DPP No.: A18 (JEE-MAIN)

Total Marks : 60	Max. Time: 40 min.		
Single choice Objective ('-1' negative marking) Q.1 to Q.20	(3 marks 2 min.)	[60, 40]	

- 1. A particle is projected up the incline such that its component of velocity along the incline is 10 m/s. Time of flight is 2 sec and maximum height above the incline is 5 m. Then velocity of projection will be:
 - (A) 10 m/s
- (B) $10\sqrt{2}$ m/s
- (C) $5\sqrt{5}$ m/s
- (D) none of these
- A pebble is thrown horizontally from the top of a 20 m high tower with an initial velocity of 10 m/s. The 2. air drag is negligible. The speed of the pebble when it is at the same distance from top as well as base of the tower $(g = 10 \text{ m/s}^2)$
 - (A) $10\sqrt{2}$ m/s
- (B) $10\sqrt{3}$ m/s
- (C) 20 m/s
- (D) 25 m/s
- 3. A ball is projected with velocity u at right angle to the slope which is inclined at an angle α with the horizontal. The distance 'x' along the inclined plane that it will travel before striking the slope is -
 - (A) $\frac{2u^2}{g}\cos\alpha$
- (B) $\frac{2u^2}{g} \tan \alpha$ (C) $\frac{2u^2}{g} \frac{\tan \alpha}{\cos \alpha}$ (D) $\frac{2u^2}{g} \frac{\tan \alpha}{\sin \alpha}$
- A stone projected at angle '0' with horizontal from the roof of a tall building falls on the ground after 4. three second. Two second after the projection it was again at the level of projection. Then the height of the building, is $(g = 10m/s^2)$ -
 - (A) 5 m
- (B) 25 m
- (C) 20 m
- (D) 15 m

5.> A particle P is projected from a point on the surface of long smooth inclined plane (see figure). Simultaneously another particle Q is released on the smooth inclined plane from the same position. P and Q collide after t = 4 second. The speed of projection of P is:

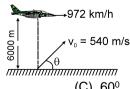


- (A) 5 m/s
- (B) 10 m/s
- (C) 15 m/s
- (D) 20 m/s
- 6. A ball is thrown from bottom of an incline plane at an angle α from the inclined surface up the plane. Another ball is thrown from a point on the inclined plane with same speed and at same angle α from the inclined surface down the plane. If in the two cases, maximum height attained by the balls with respect to the inclined surface during projectile motion are h₁ and h₂ then:
 - (A) $h_1 > h_2$

(B) $h_1 < h_2$

(C) $h_1 = h_2$

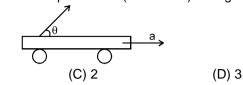
- (D) All the three can be possible
- 7. Three particles, A, B and C are projected from ground from the same point with same initial speeds making angles 30°, 45° and 60° respectively with the horizontal. Which of the following statement is correct-
 - (A) A, B and C have unequal ranges
 - (B) Ranges of A and C are equal and less than that of B
 - (C) Ranges of A and C are equal and greater than that of B
 - (D) A, B and C have equal ranges
- 8. A particle is projected from a point on ground with initial speed of 10 m/sec at an angle of 37° with the horizontal. At the same instant a fly starts flying on the same path of particle with constant speed of 10 m/s Then:
 - (A) time taken by fly to complete whole path is less then time taken by particle
 - (B) acceleration of fly is zero
 - (C) average velocity of both are same for whole journey
 - (D) None of these
- 9. A ball is thrown upward at an angle 30° to the horizontal and lands on the top edge of a building that is 20 m away and 5m high. How fast was the ball thrown ($g = 10 \text{m/s}^2$).
 - (A) 10 m/s
- (B) 20 m/s
- (C) 40 m/s
- (D) 80 m/s
- 10. A particle starts from the origin at t = 0 and moves in the x-y plane with constant acceleration a in the y direction. Its equation of motion is $y = bx^2$. The x component of its velocity is :
 - (A) variable
- (B) $\sqrt{\frac{2a}{b}}$
- (C) $\frac{a}{2b}$
- 11. An aircraft moving with a speed of 972 km/h is at a height of 6000 m, just overhead of an anti-aircraft gun. If the muzzle velocity of the gun is 540 m/s, the firing angle θ for the bullet to hit the aircraft should be:



- $(A) 73^{0}$
- (B) 30⁰
- $(C) 60^{\circ}$
- (D) 45⁰

(A) 4

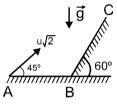
12. A platform is pulled with a constant acceleration a. A particle is projected from the platform at angle θ with the horizontal with respect to the platform as shown in the figure. The value of $\tan \theta$ such that particle again come to the starting point on the platform is (a = 5 m/s²): use g = 10 m/s²



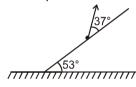
- 13. The vertical height of the projectile at time t is given by $y = 4t 5t^2$ and the horizontal distance covered is given by x = 3t. What is the angle of projection with the horizontal?
 - (A) tan-1 3/5
- (B) tan-1 4/5

(B) 6

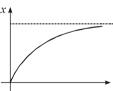
- (C) tan-1 4/3
- (D) tan-1 3/4
- 14. A particle is projected from point 'A' with velocity $u\sqrt{2}$ at an angle of 45° with the horizontal as shown in the figure. It strikes the inclined plane BC at right angle. The velocity of the particle just before the collision with the inclined is:



- (A) $\frac{\sqrt{3}}{2}$
- (B) $\frac{u}{2}$
- (C) $\frac{2u}{\sqrt{3}}$
- (D) u
- 15. A particle is projected from the inclined plane at angle 37° with the inclined plane in upward direction with speed 10 m/s. The angle of inclined plane with horizontal is 53°. Then the maximum height attained by the particle from the incline plane will be-

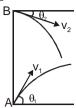


- (A) 3m
- (B) 4 m
- (C) 5 m
- (D) zero
- 16. Variation of displacement *x* of a particle moving on a straight line with time *t* is shown in following figure. The figure indicates:

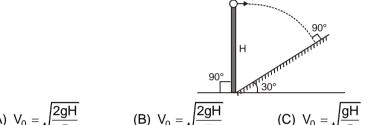


- (A) the particle starts with a certain speed but the motion is retarded
- (B) the velocity of particle is constant throughout motion
- (C) the acceleration of the particle is constant throughout motion
- (D) the particle starts with certain speed and moves with increasing speed.
- 17. A body dropped from the top of a tower covers 7/16 of the total height in the last second of its fall. The time of fall is
 - (A) 2 sec
- (B) 4 sec
- (C) 1 sec
- (D) $\left(\frac{50}{7}\right)$ sec

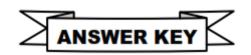
18. Two balls are projected from points A and B in vertical plane as shown in Fig. AB is a straight vertical line. The balls can collide in mid air if v_1/v_2 is equal to :



- In fig. the angle of inclination of the inclined plane is 30°. Find the horizontal velocity V₀ so that the 19.> particle hits the inclined plane perpendicularly.



- 20. A train is standing on a platform, a man inside a compartment of a train drops a stone. At the same instant train starts to move with constant acceleration. The path of the particle as seen by the person who drops the stone is:
 - (A) parabola
 - (B) straight line for sometime & parabola for the remaining time
 - (C) straight line
 - (D) variable path that cannot be defined



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1. (B) 2. (B) 3. (C) 4. (D) 5. (B) (C) 7. (B) 6. 8. (C) (C) (A) 9. (B) 10. (D) 11. 12. (C) 14. 13. (C) 15. 17. (D) (A) (A) (B) (A) 20. (C) 16. 18. 19.