

D 32382

(Pages : 2)

Name.....

Reg. No.....

**FIRST SEMESTER (CBCSS—UG) DEGREE EXAMINATION
NOVEMBER 2022**

Physics/Applied Physics

PHY 1B 01/APH 1B 01—MECHANICS-I

(2020—2022 Admissions)

Time : Two Hours

Maximum : 60 Marks

*The symbols used in the question paper have their usual meanings.***Section A (Short Answer Type)***Answer all questions in two or three sentences, each correct answer carries a maximum of 2 marks.*

1. Define and explain mass.
2. Define inertial frame of reference with an example.
3. Explain the essence of Newton's first law.
4. Explain the gravitational force of a sphere.
5. Name the four fundamental forces in nature ?
6. find the tension of a "Dangling rope" at a distance x from the bottom.
7. State work-energy theorem for a conservative system.
8. Explain one example for conservation of linear momentum.
9. Show that angular momentum is conserved for a particle in central force motion.
10. Write a note on conservation of mechanical energy.
11. Give the relation between P.E and force.
12. Define normal force.

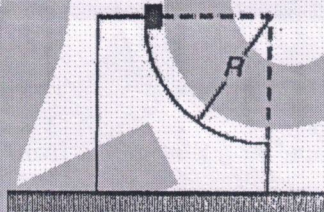
(Ceiling 20)

Turn over

Section B (Paragraph / Problem Type)

Answer all questions in a paragraph of about half a page to one page, each correct answer carries a maximum of 5 marks.

13. 'Ideal point masses are not essential for applying Newton's laws'. Explain with example.
14. Write a note on Astronauts' Tug-of-War.
15. Explain Torque due to gravity.
16. A 5-kg mass moves under the influence of a force $F = (4t^2 \hat{i} - 3t \hat{j})$ N, where t is the time in seconds. It starts at rest from the origin at $t = 0$. Find : (a) its velocity ; (b) its position ; and (c) $r \times v$, for any later time.
17. Define and explain the Principle of equivalence.
18. A small cube of mass m slides down a circular path of radius $R = 10$ cm cut into a large block of mass M , as shown. M rests on a table, and both blocks move without friction. The blocks are initially at rest, and m starts from the top of the path. Find the velocity v of the cube as it leaves the block.



19. Explain work-energy theorem for a rigid body.

(Ceiling 30)

Section C (Essay Type)

Answer in about two pages, any one question.

Answer carries 10 marks.

20. Define and explain conical pendulum. Derive the equation for the angle the rod that makes with the vertical.
21. With figure solve the equation of simple harmonic motion.

(1 × 10 = 10 marks)