Magnetic Dipole Moment of a Bar Magnet, Magnetic Field Due to a Bar Magnet)	0	0	0	0	1	0	1	1	0	0
Bar Magnet (Magnetic Field Lines)	0	0	0	0	0	0	0	0	0	0
Total	1	0	1	1	3	0	6	3	3	0

Summary: The "Magnetism and Matter" chapter provided **6 questions**, evenly split between **Easy (3 questions)** and **Medium (3 questions)** difficulties. Topics include **magnetic intensity, magnetic properties of materials, and bar magnets**.

Insights:

- **Magnetisation and Magnetic Intensity**, including susceptibility and permeability, are **recurring concepts**.
- **Magnetic Properties of Materials (diamagnetism, paramagnetism, ferromagnetism)** is an important area.
- **Bar Magnets**, covering topics like angular SHM and magnetic dipole moment, are also tested.



22. Electromagnetic Induction

Topic	2020	2021	2022	2023	2024	2025	Total	Easy	Medium	Hard
Mutual Inductance (Mutual Inductance of Coaxial Solenoids)	0	1	0	0	0	0	1	1	0	0
Magnetic Flux	0	0	1	0	0	0	1	1	0	0
Faraday'S Law of Induction (Lenz'S Law, Methods to Change the Magnetic Flux)	0	0	1	0	1	0	2	0	0	2
Inductor in Circuit (Energy Stored in an Inductor)	0	0	0	1	0	0	1	1	0	0
Self Induction (Self- Inductance)	0	0	0	0	0	1	1	0	1	0
Total	0	1	2	1	1	1	6	3	1	2

Summary: The "Electromagnetic Induction" chapter provided **6 questions**, with a mix of **Easy** (3 questions), **Medium** (1 question), and **Hard** (2 questions) difficulties. Key topics include mutual inductance, magnetic flux, Faraday's Law, and energy stored in inductors.

Insights:

- **Faraday's Law of Induction and Lenz's Law** are crucial and can be a source of Hard questions.
 - **Mutual Inductance and Magnetic Flux** are fundamental concepts that are also tested.
 - **Energy Stored in an Inductor and Self-Inductance** are important aspects of this chapter.
-



23. Alternating Current

Topic	2020	2021	2022	2023	2024	2025	Total	Easy	Medium	Hard
AC Voltage Applied to an Inductor and a Capacitor	1	0	0	0	1	0	2	1	1	0
Power in AC Circuits: the Power Factor	1	1	0	0	0	0	2	0	1	1
AC Voltage Applied to a Series LCR Circuit (Variation of Impedance with Frequency)	0	1	0	1	0	0	2	0	2	0
Transformers	0	1	0	1	1	0	3	1	2	0
Alternating Current and emf (RMS Value of AC Voltage and Current)	0	0	1	0	0	0	1	1	0	0
AC Voltage Applied to a Series LCR Circuit (Phasor Diagram Solution)	0	0	1	1	0	0	2	0	2	0
Ac Voltage Applied to a Capacitor (Reactance of Capacitive Circuit)	0	0	0	1	0	0	1	1	0	0
AC Voltage Applied to a Series LCR Circuit (Phase Relationship Between V and I)	0	0	0	0	0	1	1	0	0	1
Total	2	3	2	4	2	1	14	4	9	1

Summary: The "Alternating Current" chapter provided **14 questions**, with a notable emphasis on **Medium difficulty (9 questions)** and some Easy (4 questions) and Hard (1 question) questions. Topics cover various AC circuits, power factor, transformers, and LCR circuits.

Insights:

- **Transformers** are a **consistently recurring topic**, usually at an Easy or Medium difficulty.
- **AC Voltage applied to LCR Circuits**, including impedance variation and phasor diagrams, is **frequently tested**.
- **Power in AC Circuits and the Power Factor** are important, sometimes appearing with **Hard difficulty**.



24. Electromagnetic Waves

Topic	2020	2021	2022	2023	2024	2025	Total	Easy	Medium	Hard
Relation Between Electric Field, Magnetic Field and Speed of Light	1	1	0	1	0	1	4	3	1	0
Intensity of Electromagnetic Wave	1	0	0	0	0	0	1	0	1	0
Electromagnetic Spectrum (Microwaves)	0	0	1	0	0	0	1	0	1	0
Important Characteristics and Nature of Electromagnetic Waves	0	0	1	0	1	0	2	2	0	0
Displacement Current (Consequences of Displacement Current)	0	1	0	0	1	1	3	1	2	0
Total	2	2	2	1	2	2	11	7	4	0

Summary: The "Electromagnetic Waves" chapter contributed **11 questions**, with a **strong emphasis on Easy difficulty levels (7 questions)**. The **relationship between electric and magnetic fields, and displacement current**, are consistently asked topics.

