CHAPTER 1
INTRODUCTION TO TECHNICAL REPORT WRITING

1.1 Introduction

A technical report is a formal report designed to convey technical information in a clear and easily accessible format. It is divided into sections which allow different readers to access different levels of information. This hand-out gives the commonly accepted format for a technical report, explains the purposes of the individual sections; and gives hints on how to go about drafting and refining a report in order to produce an accurate, professional document.

The basic format of the technical report is applicable to most of the writing you will complete in your engineering classes. It, like most scientific or technical writing, should convey information in an objective, fact – based manner – a style that ensures technical information and processes that can be relayed from you to readers in a clear, efficient fashion.

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The most important information in technical reports is the steps you followed or the events that occurred; your opinions should not make their way into the text. The third person, passive voice is required since it allows you to write with more objectivity and keeps the emphasis of the writing on the processes you followed and the products you built, rather than on your experiences or role as a technician.

1.2 Components of a Technical Report

The technical report is a kind of writing you will engage in throughout your academic and professional career. It should contain the following sections:

Title Page:

The title should be brief, meaningful and describe the contents of the report. The title identifies the subject and indicates the purpose of the study. It includes the title, authors name, registration number, course name and number, department name, instructor’s name, company / Institution name, and is not numbered.

Executive Summary / Abstract:

Academicians typically require either an executive summary or an abstract with technical reports, but not both. The executive summary should give a concise and clear overview of the entire experiment or topic to be discussed and should be the main explanation of the entire report. Readers should be able to gain all necessary information from the Executive Summary and sometimes will read only this part. It should be written in third person, passive voice, and past tense because it explains work already done.

Contents or Table of Contents:

It includes numbers and lists of all section and subsection headings with page numbers.

Introduction:

This section provides a context for the work discussed in the report. Therefore, it

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- Defines the experiment / work performed.
- Defines the scientific purpose or objective for the experiment
- Includes a description of the problem and reasons for the work being done.
- Gives sufficient background information to the report.
- Must answer the questions: why was this study performed? What is the specific purpose of the study?

The Sections which make up the body of the report:

This section is divided into numbered and headed sections. These sections separate the different main ideas in a logical order.

Theory:

This section is mostly embedded in the introduction, especially if it is simple and the paper is reporting a specific sub-task like a lab experiment. Theory explains the technical background of the work. It usually included the mathematical equations, models, and formulae, as well as the scientific relations in its final forms, which governs the work, referenced to its original sources. If any derivations are required or

needed to backup the work, they are detailed in the appendix and only the beginning and final relations are mentioned in this part, with reference to the appropriate section in the appendix. Any equations or models should be formatted and numbered according to the standards followed in the technical writing.

Apparatus:

This section lists all equipment and materials used in the experiment. Be sure to include identification labels of all equipment.

Experimental Setup:

This section provides details of the setup needed to carry out the experiment or work. It could be a circuit diagram or a mechanical setup.

Experimental Procedure:

This section describes and explains the steps and process of the experiment in chronological order. You should:

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- Give detailed information in a paragraph structure that allows the reader to duplicate / repeat the experiment exactly.
- Give the information in a step – by – step format.
- Write mainly in the passive voice.

Sample Calculations:

These are part of the results sections. Calculations are usually based on equations and mathematical relations which should have been mentioned earlier in the 'Theory' section. If few calculations are performed, they can be included in this section. If calculations are repetitive and in large numbers, only one sample of each type should be included in this section and the rest can either be performed electronically with results tabulated in the appendix or can be done manually in the appendix. Final results should be summarized in this section with reference to the work in the appendix if need be.

Results and Discussions:

The results to the technical report should be analysed, interpreted and stated clearly. The use of figures and tables usually incorporated should have labels referenced in the text and fully explained with regards to how they occurred and how they affected the conclusion. An error analysis is usually an essential part of the discussion and provides a comparison to expected results. Data presented as results should be well organized. Numerical data should be included in graphs or tables to provide the best possible information about the real situation. This section should answer the questions:

- What do the results clearly indicate?
- What was discovered?
- What is the significance of the results?
- Are the results fully discussed and conclusions drawn based on the knowledge gained?
- How did errors occur?
- Did any of the errors affect the conclusion of the experiment / study?

