

## Topic :- MOTION IN A STRAIGHT LINE

- A body starts from rest. What is the ratio of the distance travelled by the body during the 4th and 3rd second  
a)  $\frac{7}{5}$                       b)  $\frac{5}{7}$                       c)  $\frac{7}{3}$                       d)  $\frac{3}{7}$
- A boat crosses a river from port  $A$  to port  $B$ , which are just on the opposite side. The speed of the water is  $V_W$  and that of boat is  $V_B$  relative to still water. Assume  $V_B = 2V_W$ . What is the time taken by the boat, if It has to cross the river directly on the  $AB$  line  
a)  $\frac{2D}{V_B\sqrt{3}}$                       b)  $\frac{\sqrt{3}D}{2V_B}$                       c)  $\frac{D}{V_B\sqrt{2}}$                       d)  $\frac{D\sqrt{2}}{V_B}$
- Two cars  $A$  and  $B$  are travelling in the same direction with velocities  $v_1$  and  $v_2$  ( $v_1 > v_2$ ). When the car  $A$  is at a distance  $d$  behind the car  $B$ , the driver of the car  $A$  applies the brake producing uniform retardation,  $a$ . There will be no collision when  
a)  $d < \left(\frac{v_1 - v_2}{2a}\right)$                       b)  $d > \frac{v_1^2 - v_2^2}{2a}$                       c)  $d > \frac{(v_1 - v_2)^2}{2a}$                       d)  $d < \frac{v_1^2 - v_2^2}{2a}$
- A bird flies for 4 s with a velocity of  $|t - 2|$  m/s in a straight line, where  $t$  is time in seconds. It covers a distance of  
a) 2 m                      b) 4 m                      c) 6 m                      d) 8 m
- If a body loses half of its velocity on penetrating 3 cm in a wooden block, then how much will it penetrate more before coming to rest?  
a) 1 cm                      b) 2 cm                      c) 3 cm                      d) 4 cm
- A body, thrown upwards with some velocity, reaches the maximum height of 20m. Another body with double the mass thrown up, with double initial velocity will reach a maximum height of  
a) 200 m                      b) 16 m                      c) 80 m                      d) 40 m

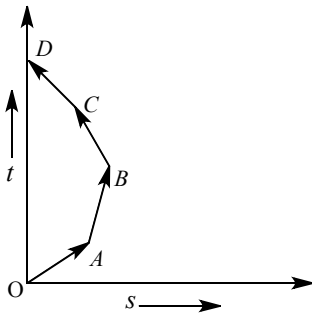
7. A bullet comes out of the barrel of gun of length 2m with a speed  $80 \text{ ms}^{-1}$ . The average acceleration of the bullet is
- a)  $1.6 \text{ ms}^{-2}$                       b)  $160 \text{ ms}^{-2}$                       c)  $1600 \text{ ms}^{-2}$                       d)  $16 \text{ ms}^{-2}$

8. The position of a particle moving along x-axis at certain times is given below:

$t(s)$	0	1	2	3
$x(m)$	-2	0	6	16

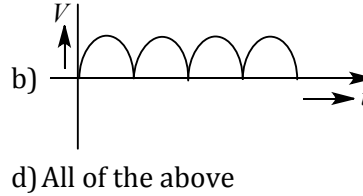
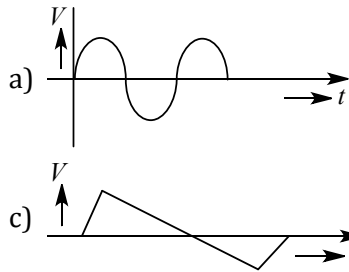
Which of the following describes the motion correctly

- a) Uniform accelerated  
 b) Uniform decelerated  
 c) Non-uniform accelerated  
 d) There is not enough data for generalization
9. Which of the following options is correct for the object having a straight line motion represented by the following graph?



