QP CODE: 23800347

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Reg No : .....

Name : .....

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 Weightage: 30

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 consrtaint.
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.
13. Write a note in Rayleigh dissipation function.

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)