CLASS TEST

SECTION-I

Straight Objective Type **9 [3(-1)]Marks**

1. A ball is dropped from a height h from the floor. The velocity of the ball is halved and reversed after every impact. The total distance travelled by the ball will be

(A) $\frac{4h}{3}$ (B) 4h (C) $\frac{5h}{3}$ (D) infinite

2. A man in a balloon rising vertically starting from rest with an acceleration of 4.9 m/s^2 releases a ball 2 seconds after the balloon is let go from the ground. The greatest height above the ground reached by the ball is ($g = 9.8\ m/s^2$)

(A) 14.7 m (B) 19.6 m (C) 9.8 m (D) 24.5 m

3. A passenger who just missed the train stands on the platform, sadly watching the last two boggies of the train. The second last boggy takes time 3 sec. to pass by the passenger, and the last one takes time 2 sec. to pass by. How late is the passenger for the departure of the train? Assume that the train accelerates at constant rate

(A) 3/2 s (B) 7/2 s (C) 9/2 s (D) None of these

4. If velocity of a particle moving along a straight line changes with time as V(m/s) = 4 sin ($\pi/2$)t, its average velocity over time interval t = 0 to t = 2(2n – 1) sec, (n being any +ve integer) is

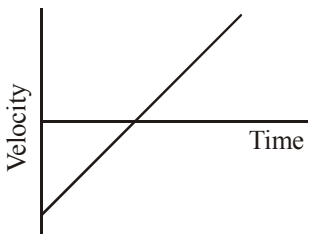
(A) $\frac{8}{\pi(2n-1)}$ m/s (B) $\frac{4}{\pi(2n-1)}$ m/s (C) Zero (D) $\frac{16(2n-1)}{\pi}$ m/s

5. A particle is moving in a straight line according to equation $x = \frac{t^3}{3} - \frac{5}{2}t^2 + 6t$. The time interval in which velocity i.e. instantaneous rate of change of position w.r.t. time is negative is

(A) $0 < t < 3$ (B) $0 < t < 2$

(C) $2 < t < 3$ (D) $t > 3$ and $t < 2$

6. The graph below shows the velocity with respect to time of an object moving in a straight line. The positive direction is to the right and the negative direction is to the left. Which of the following statements best describes the motion of this object?



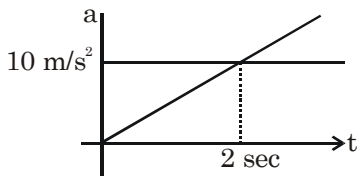
(A) The object starts at a location to the left of the origin and travels at a constant speed toward the right.

(B) The object starts at a location to the left of the origin at a slow speed and speeds up as it moves to the right.

(C) The object slows down as it moves to the left, stops, and starts moving to the right.

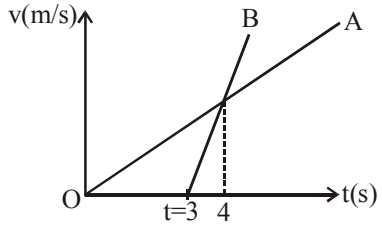
(D) The object slows down as it moves to the right, stops, and continues moving to the right.

7. Two object starts from rest and their acceleration is shown in figure. The time when their relative velocity is again zero is :-



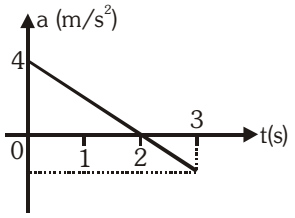
(A) 2 sec (B) 4 sec (C) 1 sec (D) 6 sec

8. v-t graph of two boys A and B starting from same point but at different time is given. Time when they cross each other, is :-



(A) 4 sec (B) 6 sec (C) 8 sec (D) 16 sec

9. The acceleration-time graph of a particle moving in x-axis with initial velocity $\vec{u} = -3\hat{i}$ m/s is given. The velocity of the particle at t = 3s is-



(A) $-\hat{i}$ m/s (B) $-2\hat{i}$ m/s (C) $\hat{i}$ m/s (D) Zero

Linked Comprehension Type (Single option correct) 2 Para × 3 Q. [3(–1)]

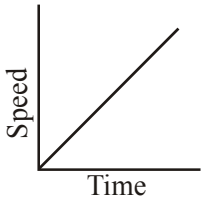
Paragraph for Question Nos. 10 to 12

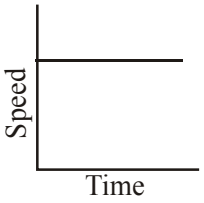
According to Aristotle, when an object is removed from its natural place, it possesses a tendency, to return to its place. Natural motion results from this tendency of an object to seek its natural place. Hence fire (or smoke), being naturally light, would rise, whereas rocks being naturally heavy, would fall. Furthermore, Aristotle asserted that any object, after it is released quickly reaches some final speed which it maintains to the end of its path. When we pick up a stone and release it, the stone strives to return to its natural place, the earth, and quickly gains a speed that it maintains during its entire fall.

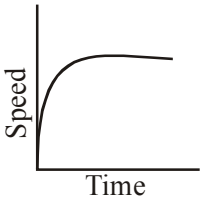
From the common observation that a heavy stone falls faster than a feather, Aristotle reasoned that mass is a factor that governs the speed of the fall. Consequently, the heavier an object, the greater would be its potential to return to the earth. In turn this stronger tendency would cause a greater speed of fall. Aristotle's description of motion agreed well with common observations of falling leaves, raindrops, and stones. In all cases, the body encounters resistance to its fall from the air.

