C 62706 (Pages : 3) Name

Reg. No. . . . . .

SECOND SEMESTER B.Sc. DEGREE EXAMINATION, MAY 2014

(UG-CCSS)

Complementary Course—Physics

PH 2C 03—MECHANICS, RELATIVITY WAVES AND OSCILLATIONS

Time : Three Hours Maximum : 30 Weightage

I. Answer all *twelve* questions, each question carries ¼ weightage :

1 The meson has a speed 0.8 c relative to ground. If its time of flight in its frame is 2×10^{-8} sec, how far the meson travels relative to ground ?

(a) 2m (b) 4m.

(c) 6m (d) 8m.

2 At what velocity along its length will a rod contract 50% :

(a) c/2. (b) $\frac{c}{2}$

(c) $\frac{c}{4}$ (d) $\frac{}{5}$

3 Energy mass relation is :

(a) $E = mc$. (b) $E = p^2 c$.

'c) $E = mc^{\frown}$. (d) $E = mc^3$.

4 Two particles are travelling in opposite direction s with speed 0.9 *c* relative to the laboratory. Their relative speed is

(a) O . 0 948 c. (b) Zero.

(c) c. (d) 0.995 c.

5 The momentum energy relation is :

(a) $E = p\ 1\ m$. (b) $E\ p^2/m$.

(c) $E = p^2/2m$. (d) $E = p/2m$.

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6 A particle executing SHM has amplitude 0.6 m. The time taken by particle in covering a distance 0.3m from mean position, if time period is 3.14 s is :

(a) 2.6 s. (b) 0.26 s.

(c) 6.2 s. (d) 0.62s.

7 The amplitude of a damped oscillator becomes ½ after t second. If the amplitude becomes (1 / x) after 3 t second, then x is equal to

(a) 0.8 (b) 8.

(c) 0.4 (d) 4.

8 The relation between driving frequency f_d and natural frequency f is :

(a) $f_d = f$ (b) $f_d =$

(c) $f_d =$ (d) $f_d =$

9 Friction is ——— force.

10 TEM stands for ———

11 The expression for energy density is ———

12 According to Schrodinger a particle is equivalent to a :

(a) Single wave. (b) Wave packet.

(c) Light wave. (d) Cannot behave as wave.

(12 x = 3 weightage)

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

13 What is Coriolis force ?

14 Explain the difference between inertial frame and non inertial frame.

15 Explain the potential energy curve.

16 Explain the significance of mass energy relation.

17 Define Simple Harmonic Motion.

18 What do you meant by energy density ?

19 Explain the expression for time period of a loaded spring.

'own an expression for equation of plane progressive wave and explain each term.

s the principle of Electron Microscope.

(9 x 1 = 9 weightage)

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II Answer any *five* questions, each question carries 2 weightage :

22 Show that mass of the particle moving with 415th the speed of light will appear as 5/3 times its rest mass.

23 Distinguish between centrifugal force and Coriolis force with suitable example.

24 With suitable example explain motion of a body under central force.

25 Obtain the period of oscillation of a simple pendulum.

26 State and explain Fourier theorem.

27 What are the postulates of quantum mechanics ?

28 With suitable example explain Eigen value and Eigen function.

(5 x 2 = 10 weightage)

IV. Answer any *two,* each question carries 4 weightage :

29 Derive the Galilean transformation equation and explain its invariance.

30 What are the postulates of special theory of relativity and explain the significance of Michelson Morley experiment.

31 Derive Time dependent Schrodinger equation of matter waves. Give the physical interpretation of the wave function.

(2 x 4 = 8 weightage)