

20U112A

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Name:

Reg.No:

FIRST SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2020

(CBCSS - UG)

CC20U PHY1 B01 - MECHANICS - I

(Physics - Core Course)

(2020 Admission - Regular)

Time : 2.00 Hours

Maximum : 60 Marks

Credit : 2

Part A (Short answer questions)

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

1. Why does a parachute descend slowly?
2. Define the S.I. unit of force.
3. Write fundamental forces with one property for each.
4. Write a short note on electro static force.
5. Explain the law of conservation of linear momentum.
6. Explain time dependent and time independent forces.
7. Define work. Give its unit.
8. Define central force. Give mathematical expression for work done by central force.
9. Define power. Give its unit.
10. Expand the angular momentum interms of cross product.
11. Expand the torque interms of cross product.
12. Explain the significance of moment of inertia?

(Ceiling: 20 Marks)

Part B (Short essay questions)

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

13. Explain constraints with examples. How it affect motion ?

14. Write a short note on normal force, when two surfaces are in contact.
15. Define centre of mass. What are the advantages of it?
16. The potential energy function between two atoms in a diatomic molecule can be expressed as $u(x) = (a/x^2) - (b/x^6)$. A) Determine the force between the atoms. B) Find the value at which potential energy is minimum.
17. A pendulum bob has a speed 3m/s while passing through its lowest position. What is its speed when it makes an angle of 60 degrees with the vertical? The length of the pendulum is 0.5m. Take $g=10\text{m/s}^2$
18. Obtain an expression for the angular momentum when a wheel of mass M and radius b rolls uniformly on a horizontal plane, without slipping.
19. Illustrate the law of conservation of angular momentum by suitable examples.

(Ceiling: 30 Marks)

Part C (Essay questions)

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

20. Consider three compartments of a freight train with equal masses are pulled by an engine with force F. Draw the force diagram of each compartments. What are the forces on each compartments. Generalise the results in the case of many compartments
21. Define physical pendulum. Derive time period of simple pendulum. Find the expression for radius of gyration.

(1 × 10 = 10 Marks)
