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NEPNY—34—2023

FACULTY OF SCIENCE AND TECHNOLOGY

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

NOVEMBER/DECEMBER, 2023

PHYSICS

SPHYC-402

(Classical Mechanics)

(Friday, 22-12-2023)

Time : 10.00 a.m. to 1.00 p.m.

Time—Three 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 five 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) Conservative and non-conservative forces
 - (b) Rutherford scattering
 - (c) Principle of least action
 - (d) Angular momentum of rigid body.
2. Solve the following questions (Each question carries 10 marks) : 20
- (a) Explain motion of charge particle in electromagnetic field. 10
 - (b) What are constraints ? Explain its types. 10

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3. Solve the following questions (Each question carries **10** marks) : 20
- (a) Explain gauge transformation from Lagrangian. 10
 - (b) Explain kinetic energy in terms of generalized co-ordinates. 10
4. Solve the following questions (Each question carries **10** marks) : 20
- (a) Explain Kepler's laws of motion. 10
 - (b) What is Poisson brackett ? Explain their properties in detail. 10
5. Solve the following questions (Each question carries **10** marks) : 20
- (a) Explain equation of motion for a rigid body. 10
 - (b) Explain stable and unstable equilibrium in detail. 10
6. Write short notes (**5** marks each) : 20
- (a) Galilean transformation
 - (b) Jacobi integral
 - (c) Canonical transformation
 - (d) Angular momentum of rigid body.