

### Circular Motion Questions:

- In a uniform circular motion, the direction of linear velocity is along the
  - Tangent to the curve path**
  - Radius vector towards the centre
  - Perpendicular to the plane of the circular motion
  - Radius vector
- The angular speed of the wheels of a bicycle is  $8\pi$  rad/s. Their period of rotation is
  - 0.25 s**
  - 0.4 s
  - $\frac{\pi}{4}$  s
  - 4 s
- A particle describes a circular path of diameter 20 m every 2s. The average angular speed of the particle during 4s is
  - $20/\pi$  rad/s
  - $10/\pi$  rad/s
  - $5/\pi$  rad/s
  - $\pi$  rad/s**
- The speed of revolution of a particle around a circle is halved and its angular speed is doubled what happens to the radial acceleration?
  - Remains unchanged**
  - Halved
  - Doubled
  - Quadrupled
- A body is describing circular motion with constant speed  $v$  along a circular path of radius  $r$ . Then its tangential acceleration will be, [MOE]
  - $\frac{v^2}{2\pi r}$
  - $\frac{v^2}{\pi r}$
  - $\frac{v^2}{r}$
  - 0**
- Two particles of equal masses are revolving in a circular path of radii  $r_1$  and  $r_2$  respectively with the same speed. What will be the ratio of their forces?
  - $\frac{r_1}{r_2}$
  - $\sqrt{\frac{r_2}{r_1}}$
  - $\left(\frac{r_1}{r_2}\right)^2$
  - $\left(\frac{r_2}{r_1}\right)^2$
- A 600gm object is tied to a string 1m long and it is rotated in a horizontal circle of radius 0.8m. Then the tension produced in the string is,
  - $g$**
  - $\frac{g}{2}$
  - $\frac{5g}{2}$
  - $\frac{3g}{2}$
- A bucket filled with water is revolved in a vertical circle of radius 4m. The time period of revolution will nearly be if water just does not fall,
  - 3s
  - 4s**
  - 8s
  - 10s
- A body moves in a circle with radius of 25cm at 2rev/sec. The acceleration of body in  $m/s^2$  is,
  - $\pi^2$
  - $2\pi^2$
  - $4\pi^2$**
  - $8\pi^2$
- Two vehicles are describing uniform circular motion along two circular tracks of radii  $R_1$  and  $R_2$  such that these vehicles complete one revolution in equal time. Then the ratio of their acceleration is:
  - 1:1
  - $R_1:R_2$
  - $R_2:R_1$
  - $R_1^2:R_2^2$**
- A body of mass 0.1 kg tied by a string is rotating around a vertical circle of radius 1m with a speed of 10m/s. What is the tension experienced by the string at the highest point?
  - 8N
  - 11N
  - 10N
  - 9N**

### MCQs:

### SQs:

- Why are roads banked on the curved path?
- Explain why a cyclist inclines himself to the vertical while moving around the circular path?
- A uniform circular motion is an accelerated motion. Justify the statement.
- In a circus why does not a motorcyclist fall when he moves on the vertical walls of the 'well of death'?
- A solid tied at a string's end is revolved vertically. At what point the tension in the string will be the greatest?
- Why a force is necessary to keep a body moving with uniform speed in a circular path?
- What is the source of centripetal force to a satellite revolving round the earth?
- Why it is more difficult to revolve a stone by tying it to a longer string than by tying it to a shorter string?
- Define angular velocity. Derive the relation between linear velocity and angular velocity.

### Numerical:

- A particle of mass 0.3kg vibrates with a period of 2s if the radius is 0.5m. What is its maximum kinetic energy? [Ans: 0.37J]
- A coin placed on a disc rotates with a speed of  $33\frac{1}{3}$  rev/min provided that the coin is not more than 10cm from the axis. Calculate the coefficient of static friction between the coin and the disc. [Ans: 0.122]
- A stone of mass 2kg tied with string is whirled in a vertical circle of radius 1m with a constant speed of 10m/s. Find the maximum and minimum tensions of the string. (Use  $g = 9.8m/s^2$ ) [Ans: 219.6N, 180.4N]4.
- An object of mass 4kg moves around a circle of radius 6m with a constant speed of 12m/s. Calculate the angular velocity and the force towards the centre. [Ans: 2 rad/s, 96N]
- A body of mass 0.2kg is whirled in a horizontal circle of radius 0.5m by a string inclined at  $30^\circ$  to the vertical. Calculate the tension in the string and the speed of the mass in the horizontal circle. [Ans: 22.3N, 1.7m/s]