DPP
DAILY PRACTICE PROBLEMS

CLASS : XITH **SUBJECT : PHYSICS**
DATE : **DPP NO. : 8**

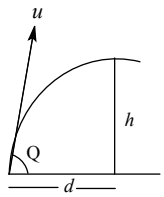
Topic :- MOTION IN A PLANE

1. A car is moving with speed 30 m/sec on a circular path of radius 500 m. Its speed is increasing at the rate of $2m/\sec^2$, What is the acceleration of the car
   a) $2m/\sec^2$ b) $2.7m/\sec^2$ c) $1.8m/\sec^2$ d) $9.8m/\sec^2$

2. The co-ordinates of a moving particle at time t are given by $x = ct^2$ and $y = bt^2$. The instantaneous speed of the particle is
   a) $2t(b+c)$ b) $2t(b+c)^{1/2}$ c) $2t(c^2-b^2)$ d) $2t(c^2+b^2)^{1/2}$

3. A simple pendulum oscillates in a vertical plane. When it passes through the mean position, the tension in the string is 3 times the weight of the pendulum bob. What is the maximum displacement of the pendulum with respect to the vertical
   a) 30° b) 45° c) 60° d) 90°

4. If a stone s to hit at a point which is at a distance d away and at a height h above the point from where the stone starts, then what is the value of initial sped u, if the stone is launched at an angle Q?



   a) $\frac{g}{\cos\theta}\sqrt{\frac{d}{2(d\tan\theta - h)}}$ b) $\frac{d}{\cos\theta}\sqrt{\frac{g}{2(d\tan\theta - h)}}$ c) $\sqrt{\frac{gd^2}{h\cos^2\theta}}$ d) $\sqrt{\frac{gd^2}{(d-h)}}$

5. A car is circulating on the path of radius r and at any time its velocity is v and rate of increases of velocity is a. The resultant acceleration of the car will be
   a) $\sqrt{\frac{v^2}{a^2}+r^2}$ b) $\sqrt{\frac{v^2}{r}+a}$ c) $\sqrt{\frac{v^4}{r^2}+a^2}$ d) $\left(\frac{v^2}{r}+a\right)$

6. A particle of mass m is moving in a circular path of constant radius r such that its centripetal acceleration a_c is varying with time as $a_c = k^2rt^4$, where k is a constant. The power delivered to the particle by the forces acting on its is

a) Zero b) $mk^2r^2t^2$ c) $\frac{1}{3}mk^2r^2t^2$ d) $2mk^2r^2t^3$

7. A particle is moving in a vertical circle. The tensions in the string when passing through two positions at angles 30° and 60° from vertical (lowest position) are T_1 and T_2 respectively. then

a) $T_1 = T_2$ b) $T_2 > T_1$

c) $T_1 > T_2$ d) Tension in the string always remains the same

8. A car is moving on a circular level road of radius of curvature 300 m. If the coefficient of friction is 0.3 and acceleration due to gravity 10 ms^{-2}, the maximum speed the car can have is (in km h^{-1})

a) 30 b) 81 c) 108 d) 162

9. A body is projected at an angle θ to the horizontal with kinetic energy E_k. The potential energy at the highest point of the trajectory is

a) E_k b) $E_k\cos^2\theta$ c) $E_k\sin^2\theta$ d) $E_k\tan^2\theta$

10. There are two forces each of magnitude 10 units. One inclined at an angle of 30° and the other at an angle of 135° to the positive direction of $x-$ axis. The x and y components of the resultant are respectively.

a) $1.59\hat{i}$ and $12.07\hat{j}$ b) $10\hat{i}$ and $10\hat{j}$ c) $1.59\hat{i}$ d) $15.9\hat{i}$ and $12.07\hat{j}$

11. An aircraft executes a horizontal loop with a speed of 150 m/s with its wings banked at an angle of 12°. The radius of the loop is ($g = 10\ m/s^2$,$\tan 12° = 0.2126$)

a) 10.6 km b) 9.6 km c) 7.4 km d) 5.8 km

12. If $\vec{A} + \vec{B} = \vec{C}$ and $A = \sqrt{3}$, $B = \sqrt{3}$ and $C = 3$, then the angle between $\vec{A}$ *and* $\vec{B}$ is

a) 0° b) 30° c) 60° d) 90°

13. The velocity of projection of an oblique projectile is $\vec{\mathbf{v}} = 3\hat{\mathbf{i}} + 2\hat{\mathbf{j}}$ (in ms^{-1}). The speed of the projectile at the highest point of the trajectory is

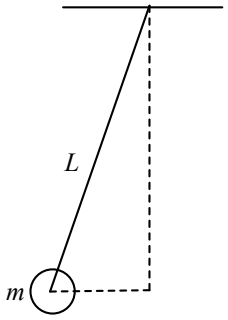
a) 3 ms^{-1} b) 2 ms^{-1} c) 1 ms^{-1} d) Zero

14. If $\vec{A}\cdot\vec{B} = 0$ and $\vec{A}\times\vec{B} = 1$, then $\vec{A}$ and $\vec{B}$ are

a) Perpendicular unit vectors b) Parallel unit vectors

c) Parallel d) Perpendicular.

15. A ball of mass(m)0.5 kg is attached to the end of a string having length (L) 0.5 m. The ball is rotated on a horizontal circular path about vertical axis. The maximum tension that the string can bear is 324 N. The maximum possible value of angular velocity of ball (in rad/s) is



a) 9 b) 18 c) 27 d) 36

16. The maximum speed with which a car is driven round a curve of radius 18 m without skidding (where, g = 10ms^{-2} and the coefficient of friction between rubber tyres and the roadway is 0.2) is

a) 36.0 km h^{-1} b) 18.0 km h^{-1} c) 21.6 km h^{-1} d) 14.4 km h^{-1}

17. The minimum speed for a particle at the lowest point of a vertical circle of radius r, to describe the circle is v. If the radius of the circle is reduced to one-fourth its value, the corresponding minimum speed will be

a) $v/4$ b) $v/2$ c) $2v$ d) $4v$

18. The angle of projection of a projectile for which the horizontal range and maximum height are equal is

a) $\tan^{-1}(2)$ b) $\tan^{-1}(4)$ c) $\cot^{-1}(2)$ d) 60°

19. A string of length l is fixed at one end and caries a mass m at the other end. The string makes $2/\pi$ rps around a vertical axis through the fixed end. What is the tension in string?

a) $m\,l$ b) 16 $m\,l$ c) 4 $m\,l$ d) 2 $m\,l$

20. At what point of a projectile motion acceleration and velocity and velocity are perpendicular to each other

a) At the point of projection
b) At the point of drop
c) At the topmost point
d) Any where in between the point of projection and topmost point