Roll.No. | 20PAMCT3009

SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai - 600 044.
M.Sc.Applicable Mathematics - END SEMESTER EXAMINATIONS - NOVEMBER 2025
SEMESTER - III

20PAMCT3009 - Classical Mechanics

Total Duration : 2 Hrs. 30 Mins. Total Marks : 60

Section B

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. What is the Galilean frame of reference. Give the differential equations of the frame?
2. State and prove the conservation theorem for the Angular Momentum of a particle.
3. Calculate the shortest distance between two points in a plane.
4. Find the Lagrange's equations to describe the motion of a hoop rolling down an inclined plane.
5. Define Coriolis force. List any three effects of the force.
6. Derive an expression for the angular momentum of a rigid body about some fixed point.
7. Define inertia tensor and moment of inertia in a rigid body.
8. What are canonical transformations? Show that the transformation

   Q= $log\left(\frac{1}{q}\sin p\right), p = q\cot p$ is canonical.

Section C

I - Answer any **TWO** questions $(2 \times 10 = 20$ Marks)

9. What is D'Alembert's principle? Apply the principle to derive Lagrange's equations for a system of particles.
10. Derive Euler's theorem on the motion of a rigid body.
11. Illustrate how the Hamiltonian varies depending on the set of generalised coordinates by the example of a harmonic oscillator fixed to a uniformly moving cart.
12. Derive the principle of least action.

II - Compulsory question $(1 \times 10 = 10$ Marks)

13. Explain the Brachistochrone problem.

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