NEET PHYSICS

Topic: Projectile Motion

Q.1 **A particle is projected with a velocity u making an angle θ with the horizontal. At any instant, its velocity v is at right angles to its initial velocity u; then v is -**

(1) u cos θ **(2) u cos θ**

(3) u cot θ **(4) u sec θ**

Q.2 **The speed at the maximum height of a projectile is $\frac{\sqrt{3}}{2}$ times of its initial speed 'u' of projection. Its range on the horizontal plane-**

(1) $\frac{\sqrt{3}u^2}{2g}$ **(2)** $\frac{u^2}{2g}$

(3) $\frac{3u^2}{2g}$ **(4)** $\frac{3u^2}{g}$

Q.3 **What is the ratio of P.E. w.r.t. ground and K.E. at the top most point of the projectile motion -**

(1) $\cos^2\theta$ **(2)** $\sin^2\theta$

(3) $\tan^2\theta$ **(4)** $\cot^2\theta$

Q.4 **A ball is thrown at an angle θ with the horizontal and the range is maximum. The value of tanθ is -**

(1) 1 **(2)** $\sqrt{3}$ **(3)** $\frac{1}{\sqrt{3}}$ **(4) 2**

Q.5 **For the top of a tower 19.6 m high, a ball is thrown horizontally. If the line joining the point of projection to the point where it hits the ground makes an angle of 45° with the horizontal, then the initial velocity of the ball is-**

(1) 9.8 ms^{-1} **(2) 4.9 ms^{-1}**

(3) 14.7 ms^{-1} **(4) 2.8 ms^{-1}**

Q.6 When a particle is thrown horizontally the resultant velocity of the projectile at any time t is given by -

(1) gt **(2)** $\frac{1}{2}gt^2$

(3) $\sqrt{u^2+g^2t^2}$ **(4)** $\sqrt{u^2-g^2t^2}$

Q.7 A ball is projected upwards from the top of a tower with a velocity of 50 ms^{-1} making an angle of 30° with the horizontal. The height of the tower is 70m. After how much time from the instant of throwing will the ball reach the ground ?

(1) 2s **(2)** 5s **(3)** 7s **(4)** 9s

Q.8 A ball is thrown at different angles with the same speed u and from the same point and it has the same range in both the case. If y_1 and y_2 be the heights attained in the two cases, then $y_1 + y_2$ = ...

(1) $\frac{u^2}{g}$ **(2)** $\frac{2u^2}{g}$ **(3)** $\frac{u^2}{2g}$ **(4)** $\frac{u^2}{4g}$

Q.9 A bullet is fired from a gun with velocity 500 ms^{-1}, then the maximum range is –

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(1) 25×10^3 m **(2)** 12.5×10^3 m

(3) 50×10^2 m **(4)** 25×10^2 m

Q.10 A body is projected at such an angle that the horizontal range is three times the greatest height. The angle of projection is –

(1) 25° **(2)** 33° **(3)** 42° **(4)** 53°

Q.11 A projectile can have the same range R for two angles of projection. If t_1 and t_2 be the times of flight in the two cases –

(1) $t_1t_2 \propto R^2$ **(2)** $t_1t_2 \propto R$

(3) $t_1t_2 \propto \frac{1}{R}$ **(4)** $t_1t_2 \propto \frac{1}{R^2}$

Q.12 The angle which the velocity vector of a projectile, thrown with a velocity v at an angle θ to the horizontal, will make with the horizontal after time t of its being thrown up is-

(1) θ (2) $\tan^{-1}\left(\frac{\theta}{t}\right)$

(3) $\tan^{-1}\left(\frac{v\cos\theta}{v\sin\theta - gt}\right)$ (4) $\tan^{-1}\left(\frac{v\sin\theta - gt}{v\cos\theta}\right)$

Q.13 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 -

(1) 1 : 1 (2) 2 : 3

(3) 1 : 2 (4) 2 : 1

Q.14 A particle starting from the origin (0,0) moves in a straight line in the (x, y) plane. Its coordinates at a later time are $(\sqrt{3},3)$. The path of the particle makes with the x-axis an angle of -

(1) 0° (2) 30°

(3) 45° (4) 60°

Q.15 A missile is fired for maximum range with an initial velocity of 20 m/s. If g = 10 m/s^2, the range of the missile is :

(1) 20 m (2) 40 m

(3) 50 m (4) 60 m

Q.16 A projectile is fired at an angle of 45º with the horizontal. Elevation angle of the projectile at its highest point as seen from the point of projection, is :

(1) 45º (2) 60º

(3) $\tan^{-1}\frac{1}{2}$ (4) $\tan^{-1}\left(\frac{\sqrt{3}}{2}\right)$

Q.17 A stuntman plans to run across a roof top and then horizontally off it to land on the roof of next building. The roof of the next building is 4.9 metre below the first one and 6.2 metre away from it. What should be his minimum roof top speed in m/s, so that he can successfully make the jump ?

