24U304S (Pages: 2) Name: .....

Reg.No: .....

THIRD SEMESTER B.Sc./M.Sc. INTEGRATED GEOLOGY DEGREE EXAMINATION, NOV. 2025

(CBCSS - UG)

CC19UPHY3C03 / CC20UPHY3C03 / CC23PHY3IC03 -

MECHANICS, RLATIVITY, WAVES AND OSCILLATIONS

(B.Sc. Physics - Complementary Course - Supplementary/Improvement)

(M.Sc. Integrated Geology - Regular/Supplementary/Improvement)

(2019 to 2023 Admissions)

Time : 2.00 Hours Maximum : 60 Marks

Credit : 2

Part A (Short answer questions)

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

1. What is Coriolis force?
2. What are different equilibrium points on a potential energy curve?
3. Give the mathematical representation for law of conservation of linear momentum.
4. What are the characteristics of central force?
5. What are Lorentz transformation equations?
6. Show that a particle of finite mass cannot move with the velocity of light.
7. From the relativistic energy-momentum relation, show that photon can travel with the velocity of light.
8. Distinguish between transverse and longitudinal waves with suitable examples.
9. Write down any 3 properties of electromagnetic waves.
10. What is photoelectric effect and work function?
11. Can the uncertainty principle be applied to energy and time? If so,how?
12. Write down the uncertainty relations and explain the symbols

(Ceiling: 20 Marks)

Part B (Short essay questions - Paragraph)

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

13. A lift is moving upwards with an acceleration 2g. Compute the effective weight of a man standing in it, when his actual mass is 70kg.
14. A single stage rocket consumes 80 kg of fuel per second exhausting it with a speed of 5km/s. Find the thrust on the rocket. If the rocket starts from rest what will be its velocity when mass of the rocket reduces to (1/10) of its inintial mass?

15. Show that the work done by a conservative force in a closed path is zero. Show that the force $F=(y^2-x^2)$ **i**+2y **j**+ 4z **k** is conservative.

16. In Michelson-Morley experiment the distance from partially silvered glass plate to each of the mirrors was 11m. If the wavelength of light used was 6000Å and the expected fringe shift was 0.4. Find the velocity of earth relative to ether.

17. Compute the speed of a rocket whose clock run one second slower per hour relative to a clock on the earth.

18. Derive the expression for the time period of a simple pendulum.

19. For a damped oscillator, the mass m of the block is 200g. Force constant=10N/m and the damping constant is 40g/S. Calculate the period of oscillation if oscillatory.

(Ceiling: 30 Marks)

Part C (Essay questions)

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

20. Derive Galilean transformation equations and hence deduce that length is invariant under Galilean transformation.

21. Derive an expression for energy density of a plane progressive wave.

(1 × 10 = 10 Marks)

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