THE INTERNATIONAL UNIVERSITY (IU) – VIETNAM NATIONAL UNIVERSITY - HCMC
FINAL EXAMINATION – CLASS
Student Name:_____Student ID:_____
Date: JUNE 2021
Duration: 48 hours (10:15 AM 22/06/2021 – 10:15 AM 24/06/2021)
GROUP 2

SUBJECT: PHYSICS 1	
Head of Department of Physics: Signature: Full name: Phan Bao Ngoc	Lecturer: Signature: Full name: Do Xuan Hoi

Question 1 (20 pts) A small package of mass 0.2 kg is released from rest at the point A of a track in the form of a quarter circle of radius 1.6 m. It reaches the lowest point B of the track at 4.8 m/s and continues to move on the horizontal surface (Fig.1). The package comes to rest at the point C.
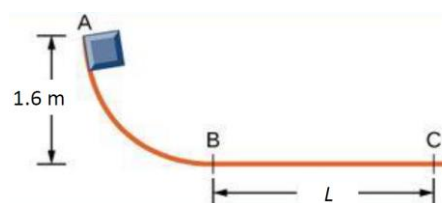

Fig. 1

a/ Is there a friction force between the arc AB and the package? Explain your answer and compute the work of this friction.

b/ Knowing that the coefficient of friction between the horizontal surface and the package is 0.4. What is the length $L = $ BC?

Question 2 (20 pts) An object of mass m is attached to one end of a vertical spring. The other end of the spring is fixed. When the object is at its equilibrium position , the spring is stretched a distance of 20 cm.

Now, the object is put at the position where the spring is unstretched (the spring has its natural length) and the object is released to move vertically.

a/ What is the maximum extension of the spring?

b/ Knowing that $m = 4$ kg, compute the spring constant.

Question 3 (20 pts) A bullet with mass 5 g moves horizontally and stuck in a block of wood with mass 2kg, suspended from the ceiling. After the collision, the blocks (with the bullet inside) swings up to the maximum height of 3cm with respect to its initial position.

a/ Compute the initial speed of the bullet.

b/ Is the collision elastic? If this is an inelastic collision, why is there a loss of mechanical energy?

Question 4 (20 pts) A bar hung vertically can rotate freely around a pivot attached to the ceiling. A small ball with mass 3 kg flies horizontally at 10 m/s strikes the bar at the point 1.5 m from the pivot and rebounds in opposite direction at 6 m/s, the bar has 5.8 rad/s as angular speed just after the collision.

a/ What is the moment of inertia of the bar with respect to the pivot?

b/ Is there any difference between the kinetic energies of the system bar – ball before and after the collision?

Question 5 (20 pts) A cylinder of radius 0.5 m and mass 1 kg can rotate around its fixed symmetrical, horizontal axis. A light cord wound around this cylinder is pulled by a constant force from rest and after 160 s, a point of the cord has 4m/s as linear speed.

a/ Compute the angular acceleration of the cylinder.

b/ What is the work of the force done on the cylinder

END OF QUESTION PAPER