25U119S (Pages: 2) Name: .....

Reg.No: .....

FIRST SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2025

(CBCSS - UG)

CC20UPHY1B01 - MECHANICS - I

(Physics - Core Course)

(2020 to 2023 Admissions - Supplementary)

Time : 2.00 Hours Maximum : 60 Marks

Credit : 2

Part A (Short answer questions)

Answer ***all*** questions. Each question carries 2 marks.

1. Why it is not possible to push a car from inside?
2. Write fundamental forces with one property for each.
3. Give a brief account on tension force on the string.
4. Define coefficient of viscosity.
5. State Hooke's law.
6. Define energy.
7. State the general law of conservation of energy.
8. Expand the angular momentum interms of cross product.
9. Expand the torque interms of cross product.
10. Define parallel axis theorem.
11. What is meant by pure rotation?
12. Give the relation connecting linear velocity and angular velocity. Explain terms.

(Ceiling: 20 Marks)

Part B (Short essay questions - Paragraph)

Answer ***all*** questions. Each question carries 5 marks.

13. Derive an expression for acceleration of astronauts in a tug of war.
14. Explain contraints with examples. How it affect motion?
15. Find the centre of mass of a solid hemisphere and hence find the centre of mass of a sphere.

16. Using work energy theorem, find the height reached by a mass 'm', when it is thrown vertically upwards with initial velocity 'u'.

17. A mass m is thrown vertically upward from the surface of the earth with initial speed u. Assuming that the the only force is gravity, find its maximum altitude and the minimum value of u for the mass to escape the earth completely.

18. Derive the expression for potential energy of a inverse square force.

19. Obtain an expression for the angular momentum when a wheel of mass M and radius b rolls uniformly on a horizontal plane,wihtout slipping.

(Ceiling: 30 Marks)

Part C (Essay questions)

Answer any ***one*** question. The question carries 10 marks.

20. Briefly explain the steps to be followed in applying Newton's laws. Consider a conical pendulam with a mass M suspended on a rod and the mass rotates in a circle, solve the equation of motion.

21. Discuss the small oscillations in a bound system. Obtain the expression foe a diatomic molecular vibrations.

(1 × 10 = 10 Marks)

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