P-101

Roll No. ....

MSCPH-502

Classical Mechanics

M.Sc. Physics (MSCPH)

Ist Semester Examination, 2023 (June)

Time : 2 Hours]   **Max. Marks : 70**

Note : This paper is of Seventy (70) marks divided into two (02) Sections A and B. Attempt the questions contained in these sections according to the detailed instructions given therein. Candidates should limit their answer to the questions on the given answer sheet. No additional (B) answer sheet will be issued.

SECTION–A
(Long Answer Type Questions)

Note : Section 'A' contains Five (05) long answer type questions of Nineteen (19) marks each. Learners are required to answer any Two (02) questions only.

                                        (2×19=38)

1. Explain the principle of virtual work. Hence deduce D'Alembert's principle.

2. State Hamilton's principle and derive Lagrange's equations of motion from it.

3. Discuss the two-body central force problem. Show that the motion of two interacting particles is equivalent to the motion of a single particle in an external field.

4. Apply Hamilton Jacobi method to solve one dimensional harmonic oscillator problem.

5. Show that the Poisson brackets are canonically invariant.

SECTION–B
(Short Answer Type Questions)

Note : Section 'B' contains Eight (08) short answer type questions of Eight (08) marks each. Learners are required to answer any Four (04) questions only.   (4×8=32)

1. Establish the Lagrange's equation of motion. Give its importance.

2. Determine the number of degrees of freedom for a massless rod, moving freely in space with a particle which is constrained to move on the rod.

3. Explain and discuss Noether's theorem. What are symmetries? Explain.

4. State and prove energy conservation law.

5. Derive the differential equation for the orbit of a particle moving under the influence of a central force.

6. Discuss alpha scattering in Coulomb's field.

7. What is generating function?

8. What do you mean by stable and unstable equilibrium?

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