This question paper contains **2** printed pages]

NEPWT—127—2024

FACULTY OF SCIENCE AND TECHNOLOGY

M.Sc. (First Year) (First Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(NEP-2020 Pattern)

PHYSICS

SPHYC-402

(Classical Mechanics)

(Saturday, 14-12-2024)   **Time : 10.00 a.m. to 1.00 p.m.**

Time—3 Hours   *Maximum Marks*—80

N.B. :— (*i*)   *All* questions carry equal marks.

(*ii*)   Question No. **1** is compulsory.

(*iii*)   Solve any *three* of the remaining questions (Q. No. **2** to Q. No. **6**).

(*iv*)   Figures to the right indicate full marks.

1.   Solve the following questions (Each question carries **5** marks) :   20

(*a*)   Explain conservative and non-conservative forces.

(*b*)   Write Gauge transformation for Lagrangian.

(*c*)   What is Poisson's Brackets ? Write its properties.

(*d*)   What is stable and unstable equilibriams ?

P.T.O.

2. Solve the following questions (Each question carries **10** marks) : 20

    (*a*) Explain in detail Galilean Transformations.

    (*b*) What is Cyclic-Coordinates and degree of freedom ?

3. Solve the following questions (Each question carries **10** marks) : 20

    (*a*) Derive Lagrangian equation of motion from D'Alembert's principle.

    (*b*) Derive Lagrangian equation from variational principle.

4. Solve the following questions (Each question carries **10** marks) : 20

    (*a*) Explain Derivation of Hamiltonian equations of motion from Hamiltonian principle.

    (*b*) Explain reduction of two body problem in one body problem.

5. Solve the following questions (Each question carries **10** marks) : 20

    (*a*) Derive Euler's equation of motion for a rigid body.

    (*b*) What are normal coordinates ? Also explain normal modes and normal frequencies of vibrations.

6. Write short notes on (Each question carries **5** marks) : 20

    (*a*) D'Alembert's principle

    (*b*) Jacobi Integral

    (*c*) Poisson Brackets

    (*d*) Rotational K.E. of a body.