



K23U 4080

Reg. No. :

Name :

I Semester B.Sc. Degree (CBCSS – OBE – Regular/Supplementary/
Improvement) Examination, November 2023
(2019 Admission Onwards)
CORE COURSE IN PHYSICS
1B01PHY : Mechanics – I

Time : 3 Hours

Max. Marks : 40

PART – A

(Answer **all** questions. **Each** question carries **1** mark.)

1. Define work energy theorem.
 2. The escape velocity of earth is _____.
 3. State law of conservation of momentum.
 4. Two bodies of masses m and $4m$ are moving with same kinetic energy. The ratio of their linear momenta will be _____.
 5. What is rigid body ?
 6. Negative value of work done by a conservative force on a particle is equal to _____.
- (6×1=6)

PART – B

(Answer **any six** questions. **Each** question carries **2** marks.)

7. State and explain Newton's first law with example.
8. Find the expression for tension of dangling rope at a distance x from the bottom.
9. Explain gravitational force of sphere.

P.T.O.



10. Discuss stability using potential energy curve.
11. Distinguish between elastic and inelastic collision.
12. State and prove parallel axis theorem.
13. Derive relation between torque and angular momentum.
14. Find expression for angular frequency of physical pendulum.

(6x2=)

PART - C

(Answer any four questions. Each question carries 3 marks.)

15. Mass m whirls with constant speed v at the end of a string of length R . Find the force on m in the absence of gravity or friction.
16. A block of mass M slides down a plane of angle θ . Find the speed of the block after it has descended through height h , assuming that it starts from rest and that the coefficient of friction μ is constant.
17. A 5 kg mass moves under the influence of a force $F = (4t^2\mathbf{i} - 3t\mathbf{j})\text{N}$, where t is the time in seconds ($1\text{ N} = 1\text{ newton}$). 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.
18. A string of length 50 cm carrying a mass 300 gm is tightly held at its free end and hurled in a circle at 2 revolutions per second.
 - a) Find the angular momentum of the mass
 - b) If the speed falls to 1 rev/sec in 1 minute find the average torque.
19. Find the moment of inertia of uniform disk of mass M , radius R , about the axis through the center and perpendicular to the plane of the disk.
20. Find the centre of mass of uniform right triangular sheet of mass M , base b , height h , and small thickness t .

(4x3=12)



PART – D

(Answer **any two** questions. **Each** question carries **5** marks.)

21. Define center of mass. Derive the expression position vector R of center of mass. Obtain the equation of motion of the center of mass of Drum major's baton.
22. Describe simple harmonic motion. Form its equation of the motion and solve it.
23. Derive the expression for the acceleration of Atwood's Machine with a massive pulley.
24. State the law of conservation of angular momentum. Prove that the angular momentum of a rigid body is the sum of angular momentum about its center of mass and angular momentum of centre of mass about the origin. **(2×5=10)**

