CLASS TEST

SECTION-I

Multiple Correct Answer Type **5 Q. [Marks 4 (0)]**

1. Equation of path of a particle moving in x-y plane is given by $y = 10x - 2x^2$ for the given particle select correct statement. Assume acceleration of gravity as 10 m/s^2 in negative y-direction :-

(A) Maximum height of the particle is 12.5 m.

(B) Range of the particle shown is x = 5.

(C) At x = 2.25 particle is moving at an angle of 45° with x-axis.

(D) Initially particle is projected at an angle of 53°.

2. A particle is moving in x-y plane and equation of its path is given by $y = x^3 + 2x^2 + 5x + 3$. At t = 0 particle is located at x = 0. Consider the case for $x \geq 0$, $y \geq 0$. Choose the **CORRECT** option(s):-

(A) Angle made by velocity vector of the particle at t = 0 is $\tan^{-1}(5)$ with x-axis.

(B) Particle will never cross the origin.

(C) Angle made by its velocity at x = 1m is $\tan^{-1}(4)$ with x-axis.

(D) If velocity of particle makes an angle θ with x-axis at point of projection, it will never make the same angle with x-axis during its motion.

3. A stone is projected with speed 'u' on an inclined plane inclined at an angle α with horizontal. It was found the stone strikes the incline perpendicularly. Initial velocity of projection was at an angle β with incline. Choose the **CORRECT** statement(s) :

(A) If u is doubled, angle at which stone strikes the incline remains same.

(B) The stone was projected up the incline.

(C) If angle of projection is changed keeping angle of incline same, still the stone can strike the incline perpendicularly by adjusting speed of projection

(D) Range of stone on the incline is $\frac{2u^2 \sin\beta}{g\cos^2\alpha}\cos(\alpha+\beta)$.

4. A particle is projected with a speed of 50 m/s at an angle of 37° with the horizontal from the top of a tower. Then select the **CORRECT** statement(s) :-

(A) Equation of trajectory of a particle is $y = \frac{3}{4}x - \frac{x^2}{320}$, if origin is taken at the point of projection.

(B) Paticle moves perpendicular to initial direction at $\frac{25}{3}$ sec

(C) Minimum speed of particle in subsequent motion is zero

(D) Maximum height attained by the particle from the point of projection is 45 m

5. Two shells are fired by guns facing each other from points A and B simultaneously in the same vertical plane with velocities 60 m/s at 30° above the horizontal and 50 m/s respectively. The points A and B are 100 m apart on horizontal ground. If both the shells hit each other, find the angel of projection at point B and time when they collide.

(A) 37° (B) 53° (C) $\left(\frac{20}{2-3\sqrt{3}}\right)$s (D) $\left(\frac{10}{4+3\sqrt{3}}\right)$s

Linked Comprehension Type (1 Para × 5Q.) (2 Para × 3 Q.) [Marks 3 (–1)]

Paragraph for Question No. 6 to 10

A projectile is observed moving with velocity $\vec{v} = (30\hat{i} - 10\hat{j})$ m/s after 5 s of its projection from the ground. On the basis of above information find the following.

6. The velocity of projection is

(A) $(30\hat{i} - 40\hat{j})$ m/s (B) $(30\hat{i} + 40\hat{j})$ m/s (C) $(30\hat{i} + 10\hat{j})$ m/s (D) None of these

7. The time of flight of the projectile is

(A) 8 sec (B) 4 sec (C) 2 sec (D) 1 sec

8. The maximum height attained by the projectile is

(A) 40 m (B) 100 m (C) 20 m (D) 80 m

9. The horizontal range of the projectile is

(A) 100 m (B) 180 m (C)120 (D) 240m

10. The equation of trajectory of the projectile is

(A) $y = \frac{4}{8}x\left(1 - \frac{x}{240}\right)$ (B) $y = \frac{4}{3}x\left(1 - \frac{x}{240}\right)$ (C) $y = \frac{4}{3}x\left(1 - \frac{x^2}{120}\right)$ (D) $y = \frac{16}{3}x\left(1 - \frac{x^2}{120}\right)$

Paragraph for Question No. 11 to 13

Two projectiles following the same trajectory are found to be 8 m apart at the same horizontal level 2 s after the second was projected. If both projectiles were projected with the same initial horizontal velocity of 4 m/s from the same point.

