Oblique Projectile Motion

1. A projectile fired with initial velocity u at some angle θ has a range R. If the initial velocity be doubled at the same angle of projection, then the range will be

(a) $2R$ (b) $R/2$

(c) R (d) $4R$

2. If the initial velocity of a projectile be doubled, keeping the angle of projection same, the maximum height reached by it will

(a) Remain the same

(b) Be doubled

(c) Be quadrupled

(d) Be halved

3. In the motion of a projectile freely under gravity, its

(a) Total energy is conserved

(b) Momentum is conserved

(c) Energy and momentum both are conserved

(d) None is conserved

4. The range of a projectile for a given initial velocity is maximum when the angle of projection is 45^o. The range will be minimum, if the angle of projection is

(a) 90^o (b) 180^o

(c) 60^o (d) 75^o

5. The angle of projection at which the horizontal range and maximum height of projectile are equal is

(a) 45^o

(b) $\theta = tan^{-1}(0.25)$

(c) $\theta = tan^{-1} 4$ or $(\theta = 76°)$

(d)60^o

6. A ball is thrown upwards and it returns to ground describing a parabolic path. Which of the following remains constant

(a) Kinetic energy of the ball

(b) Speed of the ball

(c) Horizontal component of velocity

(d) Vertical component of velocity

7. At the top of the trajectory of a projectile, the directions of its velocity and acceleration are

(a) Perpendicular to each other

(b) Parallel to each other

(c) Inclined to each other at an angle of 45^o

(d) Antiparallel to each other

8. An object is thrown along a direction inclined at an angle of 45^o with the horizontal direction. The horizontal range of the particle is equal to
(a) Vertical height
(b) Twice the vertical height
(c) Thrice the vertical height
(d) Four times the vertical height

9. The height y and the distance x along the horizontal plane of a projectile on a certain planet (with no surrounding atmosphere) are given by $y = (8t - 5t^2)$ *meter* and $x = 6t$ *meter*, where t is in second. The velocity with which the projectile is projected is
(a) 8 *m*/*sec*
(b) 6 *m*/*sec*
(c) 10 *m*/*sec*
(d) Not obtainable from the data

10. Referring to above question, the angle with the horizontal at which the projectile was projected is
(a) $tan^{-1}(3/4)$
(b) $tan^{-1}(\mathbf{4/3})$
(c) $sin^{-1}(3/4)$
(d) Not obtainable from the given data

11. Referring to the above two questions, the acceleration due to gravity is given by
(a) $10m/sec^2$
(b) $5m/sec^2$
(c) $20m/sec^2$
(d) $2.5m/sec^2$

12. The range of a particle when launched at an angle of 15^o with the horizontal is 1.5 *km*. What is the range of the projectile when launched at an angle of 45^o to the horizontal
(a) 1.5 *km* (b) 3.0 *km*
(c) 6.0 *km* (d) 0.75 *km*

13. A cricketer hits a ball with a velocity $25m/s$ at 60^o above the horizontal. How far above the ground it passes over a fielder 50 m from the bat (assume the ball is struck very close to the ground)
(a) 8.2 *m* (b) 9.0 *m*
(c) 11.6 *m* (d) 12.7 *m*

14. A stone is projected from the ground with velocity $25m/s$. Two seconds later, it just clears a wall 5 m high. The angle of projection of the stone is $(g = 10m/sec^2)$

(a) 30^o (b) 45^o

(c) 50.2^o (d) 60^o

15. Galileo writes that for angles of projection of a projectile at angles $(45+\theta)$ and $(45-\theta)$, the horizontal ranges described by the projectile are in the ratio of (if $\theta \leq 45$)

(a) 2 : 1 (b) 1 : 2

(c) 1 : 1 (d) 2 : 3

16. A projectile thrown with a speed v at an angle θ has a range R on the surface of earth. For same v and θ, its range on the surface of moon will be

(a) $R/6$ (b) $\boldsymbol{6R}$

(c) $R/36$ (d) $36R$

17. The greatest height to which a man can throw a stone is $\sqrt{\frac{F}{mr}}$. The greatest distance to which he can throw it, will be

(a) $2\pi r^2/T$ (b) v, v and v

(c) $2h$ (d) $3h$

18. The horizontal range is four times the maximum height attained by a projectile. The angle of projection is

(a) 90^o (b) 60^o

(c) 45^o (d) 30^o

19. A ball is projected with kinetic energy E at an angle of 45^o to the horizontal. At the highest point during its flight, its kinetic energy will be

(a) Zero (b) $\frac{E}{2}$

(c) $\frac{E}{\sqrt{2}}$ (d) E

20. A particle of mass m is projected with velocity v making an angle of 45^o with the horizontal. The magnitude of the angular momentum of the particle about the point of projection when the particle is at its maximum height is (where g = acceleration due to gravity)

(a) Zero (b) $mv^3/(4\sqrt{2}g)$

(c) $mv^3/(\sqrt{2}g)$ (d) $mv^2/2g$