## CHAPTER = 2 KINEMATICS

## MULTIPLE CHOICE QUESTIONS ( BOOK 11)

1. To get a resultant displacement of 10 m, two displacement vectors of magnitude 6 m and 8 m should be combined:
   (a) Parallel (b) Antiparallel
   (c) At an angle of 45° **(d) Perpendicular to each other**

2. The velocity of a particle at an instant is 10 m/s and after 5 sec the velocity of particle is 20 m/s. The velocity 3 sec before in m/s is:
   (a) 8 **(b) 4** (c) 6 (d) 7

3. A ball is thrown upwards with a velocity of 100 m/s. It will reach the ground after:
   (a) 10 sec **(b) 20 sec** (c) 5 sec (d) 40 sec

4. Two projectiles are fired from the same point with the same speed at angles of projection 60° and 30° respectively. Which one of the following is true?
   **(a) The range will be same**
   (b) Their maximum height will be the same
   (c) Their landing velocity will be the same
   (d) Their time of flight will be the same

5. The ratio of numerical values of average velocity and average speed of a body is always:
   **(a) Unity** (b) Unity or less (c) Unity or more (d) Less than unity

6. If the average velocities of a body become equal to the instantaneous velocity, body is said to be moving with:
   **(a) Uniform acceleration** (b) Uniform velocity
   (c) Variable velocity (d) Variable acceleration

7. At the top of a trajectory of a projectile, the acceleration is:
   (a) maximum (b) minimum (c) zero **(d) g**

8. At what angle the range of the projectile becomes equal to the height of the projectile?
   (a) 65° (b) 45° **(c) 76°** (d) 30°

9. The angle at which the dot product becomes equal to the magnitude of cross product is:
   (a) 65° **(b) 45°** (c) 76° (d) 30°

10. If the dot product of two non-zero vectors vanishes; the vectors will be:
    (a) in the same direction (b) opposite direction to each other
    **(c) perpendicular to each other** (d) zero

## CHAPTER = 2 KINEMATICS

## EXAMS PRACTICE MULTIPLE CHOICE QUESTIONS

1. A rain-drop continues to fall with a uniform velocity when:
   **(a) Its weight is balanced by air friction**
   **(b)** Its weight is balanced by air friction and upthrust
   **(c)** Its weight is balanced by upthrust

2. A 1 kg stone when falling from a height of 10m, strikes the ground.
   **(a)** 10 m/s **(b) 14 m/s** **(c)** 98 m/s (d) 196 m/s

3. A body goes form 2 meter of 8 meter mark and back to 2 meter mark in 3 sec. Its average speed is:
   **(a)** 2m $sec^{-1}$ **(b)** 6m $sec^{-1}$ **(c) 4m $sec^{-1}$** (d) Zero

4. How much height does a freely falling body of mass 10 kg lose in 2 sec?
   **(a)** 9.8m **(b) 19.6m** **(c)** 49m (d) 4.9m

5 A car moves for 60s covering a distance of 3600m with zero initial velocity. What is the acceleration in $m/s^2$?
   **(a) 2** (b) 2.5 (c) 3 (d) 4.5

6 A ball is thrown up with an initial velocity of 20 m/s and after some time it returns. What is the maximum height reached? Take g = 10 $m/s^2$.
   (a) 80m **(b) 20m** (c) 70m (d) 40m

7 What is the formula for displacement?
   **(a) $s = ut + 0.5at^2$** (b) $s = ut - 0.5at^2$
   (b) $s = vt - 0.5at^2$ (d) $s = vt + 0.5at^2$

8 What is the maximum velocity of a particle that moves in a straight line and its position is defined by the equation $x = 6t^2 - t^3$ (where t is in seconds and x is in meters)?
   **(a) 12 m/s** (b) 6 m/s
   (c) 9 m/s (d) 3 m/s

9 Two trains of 40 m length are travelling in opposite directions with a velocity of 10 m/s and 15 m/s. What is the time of crossing?
   (a) 1s (b) 2.4 s
   (c) 3.2 s (d) 4.4 s
   Hint **[ Length of train L= 40-(-40) = 80 , v=15−(−10)=25m/s ]**

10 A particle is moving with a constant speed along a straight-line path. A force is not required to
   (a) change its direction (b) decrease its speed
   (c) keep it moving with uniform velocity
   (d) Increase its momentum

11 If a particle has negative velocity and negative acceleration, its speed

**(a) increases** (b) decreases

(c) remains same (d) zero

12 If an object is dropped from the top of a building and it reaches the ground at t = 4 s , then the height of the building is (ignoring air resistance) (g = 9.8 $ms^{-2}$)

