Uniform Circular Motion

1. (c) $v = r\omega \Rightarrow \omega = \frac{v}{r}$ = constant [As *v* and *r* are constant]

2. (c) As time periods are equal therefore ratio of angular speeds will be same. $\omega = \frac{2\pi}{T}$

3. (b) $F = \frac{mv^2}{r} \Rightarrow F \propto v^2$. If *v* becomes double then *F* (tendency to overturn) will become four times.

4. (b) Work done by centripetal force is always zero.

5. (c) It is always directed in a direction of tangent to circle.

6. (c) Stone flies in the direction of instantaneous velocity due to inertia

7. (c) Centripetal acceleration $= \frac{v^2}{r}$= constant. Direction keeps changing.

8. (c) Linear velocity, acceleration and force varies in direction.

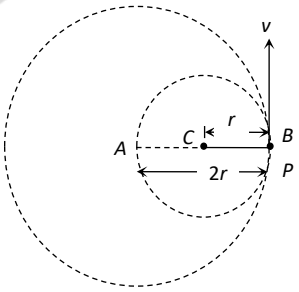
9. (b) Angular velocity of particle *P* about point *A*,

$\omega_A = \frac{v}{r_{AB}} = \frac{v}{2r}$

Angular velocity of particle *P* about point *C*,

$\omega_C = \frac{v}{r_{BC}} = \frac{v}{r}$

Ratio $\frac{\omega_A}{\omega_C} = \frac{v/2r}{v/r} = \frac{1}{2}$.



10. (b)

11. (a) $F = \frac{mv^2}{r}$. If *m* and *v* are constants then $F \propto \frac{1}{r}$

$\therefore \frac{F_1}{F_2} = \left(\frac{r_2}{r_1}\right)$

12. (a) In uniform circular motion (constant angular velocity) kinetic energy remains constant but due to change in velocity of particle its momentum varies.

13. (c)

14. (a,c) Centripetal force = $\frac{mv^2}{r}$ and is directed always towards the centre of circle. Sense of rotation does not affect magnitude and direction of this centripetal force.

15. (a) When speed is constant in circular motion, it means work done by centripetal force is zero.

16. (d)

17. (a) This horizontal inward component provides required centripetal force.

18. (a) Thrust at the lowest point of concave bridge

= $mg + \frac{mv^2}{r}$

19. (d)

20. (a) Because the reaction on inner wheel decreases and becomes zero. So it leaves the ground first.