C 82139

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Name.....

Reg. No.....

SECOND SEMESTER B.Sc. DEGREE (SUPPLEMENTARY/IMPROVEMENT) EXAMINATION, APRIL/MAY 2015

(UG—CCSS)

Complementary Course—Physics

PH 2C 03—MECHANICS, RELATIVITY, WAVES AND OSCILLATIONS

Time : Three Hours

Maximum : 30 Weightage

Section A

Answer **all** *questions.*
Each question carries ¼ weightage.

1. A muon is travelling through the laboratory at three-fifths the speed of light. It last :

   (a) 10^{-6} S.
   (b) 1.5×10^{-6} S.
   (c) 2×10^{-6} S.
   (d) 2.5×10^{-6} S.

2. In terms of the relativistic energy :

   (a) $E^2 - p^2 c^2 = m^2 c^4$.
   (b) $E^2 + m^2 c^4 = p^2 c^2$.
   (c) $E^2 + p^2 c^2 = m^2 c^4$.
   (d) $E^2 + p^2 c^2 = m^2 c^2$.

3. The magnetic dipole in an electric field carries linear momentum is also called _____.

4. A harmonic oscillator has a total energy E. Then the K.E. when the displacement is one half of the amplitude is :

   (a) E.
   (b) $\frac{1}{4}$ (E).
   (c) $\frac{1}{2}$ E.
   (d) $\frac{3}{4}$ E.

5. The relation between particle velocity and wave velocity is :

   (a) $\frac{dy}{dx} = -v\frac{dy}{dt}$.
   (b) $\frac{dy}{dx} = -\frac{1}{v}\frac{dy}{dt}$.
   (c) $\frac{dy}{dt} = -v\frac{dy}{dx}$.
   (d) $\frac{dy}{dt} = -\frac{1}{v}\frac{dy}{dx}$.

Turn over

6. The amplitude of forced vibration in resonance is :

(a) $\frac{f_0}{2kw}$.

(b) $\frac{2kw}{f_0}$.

(c) $\frac{2f_0}{kw}$.

(d) $\frac{kw}{2f_0}$.

7. Schrödinger equation plays the same role in quantum mechanics as ———— in classi mechanism.

8. ———— is time dependent Schrödinger equation.

9. S.T.M. means ————.

10. Time period of simple pendulum is :

(a) $T = \sqrt{\frac{l}{g}}$.

(b) $T = 4\pi\sqrt{\frac{g}{l}}$.

(c) $T = 2\pi\sqrt{\frac{l}{g}}$.

(d) $4\pi\sqrt{\frac{l}{g}}$.

11. Differential equation of wave motion is ————.

12. ———— is a conservative force.

(12 × ¼ = 3 weights

Section B

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

13. What do you mean by Coriolis force ?

14. Discuss with example about inertial reference frame.

15. Comment "Moving clocks run slow".

16. State and explain the law of conservation of angular momentum.

17. Briefly explain Twin paradox.

18. Write down on expression for time period of loaded spring and explain.

19. Obtain an equation of S.H.M. and explain its application.

20. Give a note on pressure variations of plane wave.

21. Discuss the postulates of quantum mechanics.

(9 × 1 = 9 weig

Section C

Answer any **five** *questions.*
Each question carries 2 *weightage.*

22. Obtain Galilean transformation equations and explain its significance.
23. Derive Lorentz contraction formula and explain why moving objects are shortened.
24. Explain Michelson Morley experiments and give its importance.
25. State and explain Fourier theorem.
26. Derive an expression for energy density of a plane progressive wave.
27. Derive the time dependent Schrödinger equation, and discuss its role in Physics.
28. With suitable diagram, explain the working of electron microscope.

(5 × 2 = 10 weightage)

Section D

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

29. Derive mass energy relation and hence to arrive momentum energy relation.
30. Discuss the motion of particle under damped motion and obtain its differential equation. Write the probable solution and represent it graphically.
31. Solve the Schrödinger equation for a particle enclosed in a one dimensional rigid box of side L. Obtain its eigen values. Draw a graph of its first three eigen functions. Discuss the probability of finding the particle.

(2 × 4 = 8 weightage)