CLASS TEST

SECTION-I

Single Correct Answer Type   **3 Q. [3 M (–1)]**

1. A juggler projects a ball upward in a room of height $H = 20m$. Ball's projection speed was such that it can just reach the ceiling. Now the ball is projected with two times of the previous velocity. After what time interval in second does this ball return to hand of juggler. Assume collision with roof results in reversal in direction of velocity with no change in magnitude.
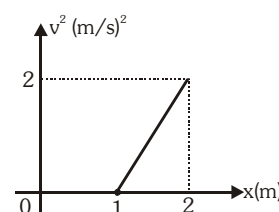
    (A) $8 - 4\sqrt{3}$ (B) $8 + 4\sqrt{3}$ (C) $4 - 2\sqrt{3}$ (D) $4 + 2\sqrt{3}$

2. A projectile is thrown with a velocity of $10\sqrt{2}$ ms^{-1} at an angle of 45^0 with vertical. The interval between the moments when speed is $5\sqrt{5}$ ms^{-1} : (Take g = 10 ms^{-2})

    (A) 1.5 s   (B) 0.5 s   (C) 1.0 s   (D) 2.0 s

3. The v^2–x graph is given for a particle undergoing a straight line motion. The acceleration of the particle after x = 1m :
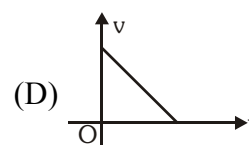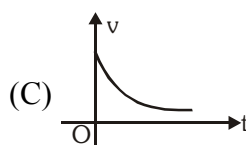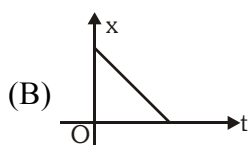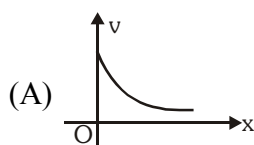
    (A) $2\hat{i}$ m/s^2

    (B) $1\hat{i}$ m/s^2

    (C) $-\dfrac{1}{2}\hat{i}$ m/s^2

    (D) $\dfrac{3}{2}\hat{i}$ m/s^2
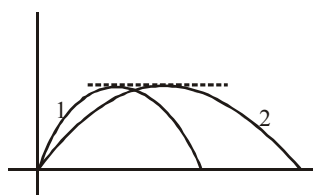

Multiple Correct Answer Type   **5 Q. [4 M (–1)]**

4. A motor car moves in a straight track with a retardation kv^2 where k is positive constant. Its initial velocity is v_0 at origin. Then, which of the following graphs is/are correct?
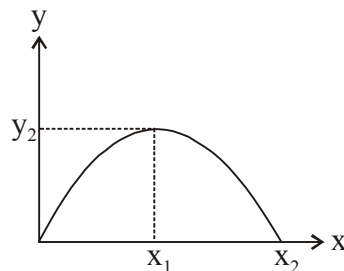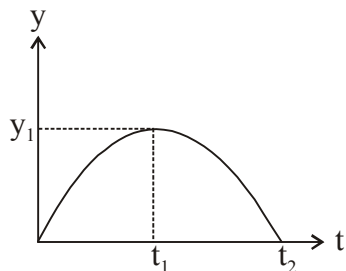

5. Trajectories of two stones projected from level ground is shown. Let T_1 ,T_2 be their time of flights and u_1, u_2 their speeds of projection then.

    (A) $T_2 > T_1$ (B) $u_2 > u_1$ (C) $T_2 = T_1$ (D) $u_2 = u_1$

6. $y - t$ graph of a projectile parabola is drawn in figure 1 and it's path is drawn in figure 2. (y vertical up, x horizontal).

(A) $y_1 = y_2$ (B) $t_1 = 2t_2$ (C) $x_2 = 2x_1$ (D) $\dfrac{x_1}{x_2} = \dfrac{t_1}{t_2}$

7. Two particles are projected from a horizontal plane with the same initial velocity v_0 at two different angles of projection θ_1 and θ_2, such that their ranges are the same. The ratio of their maximum heights reached is

(A) $\tan^2\theta_1$ (B) $\cot^2\theta_2$ (C) $\sin^2\theta_1 \csc^2\theta_2$ (D) $\sin^2\theta_1 \cos^2\theta_2$

8. A particle is projected from a point O with a velocity u at an angle α (upwards) to the horizontal. At a certain point P it moves at right angles to its initial direction. It follows that :

(A) OP makes an angle $\tan^{-1}(u/2g)$ to the horizontal

(B) the distance of P from O is $u/(2g \sin\alpha)$

(C) the time of flight from O to P is $u/(g \sin\alpha)$

(D) the velocity of the particle at P is $u \cot\alpha$

Linked Comprehension Type   **(2 Para × 3Q.)**   **[3 M (-1)]**
(Single Correct Answer Type)

Paragraph for Question No. 9 to 11

Speed of a platform is decreasing uniformly at rate 2 m/s². When its velocity is 4 m/s upwards, a stone is thrown from the platform vertically upwards. The stone falls back on the platform after 4 s. Assume acceleration due to gravity 10 m/s².