Insights:

- Understanding the **relationship between electric and magnetic fields and the speed of light** is a **frequently tested concept**, often appearing as Easy difficulty.
 - **Displacement Current and its consequences** are also recurring topics, mainly of Medium difficulty.
 - Basic characteristics of **electromagnetic waves and spectrum** are important, typically at an Easy level.
-



25. Ray Optics and Optical Instruments

Topic	2020	2021	2022	2023	2024	2025	Total	Easy	Medium	Hard
Refraction through a Prism (Derivation of Refractive Index of Material of Prism)	1	0	0	0	1	0	2	0	1	1
Optical Instruments (Telescope, Terrestrial Telescope)	1	0	0	0	1	0	2	1	1	0
Optical Instruments (Astronomical Telescope)	0	1	0	0	0	0	1	1	0	0
Dispersion by a Prism (Angular Dispersion)	0	1	0	0	0	0	1	1	0	0
Refraction by Lenses (Combination of Thin Lenses in Contact)	0	1	0	1	0	0	2	0	1	1
Refraction by Lenses (Combination of a Lens and a Mirror)	0	1	0	0	0	0	1	0	0	1
Lens Formula (Deriving the Lens Formula)	0	0	1	0	0	0	1	0	1	0
Refraction (Refraction through a Glass Slab)	0	0	1	0	0	0	1	0	1	0
Total Internal Reflection in Nature and its Technological Application	0	0	1	0	0	0	1	0	0	1
Critical Angle, Grazing Emergence	0	0	0	1	0	0	1	0	1	0
Thin Lenses	0	0	0	1	0	1	2	1	1	0
Optical Instruments (Simple Microscope and Compound Microscope)	0	0	0	0	0	1	1	1	0	0
Total	2	4	3	3	2	2	16	5	7	4



Summary: This is a **significant chapter**, with **16 questions** asked over the years. Questions covered a wide range of topics, including **refraction through prisms and lenses**, **optical instruments**, and **total internal reflection**. Difficulty was diverse, with **7 Medium**, **5 Easy**, and **4 Hard** questions.

Insights:

- **Optical Instruments (Telescopes, Microscopes)** are frequently tested.
 - **Refraction by Lenses**, especially combinations of thin lenses, and refraction through prisms are crucial and can appear with Hard difficulty.
 - **Total Internal Reflection and its applications** are also important and can be challenging.
-



26. Wave Optics

Topic	2020	2021	2022	2023	2024	2025	Total	Easy	Medium	Hard
Polarisation by Reflection (Brewster's Law)	1	0	0	0	1	1	3	1	2	0
Interference of Light Wave and YDSE (Positions of Fringes on Screen)	1	0	1	0	0	0	2	0	1	1
YDSE Fringe Width	0	0	0	0	1	0	1	1	0	0
Interference of Light Wave and YDSE (Shape of Fringes on Screen)	0	0	0	1	0	0	1	0	0	1
Total	2	0	1	1	2	1	7	2	3	2

Summary: This chapter provided 7 questions, with a balanced distribution across Easy (2), Medium (3), and Hard (2) difficulties. Topics like Polarisation by Reflection and Young's Double Slit Experiment (YDSE) are key areas.

Insights:

- **Polarisation by Reflection (Brewster's Law)** is a consistently tested topic, appearing with both Medium and Easy difficulty.
 - **Interference of Light Wave and its specifics in YDSE, including positions and shapes of fringes**, are also important and can be challenging (Hard).
-



27. Dual Nature of Radiation and Matter

Topic	2020	2021	2022	2023	2024	2025	Total	Easy	Medium	Hard
Einstein's Photoelectric Equation: Energy Quantum of Radiation	1	0	0	0	0	0	1	0	1	0
Wave Nature of Matter (De Broglie Wavelength of a Moving Particle)	1	1	1	0	1	1	5	1	4	0
Particle Nature of Light: the Photon	0	1	0	0	1	0	2	0	2	0
Experimental Study of Photoelectric Effect (Laws of Photoelectric Emission)	0	0	1	0	0	0	1	0	1	0
Photoelectric Effect (Hertz's Observations, Hallwachs and Lenard's Observations)	0	0	0	1	0	0	1	1	0	0
Experimental Study of Photoelectric Effect (Effect of Intensity of Light on Photocurrent)	0	0	0	0	0	1	1	1	0	0
Total	2	2	2	1	2	2	11	3	8	0

Summary: This chapter provided **11 questions**, with a strong leaning towards **Medium difficulty (8 questions)** and some Easy (3 questions) questions. Key areas include **Einstein's Photoelectric Equation, wave nature of matter (de Broglie wavelength), and experimental aspects of the photoelectric effect.**

Insights:

- **Wave Nature of Matter (De Broglie Wavelength)** is a **highly consistent and frequently tested topic**, primarily at Medium difficulty.
- **The Photoelectric Effect, including Einstein's equation, particle nature of light, and experimental observations**, is a **crucial recurring theme**.
- Questions tend to focus on **foundational understanding of dual nature concepts**.



