



M 26586

Reg. No. :

Name :

**I Semester M.A./M.Sc./M.Com. Degree (Reg./Supple./Improve.)
Examination, November 2014
PHYSICS
(2014 Admn. Under CBSS)
PHY 1C 02 : Classical Mechanics**

Time : 3 Hours

Max. Marks : 60

SECTION – A

Answer **both** questions, **either** (a) or (b).

1. a) What is Rutherford scattering ? Derive Rutherford scattering formula. Obtain the angular distribution of the decay products in the L-system.

OR

- b) Define clearly the term 'action'. State Hamilton's principle and derive Lagrange's equations of motion.

2. a) Define the Hamiltonian of a system of particles and obtain the canonical equations of motion. Discuss the physical significance of the Hamiltonian.

OR

- b) Define Euler angles and show that these can be seen as three successive rotations which take us from the fixed system to the moving axes system.

(2×12=24)

SECTION – B

Answer **any four**.

3. a) What is the principle of least action ?
b) Write down the Euler -Lagrangian equation and discuss its importance in classical mechanics.
c) Compare and contrast Lagrangian formalism and Hamiltonian formalism. Explain with suitable example why Hamiltonian formalism is more basic to the foundations of statistical and quantum mechanics.

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4. a) What is Poisson Brackets ?
b) State the properties of Poisson Brackets.
c) Discuss the harmonic oscillator problem using Hamiltonian Jacobi method.
5. a) What is Kepler's laws of planetary motion ?
b) Discuss the conditions for a transformation to be canonical.
c) Derive Hamilton Jacobi equation for Hamilton's function.
6. a) Briefly explain moment of inertia tensor.
b) Prove that the dimension of the action variables are always those of angular momentum.
c) Derive the frequency in Kepler problem by using the method of action-angle variable.
7. a) What is small oscillation ? Give any one example.
b) Write down the Lagrange's equations of motion for small oscillation.
c) Discuss the general problem of small oscillations in one degree of freedom.
8. a) What is Coriolis's force ?
b) What are direction cosines ? What is an orthogonal transformation ?
c) Derive Coriolis's force in Lagrangian formulation.

(4×9=36)