

Paper – V: Mechanics

- Unit – 1. D'Alembert's principle, General equation of motion of rigid body, Motion of centre of inertia, Motion relative to centre of inertia.
- Unit – 2. Motion about a fixed axis, Compound pendulum, Centre of percussion.
- Unit – 3. Motion of a rigid body in two dimension under finite forces, Motion under impulsive forces.
- Unit – 4. Motion in three dimension with reference to Euler's dynamical and geometrical equations, Motion under finite forces
- Unit – 5. Motion under no forces, Motion under impulsive forces.
- Unit – 6. Conservation of linear and angular momentums, Conservation of energy for finite and impulsive forces.
- Unit – 7. Lagrange's equation, Energy equation for conservative field, Small oscillations, Motion under impulsive forces (Lagrange's equations for blows)
- Unit – 8. Motion of a top: Equation of motion of a top, Steady motion of a top, Stability conditions.
- Unit – 9. Hamilton's principle, Principle of least action
- Unit – 10. Kinematics of ideal fluid, Lagrange's and Euler's methods, Streamlines, Path lines, Stream function in two dimensions.
- Unit – 11. Velocity potential, Rotational and Irrotational motion in two dimensions. Equation of Continuity, Lagranges approach. Eulerian approach, Equivalence of these two approaches.
- Unit – 12. Equation of Continuity: Cartesian, Cylindrical and Spherical polar coordinates, Boundary surfaces.
- Unit – 13. Euler's hydrodynamical equations, Bernoulli's theorem, Helmholtz equations.
- Unit – 14. Cauchy's integrals, Motion due to impulsive forces.
- Unit – 15. Motion in two dimensions: Complex potential, Cauchy-Riemann equations, Two dimensional Sources, Sinks, Doublets and their images.

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