28. Atoms

Topic	2020	2021	2022	2023	2024	2025	Total	Easy	Medium	Hard
Bohr Model of the Hydrogen Atom (Failure of Bohr's Theory)	1	0	0	0	0	0	1	1	0	0
Bohr Model of the Hydrogen Atom (Energy of Electron in nth Orbit)	0	0	1	0	0	0	1	0	1	0
The Line Spectra of the Hydrogen Atom, Hydrogen Spectrum	0	0	0	1	1	0	2	1	1	0
X-Rays and Atomic Number (Properties of X-rays)	0	0	0	1	0	0	1	0	1	0
Bohr's Atomic Model (Radius of Electron in nth Orbit of Single Electron Atom)	0	0	0	1	0	0	1	0	1	0
Thomson Model (Different Models of Hydrogen)	0	0	0	0	1	0	1	1	0	0
Bohr Model of the Hydrogen Atom (Radius of Electron in nth Orbit of Hydrogen Atom)	0	0	0	0	0	1	1	0	0	1
de-Broglie's Explanation of Bohr's Second Postulate of Quantization	0	0	0	0	0	1	1	0	1	0
Total	1	0	1	3	2	2	9	3	5	1

Summary: The "Atoms" chapter contributed **9 questions** across the six years. Questions were predominantly of **Medium difficulty (5 questions)**, with some Easy (3 questions) and a few Hard (1 question) questions. **The Bohr Model is a frequently tested concept, appearing multiple times with varying difficulty.**



Insights:

- **Bohr's Model of the Hydrogen Atom** is a **highly important and recurring topic**, covering aspects like its failure, energy in different orbits, and electron radius.
 - Topics related to **Hydrogen Spectrum and X-Rays** also appear.
 - Questions tend to be a mix of Easy and Medium, but can include **Hard difficulty questions, particularly concerning specific details of the Bohr model**.
-





29.Nuclei

Topic	2020	2021	2022	2023	2024	2025	Total	Easy	Medium	Hard
Mass-Energy and Nuclear Binding Energy	1	1	0	0	0	0	2	2	0	0
Nuclear Energy (Fission)	1	0	0	0	0	0	1	0	1	0
Atomic Masses and Composition of Nucleus (Electron Volt (eV))	1	0	0	0	0	0	1	1	0	0
Radioactivity (Alpha Decay and Beta Decay)	0	1	0	0	0	0	1	1	0	0
Radioactivity (Half-Life and Mean-Life)	0	1	0	1	0	0	2	1	1	0
Atomic Masses and Composition of Nucleus (Composition of Nucleus)	0	0	1	0	0	0	1	1	0	0
Size of the Nucleus (Nuclear Density)	0	0	1	0	0	0	1	1	0	0
Nuclear Energy (Chain Reaction)	0	0	0	0	1	0	1	1	0	0
Total	3	3	2	1	1	0	10	8	2	0

Summary: The "Nuclei" chapter accounted for **10 questions**, with a strong focus on **Easy** difficulty levels (**8 questions**). Key areas include **Mass-Energy and Nuclear Binding Energy**, **Radioactivity**, and **properties of the nucleus**.

Insights:

- **Mass-Energy and Nuclear Binding Energy** is a **recurrent and relatively straightforward topic**.
- **Radioactivity**, including concepts like **Alpha/Beta Decay and Half-Life/Mean-Life**, is **consistently tested**.
- Understanding the **composition and size of the nucleus** is also important.



30.Semiconductor Electronics: Materials, Devices and Simple Circuits

Topic	2020	2021	2022	2023	2024	2025	Total	Easy	Medium	Hard
Semiconductor Diode (P-n Junction under Forward/Reverse Bias)	1	0	0	0	0	0	1	0	1	0
Junction Transistor (Basic Transistor Circuit Configurations)	1	0	0	0	0	0	1	0	1	0
Digital Electronics and Logic Gates (Combination of Gates/Logic Gates)	1	1	1	1	2	1	7	1	5	1
P-n Junction (p-n Junction Formation)	0	1	1	0	0	0	2	0	1	1
Special Purpose p-n Junction Diodes (Zener Diode)	0	1	0	1	0	0	2	0	2	0
Application of Junction Diode as a Rectifier	0	0	1	0	0	1	2	1	1	0
Semiconductor Diode (Semiconductor Diode)	0	0	0	1	0	0	1	0	0	1
Photo Diode, LED, and Solar Cell	0	0	0	0	1	0	1	1	0	0
Semiconductor Diode (Circuit Symbol for a p-n Junction Diode)	0	0	0	0	1	0	1	0	1	0
Total	3	3	3	3	4	2	18	3	12	3

Summary: This is a **crucial chapter, contributing 18 questions** over the years. Questions covered various **semiconductor devices, p-n junctions, and digital electronics**. The difficulty was **predominantly Medium (12 questions)**, with some Easy (3 questions) and Hard (3 questions) questions.

Insights:

- **Digital Electronics and Logic Gates** are a **frequently tested topic**, appearing consistently and covering various difficulty levels.



- **P-n Junctions**, including their formation and specific purpose diodes (like Zener diode), are important and can lead to **Hard questions**.
- **Applications of Junction Diodes as Rectifiers and Photo Diodes/LEDs/Solar Cells** are also recurring themes.

