WRITING A LABORATORY REPORT

This document provides information on the format and guidelines in writing the Laboratory Report. It also gives an outline of the assessment criterion and weightings (see Appendix 2.)

a. The laboratory report should be typed written. However, if access to computer poses a difficulty, then a hand written report may be permitted. (Consult your laboratory instructor for permission).

b. The laboratory report will be graded and should therefore be written with the view to inform and convince your instructor how much you know of the subject. The report should be written with the assumption that the reader knows nothing of the subject and is being enlightened (in other words, do not omit relevant information which will inform your instructor because you assume your instructor already knows the subject matter).

c. Diagrams are useful in engineering to demonstrate, illustrate, clarify and support the written content. Well labeled diagrams should therefore be provided where applicable.

d. The student is expected to do literature search (research) and reading before, during and after the laboratory exercise to inform him/herself on the subject. References of the literature read are to be included in the report.

e. The laboratory report should be presentable, enclosed in a folder (optional - your instructor will advise if folder is required) and properly organized in the sequence of Cover page and Body as outlined below.

COVER PAGE

The cover page (see Appendix 1) shall bear the following identification information.

Title: (Name of the experiment); Experiment No.; Date of Experiment.

Institutional Affiliation: Name of Institution, Group; Lecturer's Name;

Name: (Your name); Date of submission, ID #.

BODY:

The body bears the content of your report and includes the following:

Table of Contents (optional): Aim, Theory, Method, Results, Calculations, Discussion, Conclusion, References.

LABORATORY REPORT

Section I

1. AIM:

   This is a brief statement of the intent and purpose of the experiment, indicating what is to be accomplished at the end of the experiment (e.g. to verify, to investigate, to measure, to determine, to compare…). The aim must clearly state what the final engineering objectives are, and **must** be supported with proper cited engineering references. (Do not reproduce the aim normally given on the laboratory instruction sheet).

2. THEORY:

   This segment explains the fundamental principles on which the experiment is based and should be concise. It should establish the engineering and scientific details surrounding the subject matter to be investigated, inclusive of relevant equations. The theory must include proper cited engineering references.

   (NB. Extracts of sentences / paragraphs of original works of authors photocopied or scanned are not acceptable as your theory).

3. OBJECTIVE(S):

   The objective(s) state what activities were done during the laboratory in order to fulfill the AIM. After an appropriate introductory statement, the objectives are to be listed in terms of specific verbs that describe the activities such as *measure, determine, test* etc. See the example below:

Example: To investigate the behaviour of a three phase four pole Delta connected alternator under varying conditions of load, the following were the objectives:

- To interpret ……..
- To construct ……
- To measure ……..
- To plot ……..
- To analyze ……

Section I *is an Executive Summary. After reading this section of the report, one should be familiar with the expectations of the laboratory as it should have the appropriate facts, references and citations relevant to the subject matter.*

Section II

4. EQUIPMENT:

   A listing of all the equipment and their specifications used in the conduct of the experiment must be included, indicating any anomalies observed or taken into consideration. (Laboratory staff should try to avoid on-the spot addition of items to be used on the day of the laboratory.)

5. METHOD / DESIGN INSTRUCTIONS:

   This reflects the instructions normally given on the lab instruction sheet, or in case of a design, the instructions that are used to develop the engineering system design. The instructions given must be clear and unambiguous to the student. The student need not reproduce these instructions, but should instead, summarize the methodology in a few paragraphs, using his / her own words.

6. RESULTS (OBSERVATIONS):

   This is the most critical segment of the exercise. In this section, information on the observations and data recorded are presented. Measurements are to be entered in a table, and the units in which the measurements were taken are to be clearly indicated. All tables should be properly labeled and numbered for referencing.

The sheet bearing the data collected in the laboratory must be signed by the Instructor / Technical staff and must be attached to the laboratory report on submission. (Omissions will be viewed as a serious infraction and is grounds for disciplinary action.)

SECTION III - Analysis of the Results

In this segment of the laboratory report, theories, equations and established engineering arguments are used to confirm that what was learnt and experienced in the experiment is in accordance with what is documented in the engineering discipline and is governed by the laws of engineering. The main engineering ideas that are gleaned from the analyses must be highlighted in this section.

7. CALCULATION:

   One clear worked example for **each** different type of calculation performed in your experiment should be presented as a sample of your calculation procedure, using relevant data obtained in your results. (**NB**. Do not submit pages full of calculations for each and every test value recorded; this just wastes your time and paper.)

