PHYSICS FORUM

PHYSICS

CLASS TEST

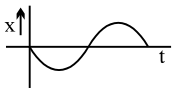
NEET / JEE - MAINS *M.M. - 60*

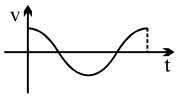
TIME: 1 Hour

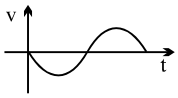
Instructions:

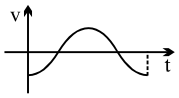
1. Attempt all questions.
2. Question number 1 - 15 are MCQ with one correct option only.
3. For each correct response +4 marks will be awarded, for each wrong choice -1 marks will be given.

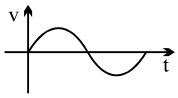
Q.1 If position time graph of a particle is sine curve as shown, what will be its velocity-time graph.



(A) 

(B) 

(C) 

(D) 

Q.2 If angular velocity of a disc depends on angle rotated θ as $\omega = \theta^2 + 2\theta$, then its angular acceleration α at $\theta = 1$ rad is :

(A) 8 rad/sec^2 (B) 10 rad/sec^2 (C) 12 rad/sec^2 (D) None

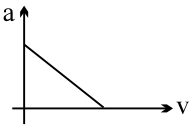
Q.3 If a particle takes t second less and acquires a velocity of v m s^{-1} more in falling through the same distance (starting from rest) on two planets where the accelerations due to gravity are 2 g and 8 g respectively then:

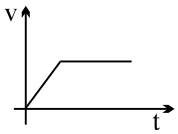
(A) $v = 2gt$ (B) $v = 4gt$ (C) $v = 5\ gt$ (D) $v = 16\ gt$

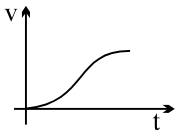
Q.4 A particle is projected from a horizontal plane (x-z plane) such that its velocity vector at time t is given by $\vec{V} = a\hat{i} + (b - ct)\hat{j}$. Its range on the horizontal plane is given by

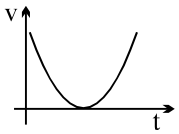
(A) $\frac{ba}{c}$ (B) $\frac{2ba}{c}$ (C) $\frac{3ba}{c}$ (D) None

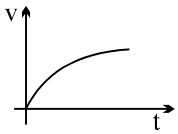
Q.5 Acceleration versus velocity graph of a particle moving in a straight line starting from rest is as shown in figure. The corresponding velocity-time graph would be



(A) 

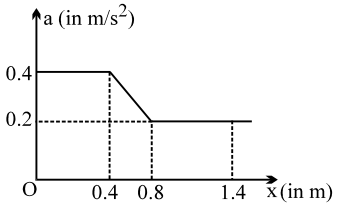
(B) 

(C) 

(D) 

Q.6 The acceleration of a particle which moves along the positive x-axis varies with its position as shown. If the velocity of the particle is 0.8 m/s at $x = 0$, the velocity of the particle at $x = 1.4$ is (in m/s)

(A) 1.6 (B) 1.2
(C) 1.4 (D) none of these



Q.7 A ball is projected from top of a tower with a velocity of 5 m/s at an angle of 53^0 to horizontal. Its speed when it is at a height of 0.45 m from the point of projection is :

(A) 2 m/s (B) 3 m/s (C) 4 m/s (D) data insufficient.

Q.8 Average velocity of a particle is projectile motion between its starting point and the highest point of its trajectory is : (projection speed = u, angle of projection from horizontal= θ)

(A) $u\cos\theta$ (B) $\frac{u}{2}\sqrt{1+3\cos^2\theta}$ (C) $\frac{u}{2}\sqrt{2+\cos^2\theta}$ (D) $\frac{u}{2}\sqrt{1+\cos^2\theta}$

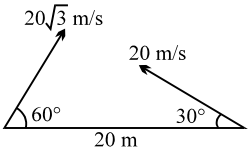
Q.9 Particle is dropped from the height of 20 m from horizontal ground. There is wind blowing due to which horizontal acceleration of the particle becomes 6 ms^{-2}. Find the horizontal displacement of the particle till it reaches ground.

(A) 6 m (B) 10 m (C) 12 m (D) 24 m

Q.10 A projectile is fired with a speed u at an angle θ with the horizontal. Its speed when its direction of motion makes an angle 'α' with the horizontal is

(A) $u\sec\theta\cos\alpha$ (B) $u\sec\theta\sin\alpha$ (C) $u\cos\theta\sec\alpha$ (D) $u\sin\theta\sec\alpha$

Q.11 In the figure shown, the two projectiles are fired simultaneously. The minimum distance between them during their flight is



(A) 20 m (B) $10\sqrt{3}$ m (C) 10 m (D) None

Q.12 A swimmer swims in still water at a speed = 5 km/hr. He enters a 200 m wide river, having river flow speed = 4 km/hr at point A and proceeds to swim at an angle of 127° (sin 37° = 0.6) with the river flow direction. Another point B is located directly across A on the other side. The swimmer lands on the other bank at a point C, from which he walks the distance CB with a speed = 3 km/hr. The total time in which he reachrs from A to B is

(A) 5 minutes (B) 4 minutes (C) 3 minutes (D) None

Q.13 Wind is blowing in the north direction at speed of 2 m/s which causes the rain to fall at some angle with the vertical. With what velocity should a cyclist drive so that the rain appears vertical to him :

(A) 2 m/s south (B) 2 m/s north (C) 4 m/s west (D) 4 m/s south

Q.14 A flag is mounted on a car moving due North with velocity of 20 km/hr. Strong winds are blowing due East with velocity of 20 km/hr. The flag will point in direction

(A) East (B) North - East (C) South - East (D) South - West

Q.15 A particle moves along an arc of a circle of radius R. Its velocity depends on the distance covered s as $v = a\sqrt{s}$, where a is a constant then the angle α between the vector of the total acceleration and the vector of velocity as a function of s will be

(A) $\tan\alpha = \frac{R}{2s}$ (B) $\tan\alpha = \frac{2s}{R}$ (C) $\tan\alpha = \frac{2R}{s}$ (D) $\tan\alpha = \frac{s}{2R}$

ANSWER KEY

ONLY ONE OPTION IS CORRECT.

Q.1	C	Q.2	C	Q.3	B	Q.4	B	Q.5	D
Q.6	B	Q.7	C	Q.8	B	Q.9	C	Q.10	C
Q.11	C	Q.12	B	Q.13	B	Q.14	C	Q.15	B