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Name...................................

Reg. No................................

FIRST SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY) EXAMINATION, NOVEMBER 2023

(CBCSS)

Physics

PHY IC 01—CLASSICAL MECHANICS

(2019 Admission onwards)

Time : Three Hours

Maximum : 30 Weightage

Section A

*Answer **all** questions. Each question carries 1 weightage.*
8 short questions answerable within 7.5 minutes.

1. Write a note on holonomic and non-holonomic constraints.

2. What are the generalised co-ordinates of simple pendulum.

3. What is meant by reduced mass ?

4. Poisson brackets are commutative ; Prove.

5. Define logistic map.

6. Write down any *two* conditions for a transformation to be canonical.

7. What are coupled oscillators ?

8. Define Hamilton Principal function.

(8 × 1 = 8 weightage)

Section B

*Answer any **two** questions.*
Each question carries 5 weightage.
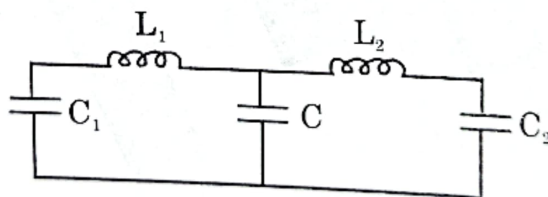*Essay questions answerable within 30 minutes.*

9. Using Lagrange equation find the equation of motion of compound pendulum.

10. Reduce two body central force problem into an equivalent single body problem.

Turn over

11. Write a note on symmetry properties of space and time and conservation laws.

12. What do you understand by normal modes of vibrations ?

$(2 \times 5 = 10)$

Section C

Answer any **four** *questions.*
Each question carries 3 weightage.
problems within 15 minutes.

13. Write the Lagrange's equation of motion of a particle moving under gravity of mass, surface of earth.

14. Solve Harmonic oscillator problem by using H-J method.

15. A particle of mass m moving in a plane in the field of a force is given by $F = -kr \cos$

    a) Justify whether the angular momentum is conserved.

    b) Obtain the differential equation of the orbit of the particle.

16. Find the Lagrangian of the circuit shown. Find the normal frequencies of the system

17. Discuss the conditions for canonical transformation .

18. Show that $[F, (G + K)] = [F, G] + [F, K]$.

19. Explain the term chaos.

$(4 \times 3 = 12)$