# ALL DERIVATion lisT

Unit–I Physical World and Measurement

- No specific derivations are typically covered in this unit. It focuses more on introducing the basic concepts and principles of physics.

Unit-II Kinematics

- Chapter–3: Motion in a Straight Line
    - Derivation of equations of motion under constant acceleration.
- Chapter–4: Motion in a Plane
    - Derivation of equations of motion for projectile motion.

Unit–III Laws of Motion

- Chapter–5: Laws of Motion
    - Newton's second law of motion (F = ma)
    - Newton's third law of motion (action and reaction)

Unit–IV Work, Energy, and Power

- Chapter–6: Work, Energy, and Power
    - Derivation of work-energy theorem
    - Derivation of kinetic energy
    - Derivation of potential energy
    - Power and its derivation

Unit-V Motion of System of Particles and Rigid Body

- Chapter–7: System of Particles and Rotational Motion
    - Centre of mass and its derivation
    - Moment of inertia and its derivation
    - Torque and angular acceleration

Unit-VI Gravitation

- Chapter–8: Gravitation
    - Newton's law of universal gravitation and its derivation
    - Escape velocity

Unit–VII Properties of Bulk Matter

- Chapter–9: Mechanical Properties of Solids
    - Stress and strain
    - Hooke's law
- Chapter–10: Mechanical Properties of Fluids
    - Pressure in a fluid
    - Pascal's law
    - Archimedes' principle
- Chapter–11: Thermal Properties of Matter
    - Expansion of solids, liquids, and gases
    - Calorimetry

Unit–VIII Thermodynamics

- Chapter–12: Thermodynamics
    - Zeroth law of thermodynamics
    - First law of thermodynamics (Internal energy and heat)
    - Specific heat capacity
    - Work done in isothermal and adiabatic processes

Unit–IX Behaviour of Perfect Gases and Kinetic Theory of Gases

- Chapter–13: Kinetic Theory
    - Derivation of Boyle's Law
    - Derivation of Charles's Law
    - Derivation of Avogadro's Law
    - Ideal Gas Law and its derivation

Unit–X Oscillations and Waves

- Chapter–14: Oscillations
    - Simple harmonic motion (SHM) and its equation
    - Derivation of displacement, velocity, and acceleration in SHM
    - Derivation of energy in SHM
- Chapter–15: Waves
    - Wave equation
    - Derivation of velocity of a wave
    - Derivation of the displacement amplitude of a wave

# IMP DERIVATIONS

**Based on the typical importance and frequency of derivations asked by examiners in Class 11 physics exams, we can identify several key derivations that students should focus on:**

1. **Derivations of Equations of Motion** (from Chapter 3: Motion in a Straight Line):
   - These derivations are fundamental to understanding the kinematics of motion and are often asked in exams.
2. **Newton's Second Law of Motion** (from Chapter 5: Laws of Motion):
   - The derivation of $F = ma$ is crucial as it forms the basis for understanding forces and their effects on motion.
3. **Work-Energy Theorem** (from Chapter 6: Work, Energy, and Power):
   - This derivation relates work done on an object to its change in kinetic energy, providing a fundamental understanding of energy transformations.
4. **Newton's Law of Universal Gravitation** (from Chapter 8: Gravitation):
   - Deriving $F = \frac{G \cdot m_1 \cdot m_2}{r^2}$ is important for understanding gravitational forces between objects, a key concept in celestial mechanics.
5. **Simple Harmonic Motion (SHM)** (from Chapter 14: Oscillations):
   - The derivation of equations describing SHM is significant as harmonic motion is prevalent in various physical systems.
6. **Wave Equation** (from Chapter 15: Waves):
   - Deriving the wave equation is crucial for understanding the propagation of waves through different mediums.
7. **Boyle's Law, Charles's Law, and Ideal Gas Law** (from Chapter 13: Kinetic Theory):
   - Derivations related to gas laws are important as they provide a foundation for understanding the behavior of gases.
8. **Centre of Mass** (from Chapter 7: System of Particles and Rotational Motion):
   - Understanding the concept and derivation of the center of mass is essential for analyzing the motion of systems of particles.