Sample Paper – 2014
Class – XII
Subject –Physics
(Rotational Motion)

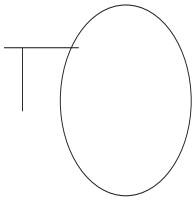
1. The radius of curvature of a convex bridge is r. A car is crossing the river with the speed v. Show that if $v \le \sqrt{rg}$ the car will not jump at the highest point .

2. What is centripetal force ? Radius of earth is 6400 km . Due to earth's diurnal rotation , what is the value of centripetal acceleration at the equator?

3. A string can bear tension not more then 16 N . A stone of mass 50gm is whirled by a string of length 50cm in a horizontal plane . At what maximum rmp the stone can be rotated so that the string does not break.

4. A billiard ball , initially at rest, is given a sharp impulse by a car . The cue is held horizontally a distance h above the centre line as shown in the fig . The ball leaves the cue with a speed v_o and because of its forward english (backward slipping) eventually acquires a final speed $\frac{9}{7}v_o$.

   Show that $h = \frac{4}{5}R$, where R is the radius of the ball.



5. A uniform cylinder of mass M and radius R rolls without slipping down a slope of angle θ to the horizontal . The cylinder is connected to a spring of spring constant K while the other end of the spring is connected to a rigid support at P. The cylinder is released when the spring is unstretched . Show that the maximum distance that the cylinder travel is $\frac{2Mg\sin\theta}{k}$.

6. If the radius of earth shrinks by $\frac{1}{2}$ %, what will be the change in the length of a day? Assume the earth to be a uniform sphere and its moment of inertia , $I = \frac{2}{5}MR^2$, M=mass and R=radius of earth.
7. If the value of the gravitational constant is gradually decreases , what will be the effects on the motion of the moon ? Explain.
8. Distance between the centers of two stars is 10cm. The masses of these stars are M and 16M and their radii a and 2a respectively . A body of mass m is fired straight from the surface of the large star towards the smaller star. What should be the minimum initial speed to reach the smaller star ? Also obtain the expression in terms of G,M and a.
9. A second pendulum loses 20sec. per day . how its length should be changed so that it may give the correct time ?
10. An object is projected vertically upward with a velocity u. Show that the maximum height reaches by the object is $h = \frac{u^2 R}{2gR - u^2}$. Calculate escape velocity from it.

Paper Submitted By:

Name: Pintu paul
Email: pintupalphysics08@gmail.com
Phone No. 9774434119