SAKARYA UNIVERSITY
FACULTY OF
ENGINEERING/SCIENCE
2025-2026 FALL SEMESTER
PHYSICS-I LABORATORY
EXPERIMENT REPORT

Department:

Name Surname - Signature:

Group Number:

EXPERIMENT NO	**3**

EXPERIMENT TITLE : NEWTON'S LAWS OF MOTION

OBJECTIVE OF THE EXPERIMENT *(5 points)*:

THEORY OF THE EXPERIMENT *(8 points)*:

1. Write and explain Newton's laws of motion. (Note: Write the names and units of the quantities in all mathematical equations).

2. Define Atwood machine and explain what it is used for.

EXPERIMENTAL SETUP:

1. **Draw the setup used in the experiment.** *(3 points)*

2. **Write the names of the materials used in the experiment and briefly explain them.** *(3 points)*

PROCEDURE OF THE EXPERIMENT:

Explain the steps of the experiment procedure completely and sequentially. *(5 points)*

MEASUREMENTS AND CALCULATIONS

1) Spescify the magnitudes of masses m_1 and m_2. *(5 points)*

   m_1=.......................... g

   m_2=..........................g

2) **Fill the table below appropriately using the data you obtained.** *(5 points)*

Point No "n"	m_1 mass			m_2 mass		
	Y_n(cm)	t_n(sn)	t_n^2(sn^2)	Y_n(cm)	t_n(sn)	t_n^2(sn^2)
0						
1						
2						
3						
4						
5						
6						

3) D r a w t h e y-t ^{2} graph for mass m_1 on graph paper and find acceleration a_1 using the slope of this graph. *(15 points)*

4) Draw the **y-t ^{2}** graph for mass **m_2** on graph paper and find the acceleration **a_2** using the slope of this graph. *(15 points)*

5) Take the arithmetic mean of accelerations a_1 and a_2 for the experimental acceleration value. *(5 points)*

6) Calculate the theoretical acceleration value using the formula. Perform the % error calculation for the accelerations. (**Take g=980 cm/s₂**) *(5 points)*

$$a = \frac{(m_2 - m_1)g \sin \phi}{m_1 + m_2}$$

7) Calculate the experimental value of the gravitational acceleration using the formula below, and perform the % error calculation for the gravitational accelerations by taking the theoretical value as **g=980 cm/s²** *(5 points)*

$$g_{deneysel} = \frac{a_{deneysel}(m_2 + m_1)}{(m_2 - m_1).\sin \phi}$$

8) Calculate the magnitude of the tension force in the string using the formula $T = \frac{2m_2 m_1 g \sin \phi}{m_1 + m_2}$ **(Use g experimental)** *(5 points)*

9) Interpret the results obtained in the experiment. *(5 points)*

EXPERIMENT QUESTIONS

1) Define what Force is. *(3 points)*

2) What is the relationship between the acceleration of an object and magnitude of the net force $\vec{F}$ (F) acting upon it? *(4 points)*

3) If an object is at rest, can you say that there are no external forces acting upon it? Explain. *(4 points)*