C 62625 (Pages 3) Name...

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

SECOND SEMESTER B.Sc. DEGREE EXAMINATION, MAY. 2019

(CUCBCSS—UG)

Physics

PITY 2C 0 —MECHANICS, RELATIVITY, WAVES AND OSCILLATIONS

Time Three Hours Maximum : 64 Marks

Part A

Answer all *questions.*
Each question carries 1 mark.

A frame of refirence moving with ________ w.r.to an inertial frame are also an inertial frame of reference.

The shape of a figure at rest is square. For an observer in motion it will appear as ________

rlielleb on and Morely performed an experiment to prove the existence of ________

Two particles having masses in the ratio 1:4. Their kinetic energies are in the ratio 4:1. The ratio of their linear momenta is ________

5: Frictional force is an example of ________ force.

in simple harmonic motion potential energy is maximum at ________

7. When wave travels from one medium to another its ________ remains unchanged.

Presence of medium is not necessary for the propagation of ________ waves.

0. Corresponding to each eigen value, there is ________ wave functions.

10. Zero point energy cannot be explained on the basis of mechanics.

(10 x 1 = 10 marks)

Part B (Short Answer Questions)

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

11. Write the Galilian transformation equations.
12. Explain the origin of Coriolis force.
13. Distinguish between conservative and non conservative forces.
14. Momentum of a body increased by 20%. What will be its change in kinetic energy.

Turn over

15. Write the expression for energy density of waves. Explain the terms in the expression.
16. Briefly explain the principle of electron microscope.
17. What are the postulates of quantum mechanics ?

(7 x 2 = 14 marks)

Part C (Paragraph Questions)

Answer any **two** *questions.*
Each question carries 4 *marks.*

18. What are the postulates of special theory of relativity ?
19. Explain the principle of rocket propulsion.
20. Show that the oscillations of a loaded spring are simple harmonic. Obtain the expression for time period.
21. Derive time independent Schrodinger equation.
22. Distinguish between inertial and non inertial frame of references.

(2 x 4 = 8 marks)

Part D (Problems)

Answer any **three** *questions.*
Each question carries 4 *marks.*

23. The position vector of a body of mass m varies as $r = at^3$. Calculate its linear momentum.
24. A body of 5 kg is dropped from a height of 5 m. Using law of conservation of energy calculate the velocity with whicha reaches ground.
25. A meter scale is moving with a velocity 0.7c. What will be the length as it appears to an observer (i) at rest ; and (ii) moving with the scale.
26. Obtain the expression for Kinetic energy and potential energy of a simple pendulum at (i) Extreme position ; and (ii) mean position.
27. A particle moving in a one dimensional space has the wave function,

lif (X, t) = 0 for $x < 0$ and

$W(x, t)$ = A exp (-Bx) exp$\left(\frac{-iEt}{h}\right)$ for $x > 0$.

Show that the particle is in its bound state.

(3 x 4 = 12 marks)

Part E

Answer any **two** *questions.*
Each question carries 10 *marks.*

28. Explain the law of conservation of : (i) linear momentum, (ii) angular momentum and (iii) energy. Give one example for each.

29. Derive Lorentz transformation equations. Explain any one consequence of it.

30. What is meant by damping ? Derive the expression for the instantaneous amplitude of a damped harmonic oscillator.

(2 x 10 = 20 marks)