- a) The object moves with constantly increasing velocity from  $O$  to  $A$  and then it moves with constant velocity.  
 b) Velocity of the object increases uniformly  
 c) Average velocity is zero  
 d) The graph shown is impossible
10. A body dropped from top of a tower fall through 60 m during the last two second of its fall. The height of tower is ( $g = 10 \text{ ms}^{-2}$ )
- a) 95 m                      b) 60 m                      c) 80 m                      d) 90 m
11. A stone is allowed to fall from the top of a tower 100m high and at the same time another stone is projected vertically upwards from the ground with a velocity of  $254 \text{ ms}^{-1}$ . The two stones will meet after
- a) 4 s                      b) 0.4 s                      c) 0.04 s                      d) 40 s
12. Speed of two identical cars  $u$  and  $4u$  at a specific instant. The ratio of the respective distances in which the two cars are stopped from that instant is
- a) 1:1                      b) 1:4                      c) 1:8                      d) 1:16

13. Which of the following speed-time graphs exist in the nature?



14. The motion of a particle along a straight line is described by equation :

$$x = 8 + 12t - t^3$$

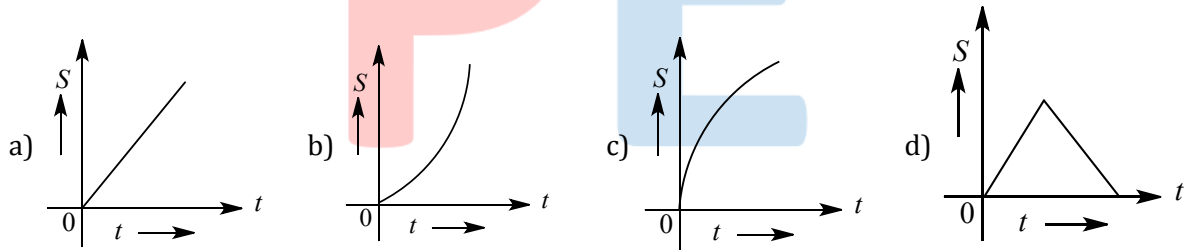
Where  $x$  is in metre and  $t$  in second. The retardation of the particle when its velocity becomes zero, is

- a)  $24\text{ms}^{-2}$                       b) Zero                      c)  $6\text{ms}^{-2}$                       d)  $12\text{ms}^{-2}$

15. If a train travelling at  $72\text{ kmph}$  is to be brought to rest in a distance of 200 metres, then its retardation should be

- a)  $20\text{ ms}^{-2}$                       b)  $10\text{ ms}^{-2}$                       c)  $2\text{ ms}^{-2}$                       d)  $1\text{ms}^{-2}$

16. From a high tower at time  $t = 0$ , one stone is dropped from rest and simultaneously another stone is projected vertically up with an initial velocity. The graph of the distance  $S$  between the two stones, before either hits the ground, plotted against time  $t$  will be as



17. Rain drops fall vertically at a speed of  $20\text{ms}^{-1}$ . At what angle do they fall on the wind screen of a car moving with a velocity of  $15\text{ms}^{-1}$ , if the wind screen is inclined at an angle of  $23^\circ$  to the vertical?

$$\left( \cot^{-1} \left[ \frac{4}{3} \right] \approx 36^\circ \right)$$

- a)  $60^\circ$                       b)  $30^\circ$                       c)  $45^\circ$                       d)  $90^\circ$

18. Two trains travelling on the same track are approaching each other with equal speeds of  $40\text{m s}^{-1}$ . The drivers of the trains begin to decelerate simultaneously when they are just 2 km apart. If the decelerations are both uniform and equal, then the value of deceleration to barely avoid collision should be

- a)  $0.8\text{ms}^{-2}$                       b)  $2.1\text{ ms}^{-2}$                       c)  $11.0\text{ ms}^{-2}$                       d)  $13.2\text{ ms}^{-2}$

19. A ball of mass  $m_1$  and another ball of mass  $m_2$  are dropped from equal height. If time taken by the balls are  $t_1$  and  $t_2$  respectively, then

a)  $t_1 = \frac{t_2}{2}$

b)  $t_1 = t_2$

c)  $t_1 = 4t_2$

d)  $t_1 = \frac{t_2}{4}$

20. A particle moves along a straight line  $OX$ . At a time  $t$  (in seconds) the distance  $x$  (in metres) of the particle from  $O$  is given by  $x = 40 + 12t - t^3$

How long would the particle travel before coming to rest

a) 24 m

b) 40 m

c) 56 m

d) 16 m

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