विद्या सर्वार्थि साधिका

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PERIODIC TEST -1

Class : XI

Subject: Physics MM : 30

Date : 03-08-2022 Time: 1Hr. 30 min.

General Instructions:

1. There are 15 questions in this question paper. All questions are compulsory.
2. Q. No. 1 to 6 are objective type questions and carry 1 mark each.
3. Q. No. 7 to 11 are short answer questions and carry 2 mark each.
4. Q. No. 12 to 14 are also short answer questions and carry 3 marks each.
5. Q. No. 15 is long answer question and carry 5 marks.

1. When we add 0.9825 to 3.04, the correct result with regard to significant figure is _____. (1)

(A) 4.0225 (B) 4.022 (C) 4.02 (D) 4.0

2. The dimensions of physical quantity X in the equation, $Force = \frac{X}{Density}$ is _____. (1)

(A) $[M^2L^{-2}T^{-2}]$ (B) $[M^1L^2T^{-2}]$ (C) $[M^2L^2T^2]$ (D) $[M^1L^{-2}T^2]$

3. $\int_{0^0}^{30^0} cos\theta \, d\theta$ is equal to _____. (1)

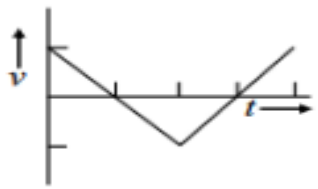
(A) $\frac{1}{2}$ (B) $-\frac{1}{2}$ (C) $\frac{\sqrt{3}}{2}$ (D) $-\frac{\sqrt{3}}{2}$

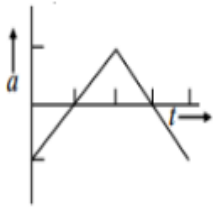
4. If the derivative of velocity 'v' with respect to time 't' is zero, ie $\frac{dv}{dt} = 0$, then the value of 'v' is _____. (1)

(A) variable (B) constant (C) infinity (D) zero

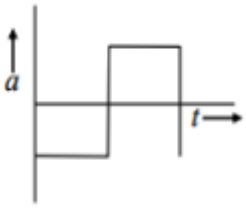
5. Assertion: Average velocity of a particle is equal to instantaneous velocity in the case of uniform motion. (1)
Reason: In uniform motion, displacement of the particle is directly proportional to the square of time elapsed.
(A) Both A and R are true, and R is the correct explanation of the assertion.
(B) Both A and R are true, but R is not the correct explanation of the assertion.
(C) A is true, but R is false.
(D) A is false, but R is true.

6. The graph shown beside is a velocity (v) versus time (t) graph for a body. Which of the following graph represents the corresponding acceleration versus time graph? (1)

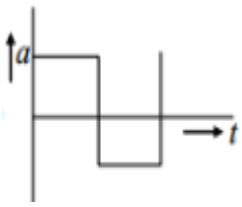




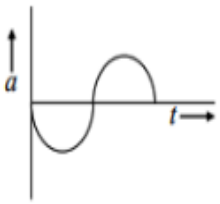
(A)



(B)



(C)



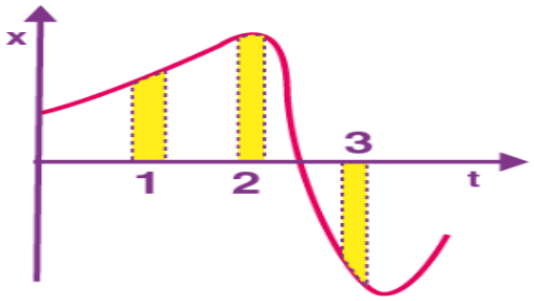
(D)

7. State the number of significant figures in the following: (2)
(a) 2.64 x 10^{24} kg
(b) 237.00 g cm^{-3}
(c) 6.032 Nm^{-2}
(d) 0.0006032 m^2

8. Draw position-time graphs for (a) positive acceleration and (b) negative acceleration. (2)

9. Out of the formulae (i) $y = a \sin \frac{2\pi t}{T}$ and (ii) $y = a \sin vt$ for the displacement y of a particle undergoing a certain periodic motion at any instant 't'. Rule out the wrong formula on basis of dimensions. (a is maximum displacement, v is speed of the particle and T is time period of the periodic motion). (2)

10. The figure gives the x-t plot of a particle in one-dimensional motion. Three different equal intervals of time are shown. In which interval the average speed is the greatest, and in which is it the least? Give the sign of average velocity for each interval. (2)



11. The position x of a particle varies with time t as $x = at^2 - bt$. Find the time when the velocity of the particle is zero. (2)

12. A U-tube of uniform cross-section contains mercury upto a height in either limb. The mercury in one limb is depressed a little and then released. By the method of dimensions, obtain an expression for the time period of oscillation assuming that T depends on the height of the mercury column h, density of mercury ρ and acceleration due to gravity g. (3)

13. A stone falls from a cliff and travels 25 m in the last second before it reaches the ground at the foot of the cliff. Find the height of the cliff. Take g = 10m/s^2. (3)

14. (a) Differentiate the following with respect to x. (i) $y = x$ and (ii) $y = \ln x$ (3)

(b) Evaluate $\int_R^\infty \frac{GMm}{x^2} dx$ where G, M and m are constants.

15. Draw a velocity – time graph of a uniformly accelerated motion starting from a non-zero initial velocity. Using the same velocity-time graph, derive the following equations of motion: (5)
$(i)\ v = u + at$ and $(ii)\ s = ut + \frac{1}{2}at^2$ where symbols have their usual meanings.