Lecture-7

The following topics were discussed:

(1) All lectures until lecture-6

(2) Tutorial-1 was discussed. This was shared in Abhikalp as Tutorial-1.

(3) Note that Worked problems on Lagrangian serve as Tutorial-2

(4) A general handout summarizing the topics discussed in the Classical Mechanics part was discussed and shared.

Topics discussed (Lectures 1-6):

Lecture 1: a) General discussion about the applicability of Classical mechanis, and , other relevant fields in physics.
b) Review of basic Newtonian mechanics, work energy theorem
c) Conservation of linear and angular momentum

Lecture 2: a) Conservation of energy
b) Curl, Gradient
c) Concept of scalar potential, properties of scalar potential energy
d) Distribution of Tutorial 1 sheet (problems on conservative force etc.)

Lecture 3: a) Drawbacks of Newtonian formulation
b) example used: planar motion in plane polar coordinates

Lecture 4: a) Introduction to Lagrangian formulation
b) Euler Lagrange equation
c) Generalised Coordinates
d) Introduction to constraints

Lecture 5: a) Discussion on different types of constraints with examples
b) Equation of constraints
c) Degrees of freedom, generalised coordinates
d) Transformation equations
e) Cyclic/Ignorable coordinates and conservation laws
f) Polar coordinate example revisited with Lagrangian

Lecture 6: a) Solved problems using Euler-Lagrange equations (Tutorial-2)
b) Concept of Hamiltonian

Lecture 7: a) Summary of Part-1 before Midsem,
b) Discussion of Tutorial-1

Quiz-1 syllabus: Lectures 1-5
Midsem Syllabus: Lectures 1-7
Refs./Textbooks: 1. Goldstein Chap 1,2
2. Spiegel
(Note that these were already discussed and shown during the class)

Topics that were mentioned for interested students: D'Alembert's principle, Principle of Stationary Action