|  |  |
| --- | --- |
| **Name:** | Your Name |
| **Title:** | Lab #, Title of Lab |
| **Date:** | Date |
| **Lab Partners:** | Lab Partner Names |

# Abstract

The abstract encapsulates the major portions of the report and addresses an audience that might not read the rest of the document. It may be read by both engineers looking for data and non-engineers, managers who will make crucial decisions about engineering projects.

The abstract provides a concise overview of your work. The information must be communicated in such a way that the reader can understand what was done, and what the outcome was, without having to read the rest of the report. Abstracts are short; they are usually about one-third of a page long, (four to six sentences), and they are results-and-conclusion-oriented. It should read smoothly and coherently, not like a collection of sentences from different parts of the report. The abstract primarily describes, in order, the problem or goal, the method, and the result. It generally describes the contents of the main format sections of your report: The objective or problem statement, the methodology, the result, and the analysis. In short, your abstract should provide one/two-sentence answers to these questions:

1. What is (are) the Objective(s) of the experiment? (Introduction)
2. What is the significance of this objective? (Introduction)
3. What type of experiment was conducted in order to achieve the objective(s)? (Procedures)
4. What major results were obtained by conducting the experiment? (Experimental Data)
5. How was the data evaluated? (Analysis)
6. What conclusions were drawn from these results? (Conclusions)

Although the abstract is placed at the beginning of the report, (for easy access by the reader); *it should be written last*, after the rest of the report has been completed. See the Long Report Format document for an example Abstract.

# Experimental Data & Results

Raw and calculated data will be presented here in tabular and graphical form. **Descriptions of the data are not required.** The most important aspect of this section is that all required data is clearly presented and correct. Shown below are examples of a table and figure with proper formatting.

Table , Velocity and Kinetic Energy of Masses 1 and 2

|  |  |  |
| --- | --- | --- |
| **Velocity (m/s)** | **Kinetic Energy of Mass 1 (J)** | **Kinetic Energy of Mass 2 (J)** |
| 1.00 | 1.23 | 0.62 |
| 2.00 | 4.90 | 2.48 |
| 3.00 | 11.03 | 5.58 |
| 4.00 | 19.60 | 9.92 |
| 5.00 | 30.63 | 15.50 |
| 6.00 | 44.10 | 22.32 |
| 7.00 | 60.03 | 30.38 |
| 8.00 | 78.40 | 39.68 |
| 9.00 | 99.23 | 50.22 |
| 10.00 | 122.50 | 62.00 |
| 11.00 | 148.23 | 75.02 |
| 12.00 | 176.40 | 89.28 |



Figure , Deflection vs. Load for a Steel Beam

# Discussion

The Discussion section is devoted to interpretation of the outcome of the experiment or project and explicitly states and supports any conclusions that can be drawn from the material shown in the Data and the Analysis section. You should describe and explain (not just restate) all of your results including any significant sources of error, measurement uncertainty, and any recommendations for future work. Describe any logical projections from the outcome, for instance the need to repeat the experiments or to measure certain variables differently and/or an assessment of the quality and accuracy of your procedure.

Specifically, the Discussion section should present your responses to questions like these:

1. What does the data tell me, (Conclusions)?
2. Do the results compare well with expected or predicted values?
3. If not, what might account for theses discrepancies?
4. What would be recommended to improve the procedure in order to overcome these discrepancies?

In responding to such questions, it is appropriate for authors to comment on problems making measurements and to indicate what such problems mean with regard to the objective(s) of the project.

# Sample Calculations

When showing calculations, students must do the following things. First, they must show the equations used. Second, they must show the steps in finding the solution. Third, they must show the final result. To do this correctly, students must first write the basic equation in terms of variables; then, they must rewrite that equation substituting experimental values with units for variables. Finally, they should show the calculated answer with units, paying attention to significant figures (digits).

After the numerical calculation has been shown, the student must describe in detail how the equations were used, which experimental values were used for each variable, and what physical forces or structures were represented by each variable or expression in the equation.

## Example Equation

Let the input signal be described by:

|  |  |  |
| --- | --- | --- |
|  |  | (1) |

Where is the signal amplitude, is the peak-to-peak voltage amplitude, is the angular frequency, and , where is the frequency and is the period of the signal. The root-mean-square of the signal is defined as:

|  |  |  |
| --- | --- | --- |
|  |  | (2) |

Note that this result, , is valid only if the input voltage is sinusoidal. For instance, for a square wave, it is easy to show that .