



K23U 2838

Reg. No. :

Name :

V Semester B.Sc. Degree (CBCSS – Supplementary)
Examination, November 2023
(2017 and 2018 Admissions)
CORE COURSE IN PHYSICS
5B08 PHY : Classical Mechanics and Relativity

Time : 3 Hours

Max. Marks : 40

Instruction : Write answers in English only.

SECTION – A

Very short answer type. Answer **all 4** questions. **Each** carries 1 mark.

1. If an object reaches the speed of light, its length changes to
2. If the velocity of a body doubles, its momentum
3. When a particle moves under the action of a central force, its _____ is conserved.
4. The orbital velocity of an artificial satellite close to the surface of earth is **(4×1=4)**

SECTION – B

Short answer type. Answer **any 7** questions. **Each** carries 2 marks.

5. What are inertial frames of references ?
6. Write down the Lorentz transformation equations.
7. What is meant by C-frame of reference ?
8. Explain the expression for force in relativistic mechanics.
9. What happens to angular velocity when the moment of inertia of an isolated system is halved ?
10. Write the relation connecting torque and angular momentum.

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11. What is the significance of virtual work ?
12. State D'Alembert's principle.
13. Define the n^{th} power law of force.
14. State and explain the superposition Principle. (7×2=14)

SECTION – C

Short Essay/Problem. Answer **any 4** questions. **Each** carries **3** marks.

15. Assuming Lorentz-Fitzgerald contraction, calculate the apparent length of a meter scale moving at a speed of 2.3×10^8 m/s.
16. Obtain Einstein's formula for addition of velocities.
17. Determine the centre of mass of a thin triangular lamina.
18. A 150 gm stone is revolved at the end of a 30 cm long string at the rate of 2 revolutions per second. Determine its angular momentum. If after 30 sec. it is making only one revolution per second, find the mean torque.
19. Derive an expression for the escape velocity for a body of mass m from the surface of a planet of mass M and radius R and calculate the escape velocity for earth ? (Radius of earth = 6.4×10^6 m).
20. Derive the Lagrange's equation of motion of a simple pendulum and hence obtain the time period. (4×3=12)

SECTION – D

Long essay type. Answer **any 2** questions. **Each** carries **5** marks.

21. Describe Michelson-Morley experiment and explain the results.
22. State law of conservation of angular momentum and briefly explain two examples of conservation of angular momentum.
23. Derive Kepler's law of planetary motion.
24. State the basic postulates of Einstein's special theory of relativity and briefly explain three consequences of Lorentz transformations. (2×5=10)