PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION MAY 2023
(Second Semester)

Branch – PHYSICS

CLASSICAL MECHANICS

Time: Three Hours   Maximum: 50 Marks

SECTION-A (5 Marks)
Answer ALL questions
ALL questions carry EQUAL marks   (5 x 1 = 5)

1   What is T in the given equation L=T-V?
   (i) Kinetic energy   (ii) Potential energy
   (iii)Total energy   (iv) Thermal energy

2   Which represents Hamiltonian?
   (i) L   (ii) H
   (iii)T   (iv) V

3   Identify the nature of orbit based on Kepler's 1st law.
   (i) Circular   (ii) Cubic
   (iii) Conic   (iv) Square

4   Name the top which spins with its axis vertical continuously.
   (i) Moving top   (ii) Spin top
   (iii) Rotating top   (iv) Sleeping top

5   In canonical transformation, poisson brackets are_____.
   (i) Invariant   (ii) Contravariant
   (iii) Zero   (iv) Covariant

SECTION - B (15 Marks)
Answer ALL Questions
ALL Questions Carry EQUAL Marks   (5 x 3 = 15)

6   a. Obtain the Lagrangian's equation of Atwood's machine.
              OR
   b. Obtain the time period of simple pendulum.

7   a. State and explain Hamilton's principle.
              OR
   b. Explain the isotropic oscillators.

8   a. Produce the classification of orbits.
              OR
   b. State and explain inverse square law of force.

9   a.   Discuss the generalized coordinates.

OR

    b.   Produce the Coriolis force.

10   a.   Explain principle of least action.

OR

    b.   What are poisson brackets? Show its mathematical expression.

SECTION -C (30 Marks)
Answer ALL questions
ALL questions carry EQUAL Marks   (5 x 6 = 30)

11   a.   Obtain the Lagrange's equation for conservative and non-conservative systems in detail.

OR

    b.   Discuss Lagrange's equation for simple harmonic oscillator.

12   a.   Describe a particle moving under central force in detail.

OR

    b.   Explain the cylinder rotating on a inclined plane.

13   a.   Enumerate reducetion the two body problem to equivalent one body problem and obtain its equation of motion.

OR

    b.   Analyse the scattering in a central force field in detail.

14   a.   Obtain the expression of Euler's integrals in detail.

OR

    b.   Describe the motion of Foucault's pendulum with diagram.

15   a.   Discuss the canonical transformation and obtain its equation.

OR

    b.   Derive Jacobi equations for Hamilton's principle.

Z-Z-Z   END