□ PHYS1050 / □ PHYS1250	
Ref. (Staff use)_____________	

Laboratory Worksheet
Experiment NE02 - Rotary Motions
Department of Physics
The University of Hong Kong

Name: ____________________ Student ID: _____________________ Date: ______________________

Experiment 1

Table 1.1 Measurements of apparatus

Total mass ($m_1 + m_2$) (g)	148.5
Distance between rotational axis and point mass R (cm)	7.5

Table 1.2 Data of experiment with point masses plus apparatus

Mass of hanging mass m (g)		
Radius of pulley r (cm)		
Slope of best-fit angular velocity-time graph (rad s^{-2})	1	2

Table 1.3 Data of experiment with apparatus alone

Mass of hanging mass m (g)		
Radius of pulley r (cm)		
Slope of best-fit angular velocity-time graph (rad s^{-2})	1	2

Experiment 2

Table 2.1 Measurements of apparatus

Mass of disk M_d (g)	120
Mass of ring M_r (g)	450
Inner radius of ring R_i (cm)	
Outer radius of ring R_o (cm)	
Radius of disk R_d (cm)	

Table 2.2 Data of experiment with disk plus ring

Mass of hanging mass m (g)		
Radius of pulley r (cm)		
Slope of best-fit angular velocity-time graph (rad s^{-2})	1	2

Table 2.3 Data of experiment with disk alone

Mass of hanging mass m (g)		
Radius of pulley r (cm)		
Slope of best-fit angular velocity-time graph (rad s^{-2})	1	2

Experiment 3

Table 3.1 Measurements of apparatus

Mass of disk M_d (g)	120
Mass of ring M_r (g)	450
Internal jaw radius of ring R_i (cm)	
External Jaw radius of ring R_o (cm)	
Radius of disk R_d (cm)	

Table 3.2 Data of experiment

Initial angular velocity ω_i (rad s^{-1})	1	2
Final angular velocity ω_f (rad s^{-1})	1	2

Calculation and Analysis

Please use your experimental result to answer following questions.

Experiment 1

Calculate the theoretical value of the moment of inertia of the point masses.

Calculate the experimental value of the moment of inertial of the point masses.

(Hint: Subtract the experimental value of the moment of inertia of the point masses plus the apparatus with that of the apparatus alone to get this value.)

Find the percentage difference between the theoretical and experimental values.

Experiment 2

Calculate the theoretical value of the moment of inertia of the ring.

Calculate the theoretical value of the moment of inertia of the disk.

Calculate the experimental value of the moment of inertial of the ring.
(Hint: Subtract the experimental value of the moment of inertia of the ring plus the disk with that of the disk alone to get this value.)

Calculate the percentage difference between the theoretical and experimental values of the moment of inertia of the ring.

Find the percentage difference between the theoretical and experimental values of the moment of inertia of the disk.

Experiment 3

Calculate the theoretical value of the final angular velocity.

Check whether the result of this experiment agrees with the conservation of angular momentum.
Find the percentage difference between the theoretical and experimental values of the final angular velocity.

Find the percentage loss of kinetic energy during the collision.
(Hint: The kinetic energy of a rotating body is given by $\frac{1}{2}I\omega^2$.)