8. UNCERTAINTY / ERROR ANALYSIS:

   There are expectations of differences between nominal values and measured values in any experiment. These are an inherent characteristic of experiments. Therefore, some estimation of the experimental uncertainty (error) is necessary to help explain the results and to verify if the scientific principle holds for the test. The student **must** therefore demonstrate this knowledge and indicate the percentage deviation of their experimental results from the expected results. Proper engineering references **must** be cited for this section.

   When asked to compare two quantities, such as a theoretical value, T, to an experimental value, E, be sure to calculate the percentage error, given by the formula:

$$\%Error = \frac{|T - E|}{T} \times 100$$

   Where T is the theoretical value and E is the experimental value, the result being an absolute value.

9. DISCUSSION:

In this segment, the engineering student should demonstrate his / her engineering abilities and comprehension. This is where you present what you accomplished in your own words, exposing your understanding, thoughts and opinion on the subject matter. Note however that your expressions **must** be backed by sound engineering principles, laws and theories. The student must seek to express him/herself to show his / her growth and development in thoughts about engineering.

The discussion section carries a significant weighting of the marks allocated to your laboratory report. Your discussion should be carefully organized and must include considerations of all of the following aspects of your experiment: results, interpretation of results, and uncertainty in results. (The content of the report is what is of importance, and not necessarily the length).

Results

• What is the connection between your measurements and your final results?

• What are the results of your calculations?

• What trends are noticeable?

• How did the independent variables affect the dependent variables?

Interpretation of results

- What is the theory or model behind the experiment you performed?
- Did your experimental results substantiate / agree with the theory? **Why or why not**? (Be sure to refer specifically to your experimental results!)

Uncertainty in results

• How much did your results deviate from expected values?

• What is your percentage error? – Indicate how confident you are of your results.

• Discuss any possible errors that may have occurred during the experiment. What Are the major sources of error? How did these affect your results?

• How could the experiment be improved?

10. POST LAB QUESTION

For some laboratory exercises, questions may be set to test students on the expected learning outcomes of the experiment. Students are to provide answers to questions appearing on the laboratory instruction sheet. Show calculations and diagrams where necessary.

11. CONCLUSION:

The conclusion segment is a summary of all the previous segments and should be no more than one page. Three paragraphs are recommended in the following condensed format:

- Pre-Laboratory Preparation
- The Given and the Known
- The Observed, the Ascertained and the Confirmed

12. LIST OF REFERENCES

Sources of information are usually arranged and numbered in alphabetical order according to the author's surname. UTech adapts the APA (American Psychological Association) format for publications, and formats are obtainable from their website www.apa.org. The APA format for some reference materials are:

Book

Author, (year). Title of the book & edition in italics. Publisher

Journal

Author, (year). Title of paper, Journal name, Vol. #, page #

Conference Paper

Author, (date). Title of paper in italics, where presented.

Thesis

Author, (year), Title, Ph.D. Thesis, name of University

Note: No less than **five** references should be submitted for the laboratory report, of which no more than **two** should be web-site references. It is not expected that a large number of students will submit the same list of references.

Appendix 1

UNIVERSITY OF TECHNOLOGY, JAMAICA

Faculty of Engineering & Computing

Laboratory Report

Title of Experiment:

Experiment #:

Date:

Instructor:

Course Name:

Programme:

Submitted by:

Date :

ID No. **:**

Appendix 2

UNIVERSITY OF TECHNOLOGY, JAMAICA

of Engineering

Laboratory Assessment Sheet

LABORATORY EXERCISE No:_____

TITLE EXERCISE:_____

DATE:_____

Group No:
Name:
Students' I.D.#:
Comments on Participation:

Pre-Lab Research (completion of preparatory work and readiness to begin experiment)

Pre-Lab Research	[ ]	0 - 2 Marks
Pre-Lab Answers	[ ]	0 - 2 Marks

LABORATORY WORK

Participation	[ ]	0 – 4 Marks
Graph (s)	[ ]	0 – 2 Marks
Result(s)	[ ]	0 - 2 Marks

LAB REPORT - DISCUSSION / CONCLUSION

* Discussion	[ ]	0 – 4 Marks
*Conclusion	[ ]	0 – 4 Marks

DEDUCTION(S)

Late Laboratory Report	[ ]	1-10 Marks (2nd Day)

TOTAL MARKS (Max. 20) [ ]

Individual Laboratory Reports are to be submitted by students

FORM No.:_____ **DATED:**_____