DPP
DAILY PRACTICE PROBLEMS

CLASS : XITH **SUBJECT : PHYSICS**
DATE : **DPP NO. : 7**

Topic :- MOTION IN A PLANE

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

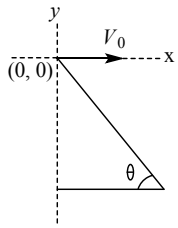
2. Two particles are projected simultaneously in the same vertical plane, from the same point, both with different speeds and at different angles with horizontal. The path followed by one, as seed by the other, is
   a) A vertical line
   b) A parabola
   c) A hyperbola
   d) A straight line making a constant angle ($\neq 90°$) with the horizontal

3. Find the maximum speed at which a car can turn round a curve of 30 m radius on a level road if the coefficient of friction between the tyres and the road is 0.4
   (Acceleration due to gravity $= 10\ ms^{-2}$)
   a) 12 ms^{-2} b) 10 ms^{-2} c) 11 ms^{-2} d) 15 ms^{-2}

4. The simple sum of two co-initial vectors is 10 units. Their vector sum is 8 units. The resultant of the vectors is perpendicular to the smaller vector. The magnitudes of the two vectors are
   a) 2 units and 14 units
   b) 4 units and 12 units
   c) 6 units and 10 units
   d) 8 units and 8 units

5. The resultant of two forces at right angle is 5N. When the angle between them is 120°, the resultant is $\sqrt{13}$. Then the force are
   a) $\sqrt{12}$N,$\sqrt{13}$N b) $\sqrt{20}$N,$\sqrt{5}$N c) 3 N, 4 N d) $\sqrt{40}$N,$\sqrt{15}$N

6. A man standing on a hill top projects a stone horizontally with speed v_0 as shown in figure. Taking the coordinate system as given in the figure. The coordinates of the point where the stone will hit the hill surface



a) $\left(\frac{2v_0^2\tan\theta}{g}, \frac{-2v_0^2\tan^2\theta}{g}\right)$ b) $\left(\frac{2v_0^2}{g}, \frac{2v_0^2\tan^2\theta}{g}\right)$

c) $\left(\frac{2v_0^2\tan\theta}{g}, \frac{2v_0^2}{g}\right)$ d) $\left(\frac{2v_0^2\tan^2\theta}{g}, \frac{2v_0^2\tan\theta}{g}\right)$

7. Given $\vec{c} = \vec{a} \times \vec{b}$. The angle which $\vec{a}$ makes with $\vec{c}$ is
a) 0° b) 45° c) 90° d) 180°

8. Two bodies are projected from ground with equal speed 20 ms^{-1} from the same position in the same vertical plane to have equal range but at different angles above the horizontal. If one of the angle is 30° the sum of their maximum heights is (assume $g =$ 10 ms^{-2})
a) 400 m b) 20 m c) 30 m d) 40 m

9. Two bodies of mass 10 kg and 5 kg moving in concentric orbits of radii R and r such that their periods are the same. Then the ratio between their centripetal acceleration is
a) R/r b) r/R c) R^2/r^2 d) r^2/R^2

10. A body is whirled in a horizontal circle of radius 20 cm. It has angular velocity of 10 rad/s. What is its linear velocity at any point on circular path
a) 10 m/s b) 2 m/s c) 20 m/s d) $\sqrt{2}\, m/s$

11. A body of mass 0.4 kg is whirled in a vertical circle making 2rev/s. If the radius of the circle is 2m, then tension in the string when the body is at the top of the circle is
a) 41.56 N b) 89.86 N c) 109.86 N d) 115.86 N

12. A body is projected horizontally with speed 20 ms^{-1}. The approximate displacement of the body after 5 s is
a) 80 m b) 120 m c) 160 m d) 320 m

13. A particle moves along a circle of radius $\left(\frac{20}{\pi}\right)$ m with constant tangential acceleration. If the velocity of the particle is 80 ms^{-1}, at the end of seconds revolution after motion has begun, the tangential acceleration is
a) 40 ms^{-2} b) 640 π ms^{-2} c) 1609 π ms^{-2} d) 40 π ms^{-2}

14. A projectile is thrown at angle β with vertical. It reaches a maximum height H. The time taken to reach the highest point of its path is

a) $\sqrt{\frac{H}{g}}$ b) $\sqrt{\frac{2H}{g}}$ c) $\sqrt{\frac{H}{2g}}$ d) $\sqrt{\frac{H}{g\cos\beta}}$

15. An object of mass 10 kg is whirled round a horizontal circle of radius 4 m by a revolving string inclined 30° to the vertical. If the uniform speed of the object is 5 ms^{-1}, the tension in the string (approximately) is

a) 720 N b) 960 N c) 114 N d) 125 N

16. The angle between $\vec{A}$ and $\vec{B}$ is θ, the value of the triple product $\vec{A}\cdot\vec{B}\times\vec{A}$ is

a) A^2B b) Zero c) $A^2B\sin\theta$ d) $A^2B\cos\theta$

17. A body crosses the topmost point of a vertical circle with critical speed. What will be its acceleration when the string is horizontal?

a) g b) 2 g c) 3 g d) 6 g

18. A car of mass 2000 kg is moving with a speed of 10 ms^{-1} on a circular path of radius 20 m on a level road. What must be the frictional force between the car and the road so that the car does not slip?

a) 10^4 N b) 10^3 N c) 10^5 N d) 10^2 N

19. The magnitude of the X and Y components of $\vec{A}$ are 7 and 6. Also the magnitudes of X and Y components of $\vec{A}+\vec{B}$ are 11 and 9 respectively. What is the magnitude of $\vec{B}$?

a) 5 b) 6 c) 8 d) 9

20. A body of mass m is thrown upwards at an angle θ with the horizontal with velocity v. While rising up the velocity of the mass after t seconds will be

a) $\sqrt{(v\cos\theta)^2+(v\sin\theta)^2}$ b) $\sqrt{(v\cos\theta - v\sin\theta)^2 - gt}$

c) $\sqrt{v^2+g^2t^2 - (2v\sin\theta)gt}$ d) $\sqrt{v^2+g^2t^2 - (2v\cos\theta)gt}$