DPP

DAILY PRACTICE PROBLEMS

CLASS : XITH **SUBJECT : PHYSICS**
DATE : **DPP NO. : 6**

Topic :- MOTION IN A PLANE

1. A projectile is fired with a velocity v at an angle θ with the horizontal. The speed of the projectile when its direction of motion makes an angle β with the horizontal is
   a) $v \cos\theta$ b) $v \cos\theta \cos\beta$ c) $v \cos\theta \sec\beta$ d) $v \cos\theta \tan\beta$

2. A body is projected with speed v ms^{-1} at angle θ. The kinetic energy at the highest point is half of the initial kinetic energy. The value of θ is
   a) 30° b) 45° c) 60° d) 90°

3. The range of particle when launched at an angle 15° with the horizontal is 1.5 km. What is the range of projectile when launched at an angle of 45° to the horizontal?
   a) 3.0 km b) 1.5 km c) 6.0 km d) 0.75 km

4. In a vertical circle of radius r, at what point in its path a particle has tension equal to zero if it is just able to complete the vertical circle
   a) Highest point b) Lowest point
   c) Any point d) At a point horizontally from the centre of circle of radius r

5. A particle comes round a circle of radius 1 m once. The time taken by it is 10 sec. The average velocity of motion is
   a) 0.2 $\pi m/s$ b) 2 $\pi m/s$ c) 2 m/s d) Zero

6. A car of mass 1000 kg negotiates a banked curve of radius 90 m on a frictionless road. If the banking angle is 45°, the speed of the car is
   a) $20ms^{-1}$ b) $30ms^{-1}$ c) $5ms^{-1}$ d) $10ms^{-1}$

7. What is the unit vector along $\hat{i} + \hat{j}$?
   a) $\frac{\hat{i} + \hat{j}}{\sqrt{2}}$ b) $\sqrt{2}(\hat{i} + \hat{j})$ c) $\hat{i} + \hat{j}$ d) $\hat{k}$

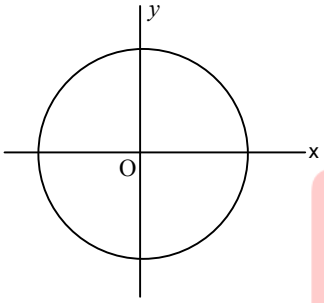
8. The speed limit of a car over a roadways bridge in the form of a vertical arc is 9.8 ms^{-1}. The diameter of the are is

a) 19.6 m b) 9.8 m c) 39.2 m d) 4.9 m

9. A body is acted upon by a constant force directed towards a fixed point. The magnitude of the force varies inversely as the square of the distance from the fixed point. What is the nature of the path?

a) Straight line b) Parabola c) Circle d) Hyperbola

10. The figure shows a circular path of a moving particle. If the velocity of the particle at same instant is $\mathbf{v} = -3\hat{\mathbf{i}} - 4\hat{\mathbf{j}}$, through which quadrant is the particle moving when clockwise and anti-clockwise respectively



a) 1st and 4 th b) 2nd and 4th c) 2 nd and 3rd d) 3 rd and 4 th

11. A car is moving along a straight horizontal road with a speedv_0. If the coefficient of friction between tyres and the road is μ, the shortest distance in which the car can be stopped is

a) $\frac{v_0^2}{2\mu g}$ b) $\frac{v_0}{\mu g}$ c) $\left(\frac{v_0}{\mu g}\right)^2$ d) $\frac{v_0}{\mu}$

12. A particle moves in a circle of radius 5 cm with constant speed and time period 0.2 πs. The acceleration of the particle is

a) 5 m/s^2 b) 15 m/s^2 c) 25 m/s^2 d) 36 m/s^2

13. A 500 kg car takes a round turn of radius 50 m with a velocity of 36 km/hr. The centripetal force is

a) 250 N b) 750 N c) 1000 N d) 1200 N

14. A road of 10 m width has radius of curvature 50 m. Its outer edge is raised above the inner edge by a distance of 1.5 m. The road is most suited for vehicles moving with velocity of

a) 8.5 ms^{-1} b) 6.5 ms^{-1} c) 5.5 ms^{-1} d) None of these

15. A plane surface is inclined making an angle θ with the horizontal. Form the bottom of this inclined plane, a bullet is fired with velocity v. The maximum possible range of the bullet on the inclined plane is

a) $\frac{v^2}{g}$ b) $\frac{v^2}{g(1+\sin\theta)}$ c) $\frac{v^2}{g(1-\sin\theta)}$ d) $\frac{v^2}{g(1+\sin\theta)^2}$

16. The maximum range of a gun on horizontal terrain is 16 km. If $g = 10\ m/s^2$. What must be the muzzle velocity of the shell

a) 200 m/s b) 400 m/s c) 100 m/s d) 50 m/s

17. A man projects a coin upwards from the gate of a uniformly moving train. The path of coin for the man will be

a) Parabolic b) Inclined straight line
c) Vertical straight line d) Horizontal straight line

18. Three vectors $\vec{A}, \vec{B}$ and $\vec{C}$ satisfy the relation $\vec{A}\cdot\vec{B} = 0$ and $\vec{A}\cdot\vec{C} = 0$. If $\vec{B}$ and $\vec{C}$ are not lying in the same plane then $\vec{A}$ is parallel to

a) $\vec{B}$ b) $\vec{C}$ c) $\vec{B}\times\vec{C}$ d) $\vec{B}\cdot\vec{C}$

19. The equation of motion of a projectile is $y = 12x - \frac{3}{4}x^2$. The horizontal component of velocity is 3ms^{-1}. What is the range of the projectile?

a) 18 m b) 16 m c) 12 m d) 21.6 m

20. Two cars of masses m_1 and m_2 are moving in circles of radii r_1 and r_2 respectively. Their speeds are such that they make complete circles in the same time t. The ratio of their centripetal acceleration is

a) $m_1r_1 : m_2r_2$ b) $m_1 : m_2$ c) $r_1 : r_2$ d) 1 :1