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D3BPH2302 **Reg. No.....**

Name: .....

THIRD SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2024

(Regular/Improvement/Supplementary)

PHYSICS: Complementary Course for Mathematics and Chemistry

GPHY3C03T: MECHANICS, RELATIVITY, WAVES AND OSCILLATIONS

Time: 2 Hours **Maximum Marks: 60**

SECTION A: Answer the following questions. Each carries *two* marks.
(Ceiling 20 marks)

1. What is a black body? Mention the significance of a black body.
2. Explain law of conservation of angular momentum.
3. Write a short note on the concept twin paradox.
4. What is the effect of Coriolis force on a particle falling freely on Earth?
5. What are the postulates of special theory of relativity?
6. State and explain Work- Energy theorem.
7. Distinguish between real forces and fictitious forces.
8. How can you locate the position of particle? Explain with examples.
9. State the hypothesis of Galilean invariance.
10. Show that all inertial frames of references in uniform relative motion are equivalent.
11. State the concept of ultra violet catastrophe.
12. "If there is no external force is acting, a given particle will experience a force in an accelerated frame of reference". Why?

SECTION B: Answer the following questions. Each carries *five* marks.
(Ceiling 30 marks)

13. What are transverse waves? On what factors does the velocity of transverse wave in a stretched string depend?
14. What are the consequences of uncertainty principle? Compare the uncertainties of momentum of an electron and a proton confined in a 10A0 box.
15. What is a potential energy curve? Explain A) Stable equilibrium. B) Unstable Equilibrium. C) Neutral Equilibrium. D) Potential well.

(PTO)

16. Explain the energy density of a wave. Give an expression for energy density.
17. How does mass vary with velocity? A particle of rest mass $9x10^{-31}$ Kg moves with a velocity of $(C/\sqrt{2})$, where C is the velocity of light. Calculate its momentum, Kinetic energy and total energy of the particle.
18. Define Simple Harmonic Motion? Derive a general differential equation of motion of a simple harmonic oscillator.
19. What is photo electric effect? State the laws of Photoelectric emission.

SECTION C: Answer any *one* question. Each carries *ten* marks.

20. Explain the principle of Rocket. Derive an expression for the final velocity of the rocket.
21. Derive the Lorentz transformation equations. Explain its consequences.

(1 x 10 = 10 Marks)