(FOR THE CANDIDATES ADMITTED   SUBJECT CODE 22 UPS 507

DURING THE ACADEMIC YEAR 2022-23 ONLY)   REG.NO. [   ]

N.G.M.COLLEGE (AUTONOMOUS) : POLLACHI
END-OF-SEMESTER EXAMINATIONS : NOVEMBER – 2024

B.Sc. – PHYSICS   **MAXIMUM MARKS: 50**

V SEMESTER   **TIME : 3 HOURS**

PART – III
MECHANICS
SECTION – A   (10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS.   **(K1)**

1.   The Newton's first law of motion is also called

    a)   law of inertia   b)   law of force   c)   law of velocity   d)   all the above

2.   The angular momentum is ----- quantity.

    a)   vector   b)   scalar   c)   dimentionsless d)   all the above

3.   The smallet possible number of variables to determine the configuration of a system is

    called

    a)   generalized coordinates   b)   degrees of freedom   c)   constraints

    d)   velocity.

4.   The Newton's second law of motion is

    a) $ma = F$ b) $ma^2 = F$ c) $.mr = F$ d) $mr^3 = F$

5.   The Hamiltonion H represents

    a)   total energy.   b)   potential energy.   c)   kinetic energy. d)   all the above.

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES.   **(K2)**

6.   State the Newton's third law of motion.

7.   State perpendicular axis theorem .

8.   Define the term constraints.

9.   What is Hamilton's principle?

10.   What is a phase space?

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SECTION – B **(5 X 3 = 15 MARKS)**

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS. **(K3)**

11. a) Explain Newton's Universal law of gravitation in detail.

(OR)

b) Describe the conservation of angular momentum.

12. a) State and prove parallel axis theorem.

(OR)

b) What is Torque ? Explain with example.

13. a) Explain the theorem for conservation of linear momentum.

(OR)

b) What are generalized coordinates? Explain the advantages of using them.

14. a) Deduce Newton's second law of motion from Hamilton's principle.

(OR)

b) Derive the period of oscillation of a simple pendulum using Lagrange's equation.

15. a) Describe Phase space and the motion of system.

(OR)

b) Explain the physical significance of H.

SECTION – C **(5 X 5 = 25 MARKS)**

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS. **(K4/K5)**

16. a) Explain the conservation of energy and work with suitable example and theory.

(OR)

b) Explain the conservation of angular momentum with theory.

17. a) State and prove perpendicular axis theorem.

(OR)

b) Describe the theory of rotation about the fixed axis.

18. a) Obtain the expression for generalized displacement and generalized acceleration.

(OR)

b) What are the various types of constraints? Explain with example.

19. a) Deduce Hamiltonian principle from D-Alembertz principle.

(OR)

b) Derive Lagrange's equation of motion from Hamiltonian principle.

20. a) Derive Hamiltonian canonical equation of motion in cylindrical coordinates systems.

(OR)

b) Describe the experiment for period of oscillation of compound pendulum using Hamiltonia's principle.

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