CBSE

MOTION IN A PLANE WS 12

Class 11 - Physics

Section A

1. A ball is thrown upwards with an initial velocity of 10 m s^{-1}. Determine the maximum height reached above the thrower's hand. **[1]**

   a) 5.25 m
   b) 5.23 m
   c) 5.43 m
   d) 5.10 m

2. A particle moves in a plane with a constant acceleration in a direction different from the initial velocity. The path of the particle is a/an: **[1]**

   a) ellipse
   b) straight line
   c) arc of a circle
   d) parabola

3. The direction of the angular velocity vector is along **[1]**

   a) the tangent to the circular path
   b) the outward radius
   c) the axis of rotation
   d) the inward radius

4. As a ball rises, the vertical component of its velocity **[1]**

   a) Can't be determined
   b) Remains constant
   c) Increase
   d) Decrease

5. At time t = 0 a particle starts travelling from a height. $7\hat{z}$ cm in a plane keeping z coordinate constant. At any instant of time it's position along the $\hat{x}$ and $\hat{y}$ directions are defined as 3t and $5t^3$ respectively. At t = 1s acceleration of the particle will be **[1]**

   a) $3\hat{x}$ + $15\hat{y}$
   b) -$30\hat{y}$
   c) $30\hat{y}$
   d) $3\hat{x}$ + $15\hat{y}$ + $7\hat{z}$

6. **Assertion (A):** The value of a_x depends on $\frac{dv}{dt}$ **[1]**

   Reason (R): Acceleration means rate of change of velocity.

   a) Both A and R are true and R is the correct explanation of A.
   b) Both A and R are true but R is not the correct explanation of A.
   c) A is true but R is false.
   d) A is false but R is true.

7. **State True or False:** **[1]**

   (a) A stone is thrown vertically upwards and then it returns to the thrower. It is a projectile. **[1]**

8. The magnitude and direction of the acceleration of a body both are constant. Will the path of the body necessarily be a straight line? **[1]**

9. Acceleration is defined as the rate of change of velocity. Suppose we call the rate of change acceleration as SLAP, then what is the unit of SLAP? **[1]**

Section B

10. A particle starts from origin at t = 0 with a velocity $15\hat{i}$ m/s and moves in xy - plane under the action of a force which produces a constant acceleration of $15\hat{\mathbf{i}} + 10\hat{\mathbf{j}}$ m/s. Find the y - coordinate of the particle at an instant when its x coordinate is 125 m. **[2]**

Section C

11. An aeroplane is flying in a horizontal direction with a velocity of 600 km /h and at a height of 1960 m. When it is vertically above the point A on the ground, a body is dropped from it. The body strikes the ground at point B. Calculate the distance AB. **[3]**

12. A fighter plane flying horizontally at an altitude of 1.5 km with speed 720 km/h passes directly overhead an anti-aircraft gun. At what angle from the vertical should the gun be fired for the shell with muzzle speed 600 m s^{-1} to hit the plane? At what minimum altitude should the pilot fly the plane to avoid being hit? (Take g = 10 m s^{-2}). **[3]**

Section D

13. A particle starts from the origin at t = 0 s with a velocity of $10.0\hat{\mathrm{j}} m/s$ and moves in the x-y plane with a constant acceleration of $(8.0\hat{i} + 2.0\hat{j})ms^{-2}$. **[5]**

    a. At what time is the x-coordinate of the particle 16 m? What is the y-coordinate of the particle at that time?

    b. What is the speed of the particle at the time?