5. Holonomic vs Non-Holonomic Systems

mic System	Non-Holonomic System
ints integrable	Constraints non-integrable
in coordinate	Involves velocities
es Lagrangian	More complex formulation
e: Simple um	Example: Rolling wheel

6. Scleronomous and Rheonomous Constraints

(a) Scleronomous Constraint

- Time-independent

$$f(q_1, q_2, \ldots, q_n) = 0$$

Example: Particle on a fixed surface

(b) Rheonomous Constraint

- Time-dependent

$$f(q_1, q_2, \ldots, q_n, t) = 0$$

Example: Bead on a moving wire

7. Importance in Analytical Mechanics

- Basis for **generalized coordinates**
- Essential for applying **Lagrange's equations**
- Simplifies equations of motion
- Widely used in **theoretical and mathematical physics**

8. Key Points for Exams

- Definition of holonomic constraint
- Mathematical condition
- Difference between holonomic and non-holonomic
- At least **two standard examples**