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Reg. No. : .....

Name : .....

First Semester M.Sc. Degree Examination, August 2021

Physics

PH 211: CLASSICAL MECHANICS

(2020 Admission)

Time : 3 Hours Max. Marks : 75

PART – A

Answer **any five** questions. Each question carries **3** marks:

I. (a) Explain force of constraints with examples.

(b) What is Virial theorem?

(c) Distinguish between stable and unstable equilibrium with example.

(d) Explain Liouvilles theorem.

(e) Write a short note on action angle variable.

(f) Explain Coriolis force and its effect.

(g) Define linear and non linear systems.

(h) Write a short note on fractals.

(5 × 3 = 15 Marks)

PART – B

Answer **all** questions. Each question carries **15** marks:

II. (a) Obtain Lagrangian equation from Hamiltons principle.

OR

(b) State and explain Keplers Law and obtain law of gravitation from Keplers Law.

III. (a) State and prove Liouovilles theorem.

OR

(b) Discuss Harmonic oscillator problem using Hamiltons Jacobi Theory.

IV. (a) Explain Four vectors in mechanics.

OR

(b) Obtain pendulum equation of nonlinear systems.

($3 \times 15 = 45$ Marks)

PART – C

Answer **any three** of the following questions. Each question carries **5** marks:

V. (a) Determine the differential scattering cross section and the total scattering cross section for the scattering of a particle by a rigid elastic sphere.

(b) Prove that the constraints in a rigid body are conservative.

(c) Obtain the differential equation of a particle moving in a central force field.

(d) Prove that, for harmonic oscillator, the hamiltons principal function is the time integral of Lagrangian.

(e) Discuss the covariant Lagrangian for freely moving particle.

(f) Show that the transformation $q=\sqrt{(2P)}\ Sin\,Q$ and $\rho=\sqrt{(2P)}\ Cos\,Q$ is canonical

(3 × 5 = 15 Marks)

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