

Overview

1. Preliminaries: differentiation, integration, scalars, vectors
2. Elementary Principles:
 - a. Systems of Particles
 - b. Constraints
 - i. Holonomic
 - ii. Non-holonomic
 - iii. Scleronomous
 - iv. Rheonomous
 - c. Generalised Coordinates
3. Principle of virtual work and D'Alembert's Principle
 - a. Virtual Displacement
 - b. Principle of Virtual Work
 - c. D'Alembert's Principle
4. Physical quantities in terms of generalised coordinates
 - a. Configuration space
 - b. Velocity
 - c. Generalised force
 - d. Kinetic energy
5. Lagrangian Mechanics
 - a. Derivation of Lagrange's Equations from Newton's Law and D'Alembert's Principle
 - b. Lagrange equations for conservative holonomic systems
 - c. Lagrange equations for systems having velocity dependent potentials
 - d. Planetary motion
 - e. Non-inertial systems of reference
6. Variational principle and Lagrange equations
 - a. The Euler equation
 - b. Hamilton's Principle (Principle of least action)
 - c. Derivation of Lagrange equations from Hamilton's principle

Text Books used:

- ** Goldstein: Classical Mechanics (2nd and 3rd edition)
- ** Greiner: Systems of particles and Hamiltonian mechanics
- ** Landau & Lifshitz: Mechanics (3rd edition)
- ** Schaum's outline series: Theoretical Mechanics