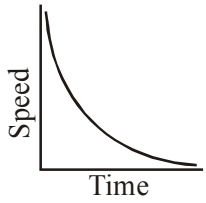
Galileo attempted to show that Aristotle's belief was logically inconsistent by the following argument. The m and M(m < M) together to form a double stone. Then, during fall, m should retard M, since it tends to fall more slowly, as it falls down individually. So the combination would fall faster than m but more slowly than M ; but according to Aristotle the double body (M + m) is heavier than M and hence should fall faster than M.

10. Which of the following graph of speed versus time correctly illustrates Aristotle's description of falling body motion ?

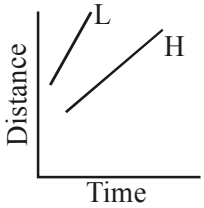
(A) 

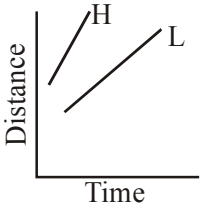
(B) 

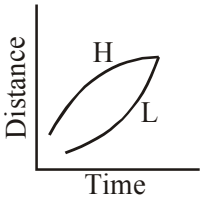
(C) 

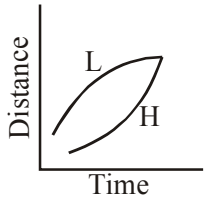
(D) 

11. Which of the following graphs, of distance fallen versus time for a heavy body H and light body L, at the end of path, would an Aristotelian construct ?

(A) 

(B) 

(C) 

(D) 

12. Choose correct option :

(A) According to Aristotle, all the bodies must take equal time in falling equal heights

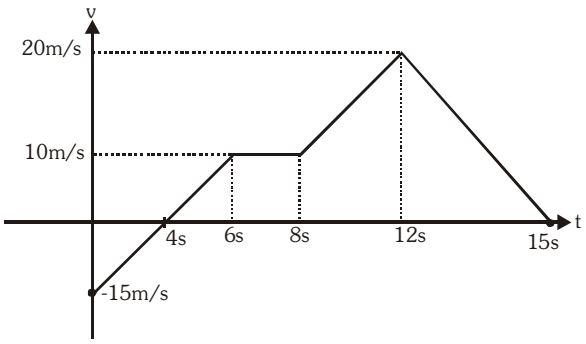
(B) According to Aristotle, falling of bodies towards earth is because of earth's attraction force

(C) According to Galileo, falling of bodies towards earth is because of earth's attraction force

(D) According to Aristotle, falling of bodies towards earth is a natural tendency of a body

Paragraph for Question 13 to 15

A moving particle is acted upon by three forces at different times to bring it to rest. Its velocity versus time graph is given below



13. The average speed for the first 6 s is

(A) zero (B) $\frac{5}{3}ms^{-1}$ (C) $\frac{10}{3}ms^{-1}$ (D) $\frac{20}{3}ms^{-1}$

14. The average velocity for the first 12s is

(A) zero (B) 5 m/s (C) $\frac{10}{3}$ m/s (D) 10 m/s

15. The average acceleration from t = 5s to t = 15 s is

(A) zero (B) –0.5 m/s^2 (C) +0.5 m/s^2 (D) 1 m/s^2

SECTION-II

Numerical Answer Type Question **1 Q. [3(0)]**

(upto second decimal place)

1. The position coordinate of a particle that is confined to move along a straight line is given by $x = 2t^3 - 24t + 6$ where x is measured from a convenient origin and t is in seconds. Determine the distance (in m) travelled by the particle during the interval from t = 1 sec to t = 4 sec.

SECTION-III

Numerical Grid Type (Ranging from 0 to 9) **2 Q. [4(-0)]**

1. Two identical pellet guns are fired simultaneously from the edge of a cliff. These guns impart as initial speed of 35.0 m/s to each pellet. Gun A is fired straight upward, with the pellet going up and falling back down, eventually hitting the ground beneath the cliff. Gun B is fired straight downward. In the absence of air resistance, how long after pellet B hits the ground does pellet A hit the ground? [g = 10 m/s^2]

2. An engineer works at a plant out-of-town. A car is sent for him from the plant every day that arrives at the railway station at the same time as the train he takes. One day the engineer arrived at the station 10 minutes before his usual time and, without waiting for the car, started walking to work. On his way he met the car and reached his plant 4 minutes before the usual time. How long (in minute) did the engineer walk before he met the car?

CLASS TEST # 03 **ANSWER KEY**

SECTION-I

Straight Objective Type **9 [3(-1)]Marks**

1. Ans. (B) **2. Ans. (A)** **3. Ans. (B)** **4. Ans. (A)**
5. Ans. (C) **6. Ans. (C)** **7. Ans. (B)** **8. Ans. (B)**
9. Ans. (D)

Linked Comprehension Type (Single option correct) **2 Para × 3 Q. [3(–1)]**

10. Ans. (C) **11. Ans. (B)** **12. Ans. (D)** **13. Ans. (D)**
14. Ans. (B) **15. Ans. (B)**

SECTION-II

Numerical Answer Type Question **1 Q. [3(0)]**
(upto second decimal place)

1. Ans. 74.00

SECTION-III

Numerical Grid Type (Ranging from 0 to 9) **2 Q. [4(-0)]**

1. Ans. 7 **2. Ans. 8**