**PHYS 123, Lab 12 Questions**

**Name**: Markiyan Varhola

**CWID**: A20324717

1. Answer the following questions using the data you acquired in this experiment:

(a) Using the parallel axis theorem, write down the equations for the moment of inertia of a short

disk attachment and the short cylindrical tube. Calculate the moments of inertia using the measured values of mass and radius.

Part 1:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **r (m)** | **m (kg)** | **a** | **I (disk)** | **I (theoretical)** |
| 0.0125 | 0.1 | 1.25 | 0.01 | 0.01 |
| 0.0125 | 0.15 | 1.9 | 0.01 | 0.01 |
| 0.0125 | 0.2 | 2.75 | 0.01 | 0.01 |
| 0.018 | 0.1 | 1.93 | 0.01 | 0.01 |
| 0.018 | 0.15 | 2.92 | 0.01 | 0.01 |
| 0.018 | 0.2 | 3.93 | 0.01 | 0.01 |

Part 2:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **I (disk)** | **w (i)** | **w (f)** | **I (hoop)** | **I (hoop) (theoretical)** |
| 0.01 | 10.38 | 6.164 | 0.007 | 0.007 |
| 0.01 | 11.33 | 7.03 | 0.006 | 0.007 |
| 0.01 | 11.48 | 7.24 | 0.006 | 0.007 |
| 0.01 | 14.97 | 9.351 | 0.006 | 0.007 |

(b) How well do the experimental values agree with the expected theoretical moments of inertia

when calculated using the parallel axis theorem?

*The experimental values for the moments of inertia were very accurate to the expected theoretical moments of inertia, as they very close.*

(c) How well is the angular momentum conserved in the second experiment? Is this collision elastic or inelastic? Explain using energy relations.

*The angular momentum wasn’t perfectly conserved due to factors such as friction and due to the fact that energy was lost out of the system in the form of heat and sound. The collision therefore was inelastic as energy was lost during the collision, and there was less energy after the collision.*

2. In a clear and concise manner, describe your observations of the single ball experiment.

Explain how the conservation of angular momentum can account for the behavior of the graph obtained. In the same manner, describe and explain your observations of the three-ball experiment.

*After the rotating platform was spun, the single ball remained stationary at the end of the bar. As the platform began to slow down, the ball eventually rolled down the inclined platform toward the center of the frame, and the platform increased its angular velocity. Because the moment of inertia of the platform decreased, the platform accelerated to compensate for the change of angular momentum. The three ball experiment was similar, where the three balls slid down separately, starting with the innermost ball. After the first ball slid down, the platform increased its angular velocity while the two other balls remained at the edge. This continued with the other two balls until eventually the platform came to a stop.*