(a) 77.3 m **(b) 78.4 m**

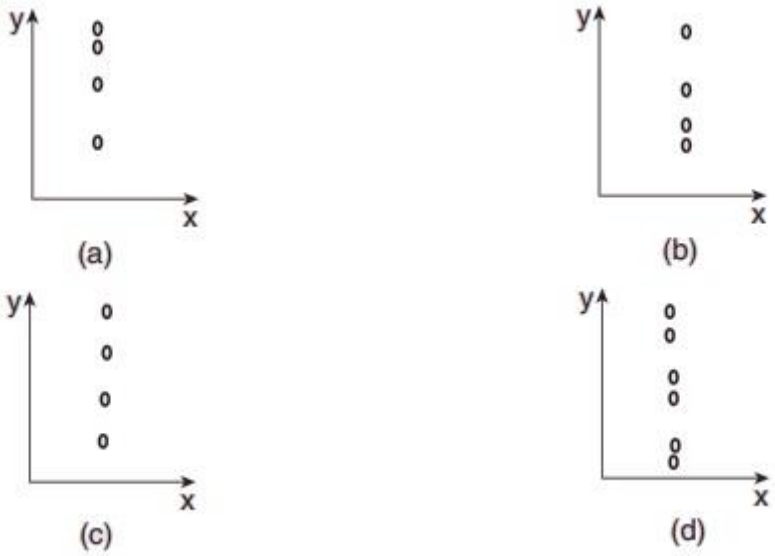
(c) 80.5 m (d) 79.2 m

13 If one object is dropped vertically downward and another object is thrown horizontally from the same height, then the ratio of vertical distance covered by both objects at any instant t is

**(a) 1** (b) 2

(c) 4 (d) 0.5

14 A ball is dropped from some height towards the ground. Which one of the following represents the correct motion of the ball?




15 An object is dropped on an unknown planet from a height 50 m, it reaches the ground in 2 s . The acceleration due to gravity on this unknown planet is

(a) g = 20 m $s^{-2}$ **(b) g = 25 m $s^{-2}$**

(c) g = 15 m $s^{-2}$ (d) g = 30 m $s^{-2}$

16 11. A body goes from 2 meter to 8 meter mark and back to 2 meter mark in 3 sec. Its average speed is:

(a) 2m $sec^{-1}$ (b) 6m $sec^{-1}$ **(c) 4m $sec^{-1}$** (d) Zero

17 When two bodies of unequal weights are dropped simultaneously from the same height, then:

(a) A heavier body will reach the ground earlier.

(b) A lighter body will reach the ground earlier.

**(c) Both of them will reach the ground at the same time.**

18 How many meters (S) will a 20 kg? The ball, starting from rest, falls freely in 3 seconds.

(a) 196 m (b) 98 m

(c) 70.0 m **(d) 44.1 m**

19 A car is moving with uniform velocity then its acceleration is.

**(a) Zero** (b) constant

(c) Increased (d) Decreased

20 Speeds of two identical cars are $u$ and $4u$ at a specific instant. If the same deceleration is applied on both cars, the ratio of the respective distances in which the two cars are stopped from that instant is

(a) 1:1 (b) 1: 4

(c) 1: 8 **(d) 1: 16.**

(d) : Both are given the same deceleration simultaneously and both finally stop.

Formula relevant to motion : $u^2 = 2\ as$

$\therefore$ For first car, $s_1 = \frac{u^2}{2a}$

For second car, $s_2 = \frac{(4u)^2}{2a} = \frac{16u^2}{2a}$

$\therefore$ $\frac{s_1}{s_2} = \frac{1}{16}$.

## SCALARS AND VECTORS

1. If the vector addition of two vectors of magnitude 3 units and 4 units has a resultant of 5 units, then the angle between those two vectors is:

**(a)** 0° **(a)** 45° **(a) 90°**

2. $\hat{k} \cdot \left(\hat{i} + \hat{j}\right)$ has value:

**(a) Zero** **(a)** One **(a)** $\hat{j}$ **(a)** $\hat{j}$

3. The magnitude of product $\hat{k} \cdot \left(\hat{i} \times \hat{j}\right)$ is:

**(a)** Zero **(a) 1** **(a)** -1 **(a)** Zero

4. $\hat{j} \times \hat{j}$ is equal to:

**(a)** $j^2$ **(a)** j **(a)** One **(a) Zero**

5. If a vector quantity is divided by its magnitude, the vector obtained is called:

**(a) Unit vector** **(a)** Position vector **(a)** Null vector **(a)** Free vector

6. Two perpendicular vectors having magnitude 4 units and 3 units are added. Their resultant has the magnitude of:

**(a)** 7 units **(a)** 12 units **(a)** 25 units **(a) 5 units**

7 The Y-component of vector $|\vec{A}| = 15units$ when it forms an angle of $50^0$ with positive x-axis is;

**(a)** 9.6 units **(a)** - 9.6 units **(a)** **11.5 units** **(a)** -11.5 units

8. If A = 5i + j, and B = 2k, then A – B is equal to:

**(a)** 5i + j + 2k **(a)** 5i – j – 2k **(a)** 5i + j – 2k **(a)** 5i – j + 2k

**9** Two forces whose magnitudes are in ratio of 3:5 give a resultant of 35N. If the angle of inclination is 60°, calculate the magnitude of each force.

