**CLASS : XIᴛʜ**   **SUBJECT : PHYSICS**
DATE :   **DPP NO. : 2**

## Topic :- MOTION IN A PLANE

1. The angle of projection at which the horizontal range and maximum height of projectile are equal is
   a) $45°$
   b) $\theta = \tan^{-1}(0.25)$
   c) $\theta = \tan^{-1} 4$ or $(\theta = 76°)$
   d) $60°$

2. A body slides down a frictionless track which ends in a circular loop of diameter D. Then the minimum height h of the body in terms of D so that it may just complete the loop, is
   a) $h = \dfrac{5}{2}D$
   b) $h = \dfrac{3}{2}D$
   c) $h = \dfrac{5}{4}D$
   d) $h = 2D$

3. A force $\vec{F} = 2\hat{\imath} + 2\hat{\jmath}$ N displaces a particle through $\vec{S} = 2\hat{\imath} + 2\hat{k}$ m in 16 s. The power developed by $\vec{F}$ is
   a) 0.25 J s^{-1}
   b) 25 J s^{-1}
   c) 225 J s^{-1}
   d) 450 J s^{-1}

4. A sphere of mass m is tied to end of a string of length l and rotated through the other end along a horizontal circular path with speed v. The work done in full horizontal circle is
   a) 0
   b) $\left(\dfrac{mv^2}{l}\right).2\pi l$
   c) $mg.2\pi$
   d) $\left(\dfrac{mv^2}{l}\right).(l)$

5. Two projectile are thrown with the same initial velocity at angles α and $(90° - \alpha)$ with the horizontal. The maximum heights attained by them are h_1 and h_2 respectively. Then $\dfrac{h_1}{h_2}$ is equal
   a) $\sin^2 \alpha$
   b) $\cos^2 \alpha$
   c) $\tan^2 \alpha$
   d) 1

6. A particle P is at the origin starts with velocity $\vec{v} = (2\hat{\imath} - 4\hat{\jmath})\text{ms}^{-1}$ with constant acceleration $(3\hat{\imath} - 5\hat{\jmath})\text{ms}^{-2}$. After travelling for 2 s, its distance from the origin is
   a) 10 m
   b) 10.2 m
   c) 9.8 m
   d) 11.7 m

7. A small sphere is hung by a string fixed to a wall. The sphere is pushed away from the wall by a stick. The force acting on the sphere are shown in figure. Which of the following statements is wrong?
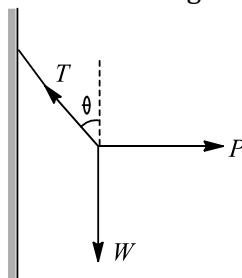
   a) $P = W\tan\theta$
   b) $\vec{T} + \vec{P} + \vec{W} = 0$
   c) $T^2 = P^2 + W^2$
   d) $T = P + W$

8. A particle moves in a circle of radius 30cm. Its liner speed is given by $v = 2t$, where t is in second and v in ms^{-1}. Find out its, radial and tangential acceleration at $t = 3s$, respectively,
   a) $220\ ms^{-2}, 50\ ms^{-2}$ b) $100\ ms^{-2}, 5\ ms^{-2}$ c) $120\ ms^{-2}, 2\ ms^{-2}$ d) $110\ ms^{-2}, 10\ ms^{-2}$

9. A small particle of mass m is projected at an angle θ with the x-axis with an initial velocity v_0 in the x-y plane as shown in the figure. At a time $t < \frac{v_0 \sin\theta}{g}$, the angular momentum of the particle is
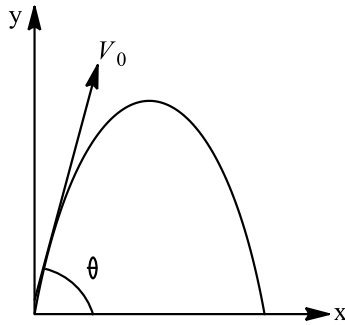
   a) $-mgv_0t^2\cos\theta\,\hat{\mathbf{j}}$ b) $mgv_0t\cos\theta\,\hat{\mathbf{k}}$ c) $-\frac{1}{2}mgv_0t^2\cos\theta\,\hat{\mathbf{k}}$ d) $\frac{1}{2}mgv_0t^2\cos\theta\,\hat{\mathbf{i}}$

10. A body is thrown upward from the earth surface with velocity $5\ m/s$ and from a planet surface with velocity $3\ m/s$. Both follow the same path. What is the projectile acceleration due to gravity on the planet
    a) $2\ m/s^2$ b) $3.5\ m/s^2$ c) $4\ m/s^2$ d) $5\ m/s^2$

11. An unbanked curve has a radius of 60 m. The maximum speed at which the car make a turn is (Take $\mu = 0.75$)
    a) $7\ ms^{-1}$ b) $14\ ms^{-1}$ c) $21\ ms^{-1}$ d) $2.1\ ms^{-1}$

12. A fly wheel rotates about a fixed axis and slows down from 300 rpm to 100 rpm in 2 min. Then its angular retardation in rad/min^2 is
    a) $\dfrac{100}{\pi}$ b) 100 c) $100\,\pi$ d) $200\,\pi$

13. A particle is projected with a velocity $200\ ms^{-1}$ at an angle of $60°$. At the highest point, it explodes into three particles of equal masses. One goes vertically upwards with a velocity $100\ ms^{-1}$, the second particle goes vertically downwards. What is the velocity of third particle?
    a) $120\ ms^{-1}$ making $60°$ angle with horizontal   b) $200\ ms^{-1}$ making $60°$ angle with horizontal
    c) $300\ ms^{-1}$ d) $200\ ms^{-1}$

14. A car is moving on a circular path and takes a turn. If R_1 and R_2 be the reactions on the inner and outer wheels respectively, then
    a) $R_1 = R_2$ b) $R_1 < R_2$ c) $R_1 > R_2$ d) $R_1 \geq R_2$

15. If the vector $\vec{A} = 2\hat{i} + 4\hat{j}$ and $\vec{B} = 5\hat{i} + p\hat{j}$ are parallel to each other, the magnitude of $\vec{B}$ is
    a) $5\sqrt{5}$ b) 10 c) 15 d) $2\sqrt{5}$

16. A body is revolving with a uniform speed v in a circle of radius r. The tangential acceleration is

a) $\dfrac{v}{r}$ b) $\dfrac{v^2}{r}$ c) Zero d) $\dfrac{v}{r^2}$

17. A bridge is in the form of a semi-circle of radius 40 m. The greatest speed with which a motor cycle can cross the bridge without leaving the ground at the highest point is ($g = 10\text{ms}^{-2}$) (frictional force is negligibly small)
a) 40 ms^{-1} b) 20 ms^{-1} c) 30 ms^{-1} d) 15 ms^{-1}

18. A car is moving with high velocity when it has a turn. A force acts on it outwardly because of
a) Centripetal force b) Centrifugal force c) Gravitational force d) All the above

19. If time of flight of a projectile is 10 seconds. Range is 500 $meters$. The maximum height attained by it will be
a) $125\ m$ b) $50\ m$ c) $100\ m$ d) $150\ m$

20. A stone is projected with a velocity $20\sqrt{2}\text{ms}^{-1}$ at an angle of 45° to the horizontal. The average velocity of stone during its motion from starting point to its maximum height is (g $= 10\text{ms}^{-2}$)
a) $5\sqrt{5}\text{ ms}^{-1}$ b) $10\sqrt{5}\text{ ms}^{-1}$ c) 20 ms^{-1} d) $20\sqrt{5}\text{ ms}^{-1}$