Reg.
No. [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

DEPARTMENT OF SCIENCES, I SEMESTER M.Sc (PHYSICS)
END SEMESTER EXAMINATIONS, NOVEMBER 2018
SUBJECT [CODE- 4103]
(REVISED CREDIT SYSTEM-2018)

Time: 3 Hours   **Date: 21/11/2018**   **MAX. MARKS: 50**

Note: (i) Answer **ALL** questions

(ii) Draw diagrams, and write equations wherever necessary

1 A. Show that a projectile motion in a resistive medium is described by $x = \frac{U}{k}\left(1 - e^{-kt}\right)$ and $y = -\frac{gt}{k} + \frac{kV+g}{k^2}\left(1 - e^{-kt}\right)$, where $x = U$, $y = V$ when $t = 0$, $k = $ resistive force per unit velocity per unit mass. Obtain an expression for its time of flight when the air resistance is small. **[5]**

1 B. Obtain the equation for the nature of the orbit. **[5]**

2 A. What do you mean by Coriolis force? Obtain an expression for deflection produced by Coriolis force on a freely falling particle. **[2+3=5]**

2 B. Obtain Lagrangian for a spherical pendulum and hence obtain the equations of motion. **[5]**

3 A. From D'Alembert's equation of motion, obtain Lagrange's Equations of motion for a conservative holonomic constraints. **[5]**

3 B. Obtain condition for precession without nutation for a symmetric top using Euler's angles. **[5]**

4 A. What do you mean by phase space? Explain. Derive Hamilton's of motion for a simple pendulum **[2+3=5]**

4 B. Show that [u, vw] = [u, v]w + v[u, w].
Prove the Jacobi identity satisfied by the Poisson Brackets**. [1+4=5]**

5 A. Obtain eigen-frequencies and eigen-vectors for the system of two identical simple pendulums of length l coupled by a spring of constant k, suspended by two supports separated by a horizontal distance a.system **[5]**

5 B. Obtain an expression for the group speed of gravity waves on water surface. **[5]**

>>>