(1) 3.1 (2) 4.0 (3) 4.9 (4) 6.2

Q.18 The maximum range of a projectile fired with some initial velocity is found to be 1000 metre. The maximum height (H) reached by this projectile is -

(1) 250 metre **(2) 500 metre**

(3) 1000 metre **(4) 2000 metre**

Q.19 Range of a projectile is R, when the angle of projection is 30°. Then, the value of the other angle of projection for the same range, is -

(1) 45° **(2) 60°** **(3) 50°** **(4) 40°**

Q.20 The number of bullets are fired in all possible direction with the same initial velocity u. The maximum area of ground covered by bullets is

(1) $\pi\left(\frac{2u^2}{g}\right)^2$ **(2)** $3\pi\left(\frac{u}{g}\right)^2$

(3) $5\pi\left(\frac{u}{2g}\right)^2$ **(4)** $\pi\left(\frac{u^2}{g}\right)^2$

Q.21 An aeroplane moving horizontally with a speed of 180 km/hr. drops a food packet while flying at a height of 490 m. The horizontal range of the packet is -

(1) 180 m **(2) 980 m**

(3) 500 m **(4) 670 m**

Q.22 Three particles A, B and C are projected from the same point with the same initial speeds making angles 30°, 45° and 60° respectively with the horizontal. Which of the following statements is correct ?

(1) A, B and C have unequal ranges

(2) Ranges of A and C are equal and less than that of B

(3) Ranges of A and C are equal and greater than that of B

(4) A, B and C have equal ranges

Q.23 A plane is flying horizontally at 98 ms^{-1} and releases an object which reaches the ground in 10 s. The angle made by it while hitting the ground is -

(1) 55° **(2) 45°**

(3) 60° **(4) 75°**

Q.24 **At the top of the trajectory of a projectile, the acceleration is -**

(1) maximum **(2) minimum**

(3) zero **(4) g**

These questions of two statements each, printed as Assertion and Reason. While answering these Questions you are required to choose any one of the following four responses.

(A) If both Assertion & Reason are true & the Reason is a correct explanation of the Assertion.

(B) If both Assertion and Reason are true but Reason is not a correct explanation of the Assertion.

(C) If Assertion is true but the Reason is false.

(D) If Assertion & Reason both are false.

Q.25 **Assertion : A body dropped from a given height and another body projected horizontally from the same height strike the ground simultaneously.**

Reason : Because horizontal velocity has no effect in the vertical direction.

(1) A **(2) B** **(3) C** **(4) D**

Q.26 **Assertion : A projectile is thrown with an initial velocity of** $(a\hat{i} + b\hat{j})$ **m/sec. If range of projectile is maximum then a = b.**

Reason : In projectile motion, angle of projection is equal to 45° for maximum range condition.

(1) A **(2) B** **(3) C** **(4) D**

Q.27 **Assertion : If the position vector of a particle moving in space is given by** $\vec{r} = 2t\hat{i} - 4t^2\hat{j}$**, then the particle moves along a parabolic trajectory.**

Reason : Because $\vec{r} = x\hat{i} + y\hat{j}$ **and** $\vec{r} = 2t\hat{i} - 4t^2\hat{j} \Rightarrow y = -x^2$

(1) A **(2) B** **(3) C** **(4) D**

Q.28 **Assertion : The path of one projectile as seen from another projectile is a straight line.**

Reason : Two projectiles projected at angles α and 90° – α have same range .

(1) A **(2) B** **(3) C** **(4) D**

Q.29 **Assertion : In case of projectile motion acceleration, horizontal component of velocity and mechanical energy remains unchanged but speed, vertical component of velocity, momentum, K.E. and P.E. change.**

Reason : In the presence of air resistance, the range and maximum height attained reduce, but time of flight increases.

(1) A (2) B (3) C (4) D

Q.30 **Assertion : In the projectile motion projected body behave just like a freely falling body.**

Reason : There is no change in linear momentum in projectile motion.

(1) A (2) B (3) C (4) D

ANSWER KEY

Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Ans.	3	1	3	1	1	3	3	3	1	4
Que.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Ans.	2	4	1	4	2	3	4	1	4	2
Que.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
Ans.	1	1	2	3	1	1	1	2	2	3