Name: _____ BU ID: _____ Lab Section: _____

Partner's name: _____ BU ID: _____ Date: _____

TF's signature: _____

PY105 Torque and Moments of Inertia -MBL

Report Sheet

Fill in all the blanks and answer all the questions. Check with your TF to make sure that you have done everything before you leave.

Part1 – Determine the moment of inertia of the top steel disk. (2.32 points)

M =_____(Kg) (0.1 point)

R =_____(m) (0.2 point)

I_{cal} = ½ MR^2 =_____($Kg \cdot m^2$) (0.2 point)

Table1 (0.07 point × 26 = 1.82 point; no credit for values of m)

	m (kg)	**α_{down} ($rad \cdot s^{-1}$)**	**α_{up} ($rad \cdot s^{-1}$)**	**α ($rad \cdot s^{-1}$)**	**I (from eq(3)) ($Kg \cdot m^2$)**
Pulley1					
b=_____m					
Pulley2					
b=_____m					

Part2 – Determine the moment of inertia of the ring. (1.78 points)

b =_____(m)

M_{ring} =_____(Kg) (0.1 point)

R_{inner} =_____(m) (0.1 point) R_{outer}=_____(m) (0.1 point)

$I_{cal} = ½ M(R_{inner}^2 + R_{outer}^2)$ = _____($Kg \cdot m^2$) (0.2 point)

$M_{ring\text{-}cover\text{-}disk}$ = _____(Kg) (0.1 point)

$R_{ring\text{-}cover\text{-}disk}$ = _____ (m) (0.1 point)

$I_{ring\text{-}cover\text{-}disk} = ½ M_{ring\text{-}cover\text{-}disk}R_{ring\text{-}cover\text{-}disk}^2$ = _____($Kg \cdot m^2$) (0.18 point)

Table. 3 (0.06 point × 15 = 0.9 point; no credit for values of m)

m (kg)	**α_{down} ($rad \cdot s^{-1}$)**	**α_{up} ($rad \cdot s^{-1}$)**	**α ($rad \cdot s^{-1}$)**	**I (from eq(3)) ($Kg \cdot m^2$)**	**$I_{tot} - I_{other}$ [a] ($Kg*m^2$)**

[a] I_{other} is the sum of the moment of inertia of the rotating steel disk and the ring's cover disk.

Part 3 – Determine the moment of inertia of the bar (1.3 points)

b =_____(m)

M_{bar} =_____(Kg) (0.1 point)

L =_____(m) (0.1 point)

$I_{cal} = M_{bar}L^2/12$ = _____($Kg \cdot m^2$) (0.2 point)

Table. 4 (0.06 point × 15 = 0.9 point)

m (kg)	**α_{down} (rad·s^{-1})**	**α_{up} (rad·s^{-1})**	**α (rad·s^{-1})**	**I (from eq(3)) (Kg·m^2)**	**$I_{tot} - I_{disk}$ [a)] (Kg*m^2)**

[a)] I_{disk} is the moment of inertia of the steel top disk.

Part 4 – Additional Questions (4.6 points)

Question 1. You should find that the values of the angular acceleration are different for the motion on the way up and on the way down. Why? (0.2) Draw free-body diagram of the top disk, including the *frictional torque*, when the mass is moving down (0.5 point) and moving up (0.5 point), respectively, to help answer the question. **(1.2 point)**

Question 2. By combining your two values of α appropriately, you can obtain a value of α that is not affected by the frictional torque. Explain how you should combine the two values.(**1 point**)

Question 3. If in Part 3, you had mounted the disk or bar vertically on the disk instead of lying it flat, would the moment of inertia have been the same, larger, or smaller? (0.2point) Explain.(1point) (**1.2 point**)

Question 4. If, in Part 3, you had mounted the disk or bar off-center would the moment of inertia have been the same, larger, or smaller? (0.2) Explain. (1 point) (**1.2 point**)

Pre-lab: _____ (10 × 20% = 2 points)

Lab: _____ (10 × 80% = 8 points)

- Punctuality (1 ponint) + performance (1point): _____ (2 points)
- Report sheet _____ (10 points × 80% = 8 points)

Total: _____

TF: _____ Grader: _____