NPTEL Video Course - Physics - NOC:Introduction to Classical Mechanics

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Co-ordinating Institute - IIT - Madras

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction. Symmetries of space and time
Lecture 2 - Generalized coordinates and degrees of freedom
Lecture 3 - Virtual Work
Lecture 4 - Virtual Work (rigid body)
Lecture 5 - d'Alembert Principle
Lecture 6 - Euler Lagrange Equation for a holonomic system
Lecture 7 - Euler Lagrange Equations. Examples
Lecture 8 - Euler Lagrange Equations. Examples (Continued...)
Lecture 9 - Properties of Lagrangian
Lecture 10 - Kinetic term in generalized coordinates
Lecture 11 - Cyclic coordinates
Lecture 12 - Conservation laws - Conservation of Energy
Lecture 13 - Energy Function, Jacobi's Integral
Lecture 14 - Momemtum conservation
Lecture 15 - Matrices and all that
Lecture 16 - Matrices, Forms, and all that
Lecture 17 - Principal axis transformation
Lecture 18 - Small Oscilaltions
Lecture 19 - Oscillations, Normal Coordinates
Lecture 20 - Oscillations, Triatomic molecule
Lecture 21 - Triatomic molecule normal coordinates
Lecture 22 - Coupled pendulums, normal modes
Lecture 23 - Coupled pendulums, Beats
Lecture 24 - Oscillations, General solution
Lecture 25 - Forced oscillations
Lecture 26 - Damped oscillations
Lecture 27 - Forced Damped oscillations
Lecture 28 - one dimensional systems
Lecture 29 - Two-body problem

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Lecture 30 - Two-body problem, Kepler's second law
Lecture 31 - Two-body problem, Kepler problem
Lecture 32 - Two-body problem, Conic Sections in Polar Coordinates
Lecture 33 - Two-body problem, Ellipse in polar coordinates
Lecture 34 - Orbits in Kepler Problem
Lecture 35 - Apsidal distances, eccentricity of orbits
Lecture 36 - Kepler's Third law; Laplace-Runge-Lenz vector
Lecture 37 - Rigid Body, degrees of freedom
Lecture 38 - Rigid Body, Transfromation matrix
Lecture 39 - Rigid Body, Euler Angles
Lecture 40 - Parameterization using Euler Angles
Lecture 41 - Rigid Body, Euler's Theorem
Lecture 42 - General motion of a rigid body
Lecture 43 - Moment of Inertia Tensor
Lecture 44 - Principal Moments
Lecture 45 - Langrangian of a rigid body
Lecture 46 - Motion of a free symmetric top
Lecture 47 - Angular velocity using Euler angles
Lecture 48 - Lagrangian of a heavy symmetric top
Lecture 49 - First integrals of a heavy symmetric top
Lecture 50 - Nutation and Precission of a heavy symmetric top
Lecture 51 - Sleeping Top
Lecture 52 - Rotating Frames. Euler Equations
Lecture 53 - Calculus of Variations
Lecture 54 - Method of Lagrange Multipliers
Lecture 55 - Calculus of Variations
Lecture 56 - Calculus of Variations
Lecture 57 - Cartesian Tensors
Lecture 58 - Hamiltonian Mechanics
Lecture 59 - Hamiltonian Mechanics
Lecture 60 - Hamiltonian Mechanics
Lecture 61 - Hamiltonian Mechanics
Lecture 62 - Hamiltonian Mechanics
Lecture 63 - Hamiltonian Mechanics
Lecture 64 - Examples of Generating Functions
Lecture 65 - Harmonic Oscillator (Canonical Transformations)
Lecture 66 - Invariance of Poisson Brackets
Lecture 67 - Normal modes of triatomic molecule using Mathematica
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