QP CODE: 23800347

INTEGRATED PG DEGREE EXAMINATION, DECEMBER 2023

Third Semester

INTEGRATED MSC BASIC SCIENCE-PHYSICS

CORE - IPH3CR01 - CLASSICAL PHYSICS - 1

2020 ADMISSION ONWARDS

DECE2391

Time: 3 Hours

Part A (Short Answer Questions)

Answer any eight questions.

Weight **1** each.

- 1. What is centre of mass?
- 2. A particle moving on ellipsoid under the influence of gravity. Identify the constraint.
- 3. What is the condition for a space to be isotropic?
- 4. Explain first integral of central force motion with an example.
- 5. Explain the concept of inverse square law force.
- 6. What is differential scattering cross section?
- 7. Define rigid body.
- 8. Explain the concept of body angle.
- 9. What is Eulers theorem?
- 10. Explain normal modes of oscillations.

(8×1=8 weightage)

Part B (Short Essay/Problems)

Answer any **six** questions.

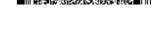
Weight **2** each.

- 11. Explain the priciple of virtual work.
- 12. Obtain the equations of motion for the motion of a particle of mass m in a potential V(x,y,z) in spherical polar coordinates.

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13. Write a note in Rayleigh dissipation function.





Weightage: 30

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- 14. A charged particle is moving under the influence of a point nucleus. Find the orbit of the particle and the periodic time in case of an elliptical orbit.
- 15. Define Eulers angles and obtain an expression for the complete transformation matrix.
- 16. Write a note on Eulers geometrical equations.
- 17. Derive an expression for the total kinetic energy of a rigid body.
- 18. Briefly explain stable, unstable and neutral equilibrium.

(6×2=12 weightage)

Part C (Essay Type Questions)

Answer any two questions.

Weight 5 each.

- 19. What is Hamilton's principle? Deduce Lagrangian's equation from Hamilton's principle subject to the condition that Lagrangian does not depent on time explicitly.
- 20. Derive the expression for Rutherford scattering cross section.
- 21. Derive Eulers equations of motion by (a) Eulers method (b)Lagrange's method.
- 22. Consider a diatomic molecule consisting of mass m1 and m2 connected by a spring of spring constant k vibrating along the line joining the two masses. Obtain its normal frequencies and normal modes of vibration.

(2×5=10 weightage)