

18. (a) Describe Rayleigh dissipation function.

Or

(b) Explain impulse and momentum.

19. (a) Explain stationary values of a function.

Or

(b) Explain brachistochrone problem.

20. (a) Explain Hamilton's principle function.

Or

(b) Explain separability.

PART C — ($3 \times 10 = 30$)

Answer any THREE questions.

21. Explain virtual work.

22. Explain Nonholonomic systems.

23. Explain and derive geodesic system.

24. Describe Hamilton's principle.

25. Write down the Pfaff differential form.

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P 22 MACC 1 A

(For candidates admitted from 2022–2023 onwards)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023.

Mathematics — Core Choice Course

CLASSICAL DYNAMICS

Time : Three hours

Maximum : 75 marks

PART A — (20 marks)

Answer ALL questions.

I. (A) Choose the correct answer: ($5 \times 1 = 5$)

1. In the configuration of a system of N particles and of there are l independent equations of constraints, then there are _____ degree of freedom.

- (a) $l - 3N$ (b) $3N - l$
(c) $3l - N$ (d) $l - N$

2. What is δx in the configuration of the system?

- (a) displacement
(b) virtual displacement
(c) constraint
(d) none the these

3. An independent function of the form $f_j(q, \dot{q}, t) = \alpha_j$ ($j = 1, 2, \dots, 2n$) is $2n$ variables called _____

- (a) Integrals (b) Functions
(c) Constraints (d) None of these

4. What is potential energy function?

- (a) $Q_i = -\frac{\partial v}{\partial q_i}$ (b) $Q_i = 0$
(c) $Q_i \neq \frac{\partial v}{\partial q_i}$ (d) $Q_i = \frac{\partial v}{\partial q_i}$

5. What is second canonical equation?

- (a) $\dot{p}_j = -\frac{\partial H}{\partial q_j}$ (b) $p_j = \frac{\partial H}{\partial q_j}$
(c) $p_j = +\frac{\partial H}{\partial q_j}$ (d) None of these

(B) Fill in the blanks: (5 × 1 = 5)

6. _____ is the velocity dependent potentials.
7. _____ is the free variations of an augmented function.
8. The lagrangian method Q's as due to the _____.

9. The general form of virtual work _____.

10. The force $\dot{q}_j = \frac{\partial H}{\partial p_j}$, is _____.

II. Answer the following questions: (5 × 2 = 10)

11. Define non holonomic constraint.
12. Write conservative system.
13. Write Angular impulse.
14. The stationary value of q_0 is what?
15. Write second canonical equation.

PART B — (5 × 5 = 25)

Answer ALL questions, choosing either (a) or (b).

16. (a) Explain configuration space.

Or

- (b) Describe the generalised coordinates.

17. (a) Describe conservative system.

Or

- (b) Define small oscillations.