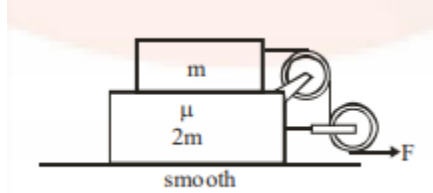# CH-5 (LAWS OF MOTION)

The minimum value of μ between the two blocks for no slipping is

(A) F/ mg
(B) F/ 3mg
(C) 2 F /3mg
(D) 4 F/3 mg

1. A man stands in a lift going downward with uniform velocity experiences a loss of weight at the start but not when lift is in uniform motion.
2. Earth is rotating frame of reference even then it is considered as inertial frame of reference for all practical purpose, why?
3. Why are mountain roads generally made winding upwards rather than going straight up?
4. A block slides down an inclined plane of angle θ with constant velocity. It is then projected up the same plane with an initial velocity v_0. How far up the inclined plane will it move before coming to rest?
5. $\mu = 0.1$ is the coefficient of friction between the wedge and the horizontal surface then for what maximum value of m in kg, the wedge remains at rest [take M = 18 kg $\theta = 45°$].
6. A thin circular loop of radius R rotates about its vertical diameter with an angular frequency ω.
   Show that a small bead on the wire remains at its lowermost point for $\omega \leq \sqrt{\dfrac{g}{R}}$
7. A nucleus is at rest in the laboratory frame of reference. Show that if it disintegrates into two smaller nuclei the products must move in opposite directions.
8. A curve in a horizontal road forms an arc of radius 50 m. A car is speeding on this road, approaching the curve. The height of centre of gravity of the car from the road level is 0.4 m and distance between its wheel is 1 m. Calculate the maximum safe velocity of the car at which it can travel round the curve. What will happen if the velocity is exceeded.
9. Vandana went to a circus with her father on weekend. There she found most exciting event which is 'well of death' in which a biker was riding a motorcycle in a big ball of iron. The motorcycle was driven in all the directions from upside down to left and right. She was amazed to find that the biker did not fall down. Her father told her that this biker is specially trained for this and he knows with what velocity he should drive the motorcycle so that it could not fall.

   A. Find out the the expression of the minimum velocity of the biker so that he could not fall.
   B. If the diameter of the ball is 50 m, the motorcyclist be at the uppermost point of the vertical loop, what is the minimum speed at lowest and highest point of the loop?
10. A neutron of mass 1.67 X 10^{-27} kg moving at 3 X 10^6 m/s collided with a proton at rest and sticks to it to form a deuteron. Find the speed of deuteron.