11. The time of flight will be :

(A) 5 sec (B) 4 sec (C) 6 sec (D) 8 sec

12. What will be the range of the path

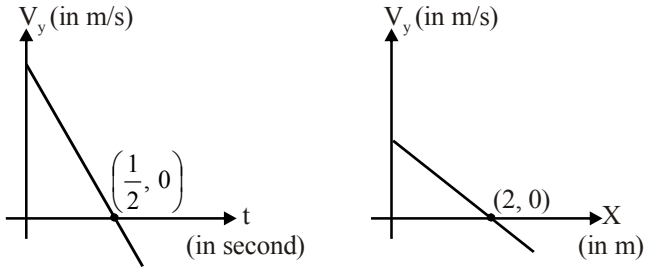
(A) 24 m (B) 10 m (C) 12 m (D) 45 m

13. The maximum height will be

(A) 80m (B) 24 m (C) 45 m (D) 10 m

Paragraph for Question No. 14 to 16

Two graphs of the same projectile motion (in the xy-plane) projected from origin are shown. x-axis is along horizontal direction and y-axis is vertically upwards. Take g = 10 m/s^2.



14. The projection speed is :

(A) $\sqrt{37}$ m/sec (B) $\sqrt{41}$ m/sec (C) $\sqrt{14}$ m/sec (D) $\sqrt{40}$ m/sec

15. Projection angle with the horizontal is :

(A) $\tan^{-1}\left(\frac{4}{5}\right)$ (B) $\tan^{-1}\left(\frac{2}{3}\right)$ (C) $\tan^{-1}\left(\frac{5}{4}\right)$ (D) $\tan^{-1}\left(\frac{1}{2}\right)$

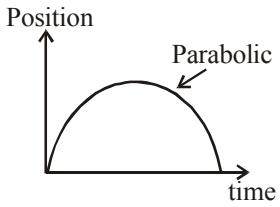
16. Maximum height attained from point of projection is :

(A) 1.25 m (B) 12.5 m (C) 2.25 m (D) None of these

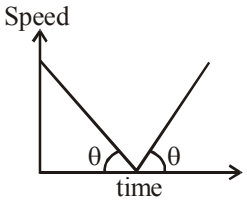
SECTION-IV

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

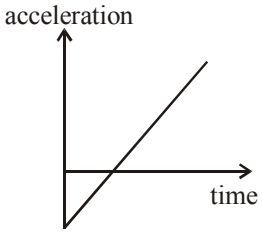
1. **Column-I** **Column-II**

(A) 

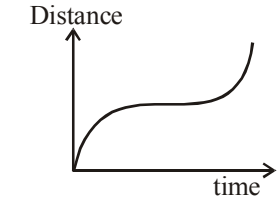
(P) Particle must change its direction during the subsequent motion

(B) 

(Q) Particle may return to its initial position during subsequent motion

(C) 

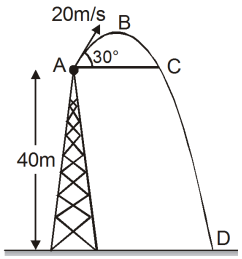
(R) Acceleration vector of a particle must be constant throughout the motion

(D) 

(S) Particle come to rest at least once during its motion

(T) Initial velocity of particle is zero.

2. A projectile is fired from top of a 40 m high tower with velocity 20 m/s at an angle of 30° with the horizontal (see figure). $g = 10\ m/s^2$.



	Column I		**Column II**
(A)	Ratio of time taken from A to D with time taken from A to C is equal to	(P)	1
(B)	Ratio of vertical distance travelled from A to D with the maximum height from ground is less than.	(Q)	2
(C)	Ratio of final speed at D with the initial speed at A is less than	(R)	3
(D)	Ratio of horizontal displacement from A to D with height of tower is greater than	(S)	4
		(T)	5

CLASS TEST # 13 **ANSWER KEY**

SECTION-I

Multiple Correct Answer Type **5 Q. [Marks 4 (0)]**

1. Ans. (A,B,C) **2. Ans. (A,B,D)** **3. Ans. (A,B,D)** **4. Ans. (A,B,D)**

5. Ans. (A,D)

Linked Comprehension Type **(1 Para × 5Q.) (2 Para × 3 Q.) [Marks 3 (–1)]**

6. Ans. (B) **7. Ans. (A)** **8. Ans. (D)** **9. Ans. (D)**

10. Ans. (B) **11. Ans. (C)** **12. Ans. (A)** **13. Ans. (C)**

14. Ans. (B) **15. Ans. (C)** **16. Ans. (A)**

SECTION-IV

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

1. Ans. A - P,Q,R,S; B - Q,S; C - Q; D - Q,S **2. Ans. (A)-Q, (B)-Q,R,S,T (C)-Q,R,S,T (D)-P**