INDIVIDUAL ASSIGNMENT

Assignment II

1. i) What do you mean by the co-efficient of kinetic friction?

   ii) What is meant by pseudo force? why is centrifugal force a pseudo force.

   iii) In a head-on collision between a compact 1000-kg car and a large 2500-kg car, which one experiences the greater force? Explain. Which one experiences the greater acceleration? Explain why. Why are passengers in the small car more likely to be injured than those in the large car, even when the two car bodies are equally strong?

   iv) Suppose you are in a rocket with no windows, traveling in deep space far from other objects. Without looking outside the rocket or making any contact with the outside world, explain how you could determine whether the rocket is accelerating in the forward direction.

2. Suppose you are having a dinner with your family. You asked your brother to pass on ketchup bottle. He (manner-less) slides the ketchup bottle across the table The bottle leaves his hand moving at 2.8 m/s, then slows down as it slides because of a constant horizontal friction force exerted on it by the table. It slides for 1.0 m before coming to rest. What are the magnitude and direction of the friction force acting on the bottle? The mass of Ketchup bottle is 0.45 kg.

3. A ball is dropped from rest and feels air resistance as it falls. Which of the graphs in Fig.1 best represents its acceleration as a function of time?

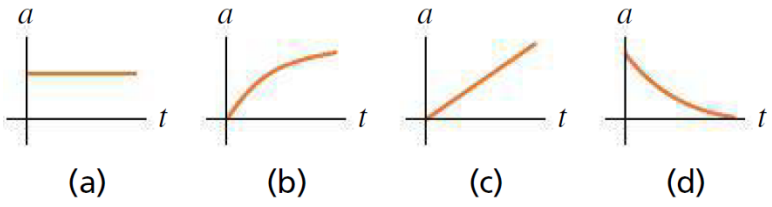

FIG. 1:

4. The flywheel of an engine has moment of inertia 2.00 kg/m^2 about its rotation axis.

What constant torque is required to bring it up to an angular speed of 450 rev/min in 7.90 s, starting from rest?

5. Consider four objects, all solid spheres. Sphere (A) has radius r and mass m, (B) has radius 2r and mass m, (C) has radius r and mass 2m, and (D) has radius r and mass 3m. All can be placed at the same point on the same inclined plane where they will roll without slipping to the bottom.

   (a) Which object has the largest rotational inertia?

   (b) If released from rest, which object will experience the largest linear acceleration?

   (c) If allowed to roll down the incline, which object will have the largest speed at the bottom of the incline?

   (d) If allowed to roll down the incline, which object will reach the bottom of the incline in the shortest time?

6. Where is the center of mass of three particles shown in Figure **??**

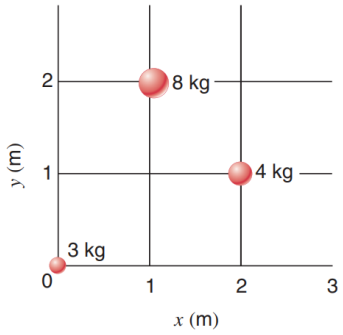

FIG. 2:

7. Draw a Free-body diagram of the following figure

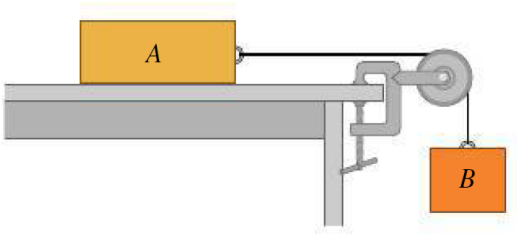

FIG. 3: