Rectilinear Motion

Exercise-3

Marked Questions can be used as Revision Questions.

PART - I : JEE (MAIN) / AIEEE PROBLEMS (PREVIOUS YEARS)

1.⊾	If a body loses half of it more before coming to (1) 1 cm	s velocity on penetrating rest? (2) 2 cm	3 cm in a wooden block, (3) 3 cm	then how much will it penetrate [AIEEE - 2002, 4/300] (D) 4 cm			
2.	From a building two balls A and B are thrown such that A is thrown upwards and B downwards (both vertically with same speed). If V_A and V_B are their respective velocities on reaching the ground, then [AIEEE - 2002, 4/300]						
	(1) v _B > v _A (3) v _A > v _B		(2) v _A =v _B (4) their velocities de	epends on their masses			
3.⊾	Speeds of two identical which the two cars are (1) 1 : 1	cars are u and 4u at a stopped at the same inst (2) 1 : 4	specific instant. The rati ant is : (3) 1 : 8	o of the respective distances at [AIEEE - 2002, 4/300] (4) 1 : 16			
4.	The coordinates of a moving particle at any time t are given by $x = \alpha t^3$ and $y = \beta t^3$. The speed oparticle at time t is given by : [AIEEE - 2003, 4]						
	(1) $\sqrt{\alpha^2 + \beta^2}$	(2) $3t^2\sqrt{\alpha^2+\beta^2}$	(3) $t^2 \sqrt{\alpha^2 + \beta^2}$	$(4) \sqrt{\alpha^2 + \beta^2}$			
5.	A car moving with a sp moving at a speed of 10 (1) 12 m	eed of 50 km/hr, can be 00 km/hr, the minimum s (2) 18 m	stopped by brakes after topping distance is : (3) 24 m	at least 6 m. if the same car is [AIEEE - 2003, 4/300] (4) 6 m			
6.¤	A ball is released from t is the position of the ba (1) h/9 metre from the g (3) 8h/9 metre from the	he top of a tower of heigh ll in T/3 seconds? ground ground	h metres. It takes T seconds to reach the ground. What [AIEEE - 2004, 4/300] (2) 7h/9 metre from the ground (4) 17h/9 metre from the ground				
7.ເ≧	An automobile travelling is going twice as fast, if (1) 20 m	g with a speed of 60 km/ e. 120 km/h, the stopping (2) 40 m	h, can brake to stop with distance will be (3) 60 m	in a distance of 20 m. If the car [AIEEE - 2004, 4/300] (4) 80 m			
A.A	The relation between tin is: (1) –2abv ²	me t and distance x is t = (2) 2bv ²	$ax^2 + bx$, where a and b (3) $-2av^3$	are constants. The acceleration [AIEEE 2005, 4.300] (4) 2av ³			
9.	A car, starting from rest, accelerates at the rate f through a distance S, then continues at constant spe						
	for time t and then decelerates at the rate $\frac{f}{2}$ to come to rest. If the total distance travelled is 15 S, then [AIEEE 2005, 4/300]						
	(1) S = ft	(2) S = $\frac{1}{6}$ ft ²	(3) S = $\frac{1}{72}$ ft ²	(4) S = $\frac{1}{4}$ ft ²			
10.	A particle is moving ea northwards. The average	stwards with a velocity of a cceleration in this time	of 5 ms ⁻¹ . In 10 second ne is :	the velocity changes to 5 ms ⁻¹ [AIEEE 2005, 4/300]			
	(1) $\sqrt{\frac{1}{\sqrt{2}}}$ ms ⁻² towards north-west		(2) $\frac{1}{2}$ ms ⁻² towards north				
	(3) zero		(4) $\frac{1}{2}$ ms ⁻² towards nort	h-west.			

Rectilinear Motion

14.

- A parachutist after bailing out falls 50 m without friction. When parachute opens, it decelerates at 2m/s². He reaches the ground with a speed of 3 m/s. At what height approximately, did he bail out?
 [AIEEE 2005, 4/300]
 - (1) 91 m (2) 182 m (3) 293 m (4) 111 m

12. A particle located at x = 0 at time t = 0, starts moving along the positive x-direction with a velocity v that varies as $v = \alpha \sqrt{x}$. The displacement of the particle varies with time as [AIEEE-2006, 3/180] (1) $t^{1/2}$ (2) t^3 (3) t^2 (4) t

- **13.** The velocity of a particle is $v = v_0 + gt + ft^2$. If its position is x = 0 at t = 0, then its displacement after unit time (t = 1) is [AIEEE 2007, 3/120]
 - (1) $v_0 + 2g + 3f$ (2) $v_0 + \frac{g}{2} + \frac{f}{3}$ (3) $v_0 + g + f$ (4) $v_0 + \frac{g}{2} + f$ An object moving with a speed of 6.25 m/s, is decelerated at a rate given by : $\frac{dv}{dt} = -2.5\sqrt{v}$ where v is the instantaneous speed. The time taken by the object, to come to rest, would be :

(1) 1 s (2) 2 s (3) 4 s (4) 8 s

A particle of mass m is at rest at the origin at time t = 0. It is subjected to a force F(t) = F⁰e^{-bt} in the x direction. Its speed v(t) is depicted by which of the following curves ? [AIEEE 2012; 4/120, -1]
 Force



- **16.** From a tower of height H, a particle is thrown vertically upwards with a speed u. The time taken by the particle, to hit the ground, is a n times that taken by it to reach the highest point of its path. The relation between H, u and n is : [JEE(Main)-2014; 4, -1] (1) 2 g H = n^2u^2 (2) g H = $(n - 2)^2u^2$ (3) 2 g H = $nu^2(n - 2)$ (4) g H = $(n - 2)u^2$
- A body is thrown vertically upwards. Which one of the following graphs correctly represent the velocity vs time ?
 [JEE(Main)-2017; 4/120, -1]



PART - II : JEE (ADVANCED) / IIT-JEE PROBLEMS (PREVIOUS YEARS)

* Marked Questions may have more than one correct option.

1. A block is moving down a smooth inclined plane starting from rest at time t = 0. Let Sⁿ be the distance

trave	elled by th	the block in the interval $t = n - 1$ to $t = r$	n. The ratio	S _{n+1} is	[JEE (Scr.), 2004, 3]
	2n – 1	2n – 1	2n + 1		2n
(A)	2n	(B) 2n+1 (C) 2n-1	(D) 2n-1

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