D 131327 **(Pages : 2)** **Name.....**

Reg. No.....

FIRST SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY) EXAMINATION, NOVEMBER 2025

(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. What are canonical co-ordinates ?
2. Show that [F, G] = – [G, F].
3. Define body centered and space centered co-ordinate systems.
4. How much is the number of degrees of freedom for a) Four particles moving freely in space ; and b) A rigid body with two points fixed.
5. State Kepler's third law of motion.
6. Show that Poisson bracket obey distributive law.
7. State Canonical or Contact transformation.
8. Explain infinitesimal contact transformation.

(8 × 1 = 8 weightage)

Section B

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

9. Write a note on symmetry properties of space and time and conservation laws.
10. Discuss the vibrations of linear triatomic molecules.

Turn over

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

12. Explain the properties of Poison's brackets. Show that Poisons brackets are a) commutative ; and b) distributive.

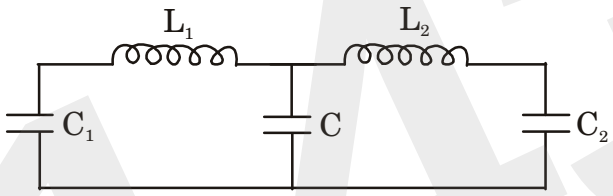
(2 × 5 = 10 weightage)

Section C

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

13. Explain any *two* the conditions for canonical transformation.

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



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

16. Show that Poisson brackets are invariant under canonical transformations.

17. Discuss the conditions for canonical transformation.

18. Prove that two or more successive canonical transformations also is canonical.

19. Write a note on Chaos.

(4 × 3 = 12 weightage)