Reg. No. : ....

Name : ....

V Semester B.Sc. Degree (CBCSS – Supplementary) Examination, November 2022
(2016 – 18 Admissions)
CORE COURSE IN PHYSICS
5B08PHY : Classical Mechanics and Relativity

Time : 3 Hours

Total Marks : 40

SECTION – A

Very Short Answer Type. **Each** carries **1** mark. Answer **all 4** questions.

1. In the case v<<c, Lorentz transformation is the same as _____ transformation.

2. When the divers, jump from the diving board of a swimming pool they have to use the principle of conservation of

3. The surface at which the potential is constant is called

4. The conditions which restrict the motion of the system are called   (4×1=4)

SECTION – B

Short Answer Type. **Each** carries **2** marks. Answer **any 7** questions.

5. Distinguish between inertial and non-inertial frame of reference.

6. What is the importance of Michelson Morley experiment ?

7. Discuss the concept of space and time in special theory of relativity.

8. State the law of conservation of linear momentum for a system of particles.

9. Why the centre of mass frame of reference is called zero-momentum frame ?

10. Define inverse square law force. Give one example.

11. Define gravitational potential.

12. Define velocity of escape.

13. Explain the expression for force in relativistic mechanics.

14. Differentiate between holonomic and non-holonomic constraints.   (7×2=14)

SECTION – C

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

15. A particle of rest mass m_0 moves with speed 0.806c. Calculate its mass, momentum, total energy and KE.

16. What is the mean life of a meson travelling with a velocity 80% of the velocity of light ? The proper mean life time is 3.2×10^{-8} s.

17. Find the momentum of an electron which is accelerated by a potential difference of 10 volts ?

18. Define centre of mass and find out the centre of mass of a thin uniform rod of length l.

19. What is the potential energy of a mass of 2 Kg on the surface of the earth, referred to zero potential energy at infinite energy ? Also calculate the potential energy at a distance 10000 km from the centre of the earth.

20. Derive the Lagrange's equation of motion of a linear harmonic oscillator. **(4×3=12)**

SECTION – D

Long Essay Type. **Each** carries **5** marks. Answer **any 2** questions.

21. Derive Einstein's mass energy relation. Give one example to prove the mass energy equivalence.

22. Explain the meaning of centre of mass. Find out the expression of position vector and velocity of centre of mass of a system of particles.

23. Explain Gravitational field. Calculate the gravitational field due to a solid sphere at a point (i) outside the sphere and (ii) on the surface of a sphere.

24. State D'Alembert's principle and derive Lagrange's equation of motion. **(2×5=10)**

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