Classical physics

-statics

-balanced force on rigid body

-balanced torques

-center of mass and centroid

-trusses and fames

-beams and support reactions

-friction in static system

-equilibrium of particles

-static pressure

-stability and tipping

-combined loading

-motion

-linear motion

-circular motion

-projectile motion

-rotational motion

-relative motion

-motion in a gravitational field

-motion in friction

-uniform and non uniform acceleration

-coupled motion

-spiral motion

-projectile

-basic projectile in 3d

-projectile motion in 3d with air resistance

-projectile motion with rotating earth(coriolis effect)

-projectile motion in non uniform gravitational field

-multi axis projectile motion

-collisions

-elastic collisions

-inelastic collisions

-1d collisions

-2d collisions

-oblique collisions

-multiple collisions

-collisions with barrier

-momentum transfer

-realistic collisions (friction, air resistance and spin)

-energy loss in collisions

-friction

-object in rest

-sliding object in an unsmooth surface

-object rolling down an inclined plane

-friction between surfaces

-friction in rotational motion

-car stimulation in friction

-air resistance and friction in a fall

-energy

-kinetic energy and potential energy in a free falling body

-potential energy in a gravitational field

-energy in a roller coaster system

-energy in simple harmonic oscillator

-energy dissipation

-solar panel energy conversion

-power

-basic power calculations

-Instantaneous power

-power in rotational motion

-mechanical power

-power efficiency

-power in fluids

-spring

-simple spring mass system

-damped harmonic oscillations

-forced harmonic oscillations

-spring in the influence of gravity

-spring with multiple mass

-spring powered canon

-pulley

-simple pulley system

-moveable pulley system

-block and pulley system in an inclined plane

-Atwood machine(two masses and pulley)

-compound pulley system

-pulley with rotational inertia

-pulley with friction

-pulley with variable load

-pulley in space

-gravity

-Gravity between two masses

-orbital motion of planets

-gravity field visualization

-gravitational potential

-multibody gravitational interaction

-black hole visualization

-gravitational slingshot

-tidal forces

-weight on different planets

-gravity waves

-gravity assist trajectories

-Pressure

-pressure

-pressure in fluids

-atmospheric pressure

-pressures in gas

-pressure and surface area

-Bernoulli’s Principle

-pressure in solids

-air pressure supports vehicle weight

-pressure variations in sound waves and shock waves

-elasticity

-Elasticity

-Hooke’s law

-linear elasticity

-non linear elasticity

-Bulk elasticity

-shear elasticity

-elastic potential energy

-stress-strain curve

-poisson’s ratio

-bridge design

-sky scrapers  
 -anisotropic elasticity

-viscoelasticity

-pendulum

-simple pendulum

-Compound pendulum

-damped pendulum

-driven pendulum

-double pendulum

-Foucault pendulum

-pendulum clock

-seismic pendulums

-torsional pendulum

-large angle oscillations

-pendulum arrays

-parametric excitation of pendulum

-elevator

-forces in an elevator

-energy analysis in elevator

-pulley system in elevator

-elevator in free fall

-elevator in sapce

-rotational disk

-rotational motion of disk

-rolling without slipping

-friction in rotational motion

-gyroscopic effects

-flywheels

-spinning tops

-disk brakes

-fluid dynamics

-laminar and turbulent flow

-viscosity and flow resistance

-flow around objects

-hydrostatics

-pressure in fluids

-hydrostatic equilibrium

-buoyancy

-pascal’s law

-fluid pressure in depth

-fluid in a U-tube(manometer)

-open ended sytems (free surface)

-hydrostatic pressure distribution in different geometrics

-sound

-sound waves

-frequency and pitch

-amplitude and loudness

-reflection, refraction and diffraction of sound

-standing waves and resonances

-doppler effect

-interference of sound waves  
 -sound propagation in different media

-waves

-wave types

-wave properties

-wave behaviour

-transverse wave on string

-wave interference

-reflections of waves(boundary collitions)

-wave speed and medium properties

-standing waves(resonance)

Physics Topic Relevant DSA Techniques & Structures

Classical Mechanics

Graphs (for modeling forces & trajectories), Binary Search (collision time estimation), Segment Trees (range queries on motion), Priority Queues (event simulation), Dynamic Programming (optimal paths)

Electromagnetism

Graphs (electric circuits, field lines), DFS/BFS (finding connected components in circuits), Union-Find (disjoint sets for circuit components), Fenwick Trees/BIT (cumulative fields)

Thermodynamics

Heaps (managing energy states), Hash Maps (state counts), Greedy Algorithms (maximizing/minimizing energy)

Quantum Mechanics

Matrices (quantum state representations), Recursion (quantum state expansion), Graph Algorithms (quantum walks), Backtracking (quantum puzzle solving)

Wave Mechanics

Segment Trees (wave segment queries), Sliding Window Algorithms (signal processing), Trie (pattern matching in signals)

Optics

Graphs (light path tracing), Binary Search (focal length estimation), Greedy (light optimization algorithms)

Fluid Dynamics

Graphs (flow networks), Union-Find (connected fluid regions), Dynamic Programming (optimal routing in flows)

Statistical Mechanics

Hash Maps (particle states), Segment Trees (state range queries), Monte Carlo simulations (using efficient data structures)

Astrophysics Octrees/Quadtrees (space partitioning), K-D Trees (nearest neighbor search), Heaps (event scheduling in simulations)

Computational Physics Arrays and Matrices (vector simulations), Graph Algorithms (DFS/BFS for simulations), Priority Queues (event-driven simulations)