9. Velocity of projection of the stone relative to the platform is

(A) 20 m/s   (B) 24 m/s   (C) 16 m/s   (D) 12 m/s

10. What maximum height the stone would reach during its flight (height is measured from the instant when stone was thrown)

(A) 20 m   (B) 24 m   (C) 16 m   (D) 12 m

11. What is the displacement of the stone relative to ground during its flight?

(A) zero   (B) 32 m   (C) 16 m   (D) 20 m

Paragraph for Question No. 12 to 14

Two Aeroplanes, P and Q, move with constant velocities 3 ms^{-1} and 6 ms^{-1} along two mutually perpendicular straight tracks toward the intersection point O. At the moment $t = 0$, the Aeroplanes P and Q were located at distances 10^5 mm and 2×10^4 cm respectively from the point O.

12. The distance between them at time t is :-

(A) $\sqrt{(200)^2 + (100)^2}$ m   (B) $\sqrt{(200 - 6t)^2 + (100 - 3t)^2}$ m

(C) $[(200 - 6t) + (100 - 3t)]$ m   (D) $\sqrt{(200 - 3t)^2 + (100 - 6t)^2}$ m

13. At which time the distance between them will be shortest?

(A) $\dfrac{100}{3}$ s   (B) $\dfrac{125}{3}$ s   (C) $\dfrac{250}{3}$ s   (D) 50 s

14. The shortest distance between them is :-

(A) $\dfrac{200\sqrt{5}}{3}$ m (B) $\dfrac{200\sqrt{3}}{5}$ m (C) $\dfrac{250}{3}$ m (D) None of these
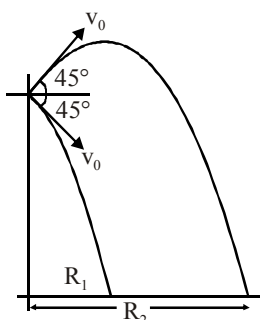
SECTION-II

Numerical Answer Type Question **2Q.[3(0)]**

(upto second decimal place)

1. Two balls are thrown from the top of a cliff of unknown height with equal initial speed $v_0 = 10$ m/s one is projected at an angle $\theta = 45°$ above horizontal and second is projected at the same angle below horizontal. What is difference between range (in m) of projectiles.

2. A projectile takes off with an initial velocity of 50 m/s at an angle of 37° with horizontal. It is just able to clear two hurdles of height 25 m each, separated from each other by a distance d (in m). Calculate d.

SECTION-III

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

1. A particle moves in xy plane according to scheme $x = -8 \sin \pi t$ and $y = -2 \cos 2\pi t$ where t is time in s and x and y are in m. Find minimum distance (in m) of particle from origin.

2. A projectile is thrown with some initial velocity u at an angle θ to the horizontal. Its speed when it is at the highest point is $\sqrt{\dfrac{2}{5}}$ times the speed v when it is at height half of the maximum height. Then ratio
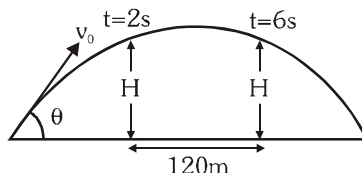
$\dfrac{v}{u} = \sqrt{\dfrac{n}{8}}$. Find the value of n.

SECTION-IV

Matrix Match Type (4 × 5) **1 Q. [8 M (for each entry +2(0)]**

1. A projectile crosses two walls of equal heights symmetrically as shown.

	Column-I		Column-II
(A)	Velocity of projection	(P)	60
(B)	Height of each wall	(Q)	80
(C)	Maximum height of the projectile is	(R)	240
(D)	Range of the projectile	(S)	50
		(T)	300

CLASS TEST # 09	ANSWER KEY

SECTION-I

Single Correct Answer Type   **3 Q. [3 M (–1)]**

1. Ans. (A)   2. Ans. (C)   3. Ans. (B)

Multiple Correct Answer Type   **5 Q. [4 M (–1)]**

4. Ans. (A,C)   5. Ans. (B,C)   6. Ans. (A,C,D) 7. Ans. (A,B,C) 8. Ans. (C,D)

Linked Comprehension Type   **(2 Para × 3Q.)[3 M (-1)]**
(Single Correct Answer Type)

9. Ans. (C)   10. Ans. (A)   11. Ans. (A)   12. Ans. (B)   13. Ans. (A)   14. Ans. (D)

SECTION-II

Numerical Answer Type Question (upto second decimal place)   **2Q.[3(0)]**

1. Ans. 10.00   2. Ans. 160.00

SECTION-III

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

1. Ans. 2   2. Ans. 5

SECTION-IV

Matrix Match Type (4 × 5)   **1 Q. [8 M (for each entry +2(0)]**

1. Ans. (A) → (S) ; (B) → (P) ; (C) → (Q) ; (D) → (R)