Reg. No. : ....

Name : ....

V Semester B.Sc. Degree (CBCSS – Supplementary)
Examination, November 2024
(2018 Admission)
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. A particle with zero rest mass travel with speed _____

2. Principle behind the convex lens shape of galaxy is _____

3. Work done to move any mass on an equipotential surface is _____

4. Constraints that are independent of time is called _____   **(4×1=4)**

SECTION – B

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

5. What are the fundamental postulates of special theory of relativity ?

6. Explain length contraction.

7. What is coefficient of restitution ? Write the equation.

8. What is the importance of conservation of angular momentum in planetary motion ?

9. Discuss conservation of linear momentum.

10. What is central force ?

11. Define electric potential.

P.T.O.

12. What is escape velocity ?

13. Explain the significance of virtual work.

14. What is centre of mass reference frame ?   **(7×2=14)**

SECTION – C

Short essay/problem. Answer **any 4** questions. **Each** carries **3** marks.

15. A meson has a speed 0.8c relative to the ground. Find how far the meson travels relative to the ground, if its speed remains constant and time of its flight relative to the system, in which it is at rest, is 2×10^{-8} s.

16. What is electron- positron annihilation ? Calculate the energy released during this process.

17. Derive the centre of mass of thin uniform rod and triangular lamina.

18. The maximum and minimum distances of comet from the sun are 1.4×10^{12} m and 7×10^{10}m respectively. If the velocity nearest to the sun is 6×10^4 m/s, what is the velocity when farthest ?

19. Derive potential energy of a system of charges.

20. Derive the potential at a point outside a thin spherical shell.   **(4×3=12)**

SECTION – D

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

21. Derive Lorentz transformation equation and show that space time interval between two events is invariant.

22. Describe the principle of a rocket. Derive the equation for final velocity.

23. State Kepler's laws of planetary motion. Show how they can be deduced from Newton's Universal law of gravitation.

24. Derive Lagrange's equation of motion using D' Alembert's principle.   **(2×5=10)**

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