(a) 15N and35N **(b) 15N and 25N**

(c) 10N and 15N (d) 20N and 5N

**10** A force of 50 N operates on a body, displacing it across a distance of 10 meters in a direction where the force forms a 60-degree angle with the body. What is the work done?

(a) 100 J (b) 150 J

(c) 200 J **(d) 250 J**

11 What is the area of the parallelogram whose vectors P =2i+3j and Q =i+4j represent?

**(a) 5 Units** (b) 10 Units

(c) 15 Units (d) 20 Units

12 The magnitude of a unit vector is-

(a) 5 **(b) 1**

(c) 10 (d) 0.

13 What is the result of multiplying î + 14 ĵ by √49?

**(a) 7î + 98ĵ** (b) 98î + 14ĵ

(c) 7î + 98ĵ (d) (î + 7ĵ)*√49

14 What may the cross product of two vectors be used for?

(a) area of rectangle (b) area of square

**(c) area of parallelogram** (d) perimeter of rectangle

15 The position vectors of points P and Q are given by $\vec{r_1} = 2\hat{i} + 3\hat{j} - \hat{k}, \vec{r_2} = 4\hat{i} - 3\hat{j} + 2\hat{k}.$

Determine the magnitude of $|\overrightarrow{PQ}|$

(a) 5 **(b) 7**

(c) 14 (d) 27.

## PROJECTILE MOTION

1. The maximum range of the Ghori Missile ($V_0$ = 3834 m/s) is:

**(a)** **1500 Km** **(b)** 2000 Km **(c)** 2500 Km **(d)** 391 Km

2. If a projectile is launched at 45° with velocity 100 m/s. It hits the target. It will have double the range if its velocity is:

**(a)** **141.4m/s** **(b)** 200m/s **(c)** 173.2m/s **(d)** 400m/s

3. If a projectile is thrown at an angle of 35°, it hits a certain target. It will have the same range if it.

**(a)** 45° **(b)** **55°** **(c)** 10° **(d)** 70°

4 In projectile motion a body moves with:

**(a)** The constant vertical component of velocity

**(b)** **The constant horizontal component of velocity**

**(c)** Both changing horizontal and vertical components of velocity

**(d)** Horizontal component changing but vertical component of velocity constant

5. The motion on a curved path, when one component of velocity is constant and the other is variable is called:

**(a)** Circular motion **(a) Projectile motion** **(a)** Vibratory motion

6 A projectile is fired at an angle of θ with the horizontal, its velocity will be maximum at;

**(a)** The point of projection **(a) The highest point**

**(a)** The point of landing on the ground **(a)** all points of its path

7 A stone is just released from the window of a train moving along a horizontal straight track. The stone will hit the ground following

(a) Hyperbolic path (b) Straight path

(c) Circular path **(d) Parabolic path**

8 A bullet is fired from a gun with a speed of 100m/s at an angle of 15° with the horizontal. Find its range.

(a) 100 m (b) 250 m

(c) 410 m **(d) 510 m**

9 An aeroplane moving horizontally with a speed of 720 km/h drops a food packet while flying at the height of 396.9m. The time taken by the food packet to reach the ground and its horizontal range is

**(a) 9 s and 1800 m** (b) 9 s and 720 m

(c) 9 s and 5200 m (d) 9 s and 510 m

10 A body of mass 10 kg, projected at an angle of 60° from the ground with an initial velocity of 5 m/s, acceleration due to gravity is g = 10 m/s$^2$, what is the time of flight?

**(a) 0.866s** (b) 1.86 s

(c) 1.96 s (d) 1.862 s

11 On calculating which of the following quantities, the body's mass affects simple projectile motion?

(a) Velocity **(b) Force**

(c) Time of flight (d) Range

12 An object of mass 2000 g covers a maximum vertical distance of 6 m when it is projected at an angle of 45° from the ground. Calculate the velocity with which it was thrown. Take g = 10 m/s$^2$,

**(a) 12.10 m/s** (b) 15.49 m/s

(c) 2.155 m/s (d) 12.0 m/s

13 The trajectory of the projectile is:

(a) A Straight line (b) A Circle

**(c) Parabola** (d) Hyperbola

14 Horizontal range of a projectile is maximum when it is fired at an angle of:

(a) 30º **(b) 45º**

(c) 90º (d) 30º

15 At the highest point vertical components of the velocity of the projectiles become

**(a) Zero** (b) Minimum

(c) Maximum (d) same