DYNAMICS OF UNIFORM CIRCULAR MOTION

1. A cyclist bends while taking turn to:
   (a) reduce friction **(b)** generate required centripetal force (c) reduce apparent weight (d) reduce speed

2. A body is moving in a circular path with. If its velocity gets doubled, then the ratio of acceleration after and before the change is: (a) 1 :2 (b) 2:1 (c) 3 1 **(d)** 4 : 1

3. A cyclist riding the bicycle at a speed $10\sqrt{3}$ m/s takes a turn around a circular road of radius $10\sqrt{3}$ m without skidding. Given, g = 10 m/s^2, what is his inclination to the vertical?
   (a) 30° (b) 90° (c) 45° **(d)** 60°

4. A car of mass 1200 kg moves on a circular track of radius 20 m. If the coefficient of friction is 0.5, then the maximum velocity with which the car move is (g = 10 m/s^2):
   (a) 15.4 m/s (b) 12.6 m/s **(c)** 10.0 m/s (d) 7.5 m/s

5. A toy car is moving along a circular path of radius 2 m. The coefficient of friction between the surface of the path and the body is 0.45. The angular velocity in rad/s, with which the body should move so that it does not leave the path is (Take g = 10 m/s^2):
   (a) 4.5 (b) 3.5 (c) 2.5 **(d)** 1.5

6. A car is moving with speed 30 m/s on a circular path of radius 500 m. Its speed is increasing at the rate of 2 m/s^2, its resultant acceleration will be nearly:
   (a) 2.3 m/s^2 **(b)** 2.7 m/s^2 (c) 2.9 m/s^2 (d) 3.5 m/s^2

7. A particle of mass 5 kg moves in a circle of radius 20 cm. Its linear speed at a time t is given by v = 4t, t is in s and v is in m/s. The net force acting on the particle at t = 0.5 s:
   (a) $20\sqrt{26}$ N (c) 104 N (b) 120 N (d) $10\sqrt{26}$ N

8. A coin placed on a rotating table just slips if it is placed at a distance 4r from the centre. On doubling the angular velocity of the table, the coin will just slip when at a distance from the centre equal to:
   (a) 4r (b) 2r **(c)** r (d) r/4

9. A cyclist moving with a velocity of 36 km/h on a flat road takes a turn at a point where the radius of curvature of the road is 40 m. The acceleration due to gravity is 10 m/s^2. In order to avoid skidding, he must not bent with respect to the vertical plane by an angle greater than:
   (a) $tan^{-1}\left(\frac{1}{4}\right)$ (b) $tan^{-1}\left(\frac{1}{3}\right)$ (c) $tan^{-1}(3)$ (d) $tan^{-1}\left(\frac{1}{2}\right)$

10. A tube one metre long is filled with liquid of mass 1 kg. The tube is closed at both the ends and is revolved about one end in a horizontal plane at 2 rev/s. The force experienced by the liquid at the other end is:
    (a) $2\pi^2$ N (b) $4\pi^2$ N (c) $6\pi^2$ N **(d)** $8\pi^2$ N

11. The banking angle for a curved road of radius 490 m for a vehicle moving at 35 m/s is:
    (a) $tan^{-1}\left(\frac{1}{2}\right)$ (b) $tan^{-1}(1)$ (c) $tan^{-1}\left(\frac{2}{3}\right)$ **(d)** $tan^{-1}\left(\frac{1}{4}\right)$