(Pages: 2)

Name: ....

Reg.No: ....

FIRST SEMESTER M.Sc DEGREE EXAMINATION, NOVEMBER 2021

(CBCSS - PG)

(Regular/Supplementary/Improvement)

CC19P PHY1 C01 - CLASSICAL MECHANICS

(Physics)

(2019 Admission onwards)

Time : 3 Hours

Maximum : 30 Weightage

Section A

Answer *all* questions. Each question carries 1 weightage.

1. What is a cannical transformation?

2. State and explain Hamilton Jacobi equation for Hamiltons principal function.

3. Write the significance of HJ method in Kepler's law.

4. How HJ equation is related to schrodinger equation?

5. What are Euler angles?

6. Obtain the dynamical equation of motion of a rigid body using rate of change of vector method.

7. In the force free motion of rigid body, distinguish between body cone and space cone.

8. What do you mean by limit cycles?

(8 × 1 = 8 Weightage)

Section B

Answer any *two* questions. Each question carries 5 weightage.

9. Define angle of scattering and deduce an expression for angle of scatteringin a central force field.

10. Explain the seperation of variable method in HJ equation.

11. What do you mean by normal mode and eigen frequencies? Discuss double pendulum in the light of theory of small oscillations.

12. Explain the concept of logisitc map using an example.

(2 × 5 = 10 Weightage)

Section C

Answer any *four* questions. Each question carries 3 weightage.

13. Find the Lagranges equation of motion for LC Circuit and also deduce the time period.

14. Set up the Lagrangian and obtain the Lagranges equations for a simple pendulum. Deduce the formula for its time period.

15. Using Lagrangian obtain an expression for time period of a compound pendulum.

16. The Lagrangian is given by L=AXX+BYY-kxy, where X is the derivative of x, Y is the derivative of y. find the Hamiltonian and equation of motion. Is Hamiltonian conserved?

17. Show that the tranformation is defined by q=2P sin Q, P= 2P cos Q is canonical.

18. Examine the use of poisson bracket in finding the integrals of motion. And also check the canonical invariance of poisson bracket.

19. Find the modes of vibration of a system of two harmonic oscilltors coupled by a spring of spring constant k_1.

(4 × 3 = 12 Weightage)

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