DPP
DAILY PRACTICE PROBLEMS

CLASS : XITH **SUBJECT : PHYSICS**
DATE : **DPP NO. : 1**

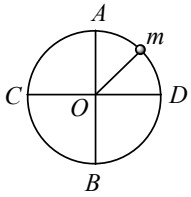
Topic :- MOTION IN A PLANE

1. A ball rolls of the top of stair-way with a horizontal velocity of magnitude 1.8 ms^{-1}. The steps are 0.20 m high and 0.20 m wide. Which step will the ball hit first?
   a) First b) Second c) Third d) Fourth

2. A body of mass 100 g is rotating in a circular path of radius r with constant velocity. The work done in one complete revolution is
   a) 100 rJ b) $(r/100)J$ c) $(100/r)J$ d) Zero

3. In uniform circular motion of a particle
   a) Velocity is constant but acceleration is variable
   b) Velocity is variable but acceleration in constant
   c) Both speed and acceleration are constant
   d) Speed is constant but acceleration is variable

4. A small sphere is attached to a cord and rotates in a vertical circle about a point O. If the average speed of the sphere is increased, the cord is most likely to break at the orientation when the mass is at



   a) Bottom point B b) Top point A c) The point D d) The point C

5. A stone of mass 1 kg tied to a light inextensible string of length $L = \frac{10}{3}$ is whirling in a circular path of radius L in vertical plane. If the ratio of the maximum tension to the minimum tension in the string is 4. What is the speed of stone at the highest point of the circle? (Taking g = 10m s^{-2})
   a) 10 ms^{-1} b) $5\sqrt{2}$ ms^{-1} c) $10\sqrt{3}$ ms^{-1} d) 20 ms^{-1}

6. A proton in a cyclotron changes its velocity from 30kms^{-1} north to 40kms^{-1} east in 20 s. what is the average acceleration during this time
   a) 2.5 kms^{-2}at 37° E of S
   b) 2.5 kms^{-2}at 37° N of E
   c) 2.5 kms^{-2}at 37° N of S
   d) 2.5 kms^{-2}at 37° E of N

7. A man can throw a stone to a maximum distance of 80 m. The maximum height to which it will rise in metre, is
   a) 30 m
   b) 20 m
   c) 10 m
   d) 40 m

8. The bob of a pendulum of mass m and length L is displaced, 90° from the vertical and gently released. In order that the string may not break upon passing through the lowest point, its minimum strength must be
   a) mg
   b) 2 mg
   c) 3 mg
   d) 4 mg

9. An aeroplane is flying horizontally with a constant velocity of 100 kmh^{-1} at a height of 1 km from the ground level. At $t = 0$, it starts dropping packets at constant time intervals of T_0. If R represents the separation between two consecutive points of impact on the ground, then for the first three packets, R_1/R_2 is
   a) 1
   b) >1
   c) <1
   d) Sufficient data is not given

10. A particle is acted upon by a force of constant magnitude which is always perpendicular to the velocity of the particle. The motion of the particle takes place in a plane it follows that
   a) Its velocity is constant
   b) Its acceleration is constant
   c) Its kinetic energy is constant
   d) It moves in a straight line

11. A stone is just released from the window of a train moving along a horizontal straight track. The stone will hit the ground following
   a) Straight path
   b) Circular path
   c) Parabolic path
   d) Hyperbolic path

12. A cyclist riding the bicycle at a speed of $14\sqrt{3}\ ms^{-1}$ takes a turn around a circular road of radius $20\sqrt{3}\ m$ without skidding. Given $g = 9.8\ ms^{-2}$, what is his inclination to the vertical
   a) 30°
   b) 90°
   c) 45°
   d) 60°

13. When a projectile is projected at a certain angle with the horizontal, its horizontal range is R and time of flight is T_1. When the same projectile is throwing with the same speed at some other angle with the horizontal, its horizontal range is R and time of flight is T_2. The product of T_1 and T_2 is
   a) $\frac{R}{g}$
   b) $\frac{2R}{g}$
   c) $\frac{3R}{g}$
   d) $\frac{4R}{g}$

14. The equation of a projectile is $y = \sqrt{3}x - \frac{gx^2}{2}$. The angle of projection is given by

a) $\tan\theta = \frac{1}{\sqrt{3}}$ b) $\tan\theta = \sqrt{3}$ c) $\frac{\pi}{2}$ d) Zero

15. A cyclist is moving on a circular track of radius 80 m with a velocity $v = 36\text{kmh}^{-1}$. He has to lean from the vertical approximately through an angle
(take $g = 10\ \text{ms}^{-2}$

a) $\tan^{-1}(4)$ b) $\tan^{-1}\left(\frac{1}{3}\right)$ c) $\tan^{-1}\left(\frac{1}{4}\right)$ d) $\tan^{-1}\left(\frac{1}{8}\right)$

16. A particle of mass m is fixed to one end of a light spring of force constant k and unstretched length l. The system is rotated about the other end of the spring with an angular velocity ω, in gravity free space. As shown in figure the increase in length of the spring will be

a) $\frac{m\,\omega^2 l}{k}$ b) $\frac{m\,\omega^2 l}{k - m\,\omega^2}$ c) $\frac{m\,\omega^2 l}{k + m\,\omega^2}$ d) None of these

17. If a person can throw a stone to maximum height of h metre vertically, then the maximum distance through which it can be thrown horizontally by the same person is

a) $\frac{h}{2}$ b) h c) $2h$ d) $3h$

18. A particle is tied to $20cm$ long string. It performs circular motion in vertical plane. What is the angular velocity of the string when the tension in the string at the top is zero

a) 5 rad/sec b) 2 rad/sec c) 7.5 rad/sec d) 7 rad/sec

19. The maximum and minimum tensions in the string whirling in a circle of radius 2.5 m are in the ratio 5:3, then its velocity is

a) $\sqrt{98}\ \text{ms}^{-1}$ b) $7\ \text{ms}^{-1}$ c) $\sqrt{490}\ \text{ms}^{-1}$ d) $\sqrt{4.9}\ \text{ms}^{-1}$

20. Two bodies are projected from the same point with equal speeds in such directions that they both strike the same point on a plane whose inclination is β. If α be the angle of projection of the first body with the horizontal the ratio of their times of flight is

a) $\frac{\cos\alpha}{\sin(\alpha+\beta)}$ b) $\frac{\sin(\alpha+\beta)}{\cos\alpha}$ c) $\frac{\cos\alpha}{\sin(\alpha-\beta)}$ d) $\frac{\sin(\alpha-\beta)}{\cos\alpha}$