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Conclusion:

This section should briefly summarize the significant results of the experiment. The conclusion:

- Must answer any questions raised in the introduction regarding what was shown, discovered, verified, proved, or disproved.
- Must explain why the experiment is significant.
- Must explain the implications for your particular field of study.
- Should not include discussion of new information not already mentioned in the report.

References:

This Section contains details of published sources of material referred to or quoted in the text (including any lecture notes and URL addresses of any websites used)

Bibliography:

Generally other published source of material, including websites, not referred to in the text but useful for background or further reading should be included in this section.

Acknowledgement:

List of people who helped you research or prepare the report, including your proof readers must be mentioned in this section.

Appendices:

Useful information too lengthy to fit within the body of the paper is placed in and appendix. Typically appendices are used for long mathematical formulas and complete sets of data such as tables or figures. All appendices should be referenced within the text of the report; items in the appendices should be arranged in order in which they are mentioned in the report itself.

1.3 Presentation

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For technical reports required as part of an assessment, the following presentation guidelines are recommended;

Script — The report must be printed single sided on white A4 paper. Hand written or dot-matrix printed reports are not acceptable.

Margins — All four margins must be at least 2.54 cm

Page numbers — Do not number the title, summary or contents pages. Number all other pages consecutively starting at 1

Binding — A single staple in the top left corner or 3 staples spaced down the left hand margin. For longer reports (eg. Year 3 project report) binders may be used.

1.4 Planning the report

Here is a checklist of the main stages:

Collect your information

Sources include laboratory handouts and lecture notes, the University Library, the reference books and journals in the Department office. Keep an accurate record of all the published references which you intend to use in your report, by noting down the following information;

a) Journal Article

Author (s)
Title of Article
Name of Journal (italic or Underlined)
Year of Publication
Volume Number (bold)
Issue number, if provided (in brackets)
Page number

b) Book

Author (s)
Title of Book (italic or underlined)
Edition, if appropriate
Publisher
Year of Publication

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Creative Phase of Planning

Write down topics and ideas from your researched material in random order. Next arrange them into logical groups. Keep note of topics that do not fit into groups in case they come in useful later. Put the groups into a logical sequence which covers the topic of your report.

Structuring the Report

Using your logical sequence of grouped ideas, write out a rough outline of the report with headings and subheadings.

1.5 Writing the First Draft:

Begin writing with the main text, not the introduction. Follow your outline in terms of headings and subheadings. Let the ideas flow; do not

worry at this stage about style, spelling or word processing. If you get stuck, go back to your outline plan and make more detailed preparatory notes to get the writing flowing again.

Make rough sketches of diagrams or graphs. Keep a numbered list of references as they are included in your writing and put any quoted material inside quotation marks.

Write the conclusion next, followed by the Introduction. Do not write the summary at this stage.

1.6 Revising the First Draft

This is the stage at which your report will start to take shape as a professional, technical document. In revising what you have drafted you must bear in mind the following, important principle;

- *The essence of a successful technical report lies in how accurately and concisely it conveys the intended information to the intended readership.*

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Most importantly, when you read through what you have written, you must as yourself these questions;

- Does these sentence/paragraph/section say what I want and mean it to say? If not, write it in a different way.
- Are there any words/sentences/paragraphs which could be removed without affecting the information which I am trying to convey? If so, remove them.

1.7 Diagrams, graphs, tables and mathematics

It is often the case that technical information is most concisely and clearly conveyed by means other than words. Imagine how you would describe an building Plan using words rather than a line diagram. Here are some simple guidelines;

Diagrams — Keep them simple. Draw them specifically for the report. Put small diagrams after the text reference and

as close as possible to it. Think about where to place large diagrams.

Graphs and Tables Is a tables the best way to present your information? Consider graphs, bar charts or pie charts.

Dependant tables (small) can be placed within the text, even as part of a sentence.

Independent tables (larger) are separated from the text with table numbers and captions. Position them as close as possible to the text reference. Complicated tables should go in appendix.

Mathematics Only use mathematics where it is the most efficient way to convey the information. Longer mathematical arguments, if they are really necessary, should go into an appendix.

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1.8 The Report Layout

The appearance of a report is no less important than its content. An attractive, clearly organised report stands a better chance of being read. Use a standard, 12pt, font, such as Times New Roman, for the main text. Use different font sizes, bold, italic and underline where appropriate but not to excess. Too many changes of type style can look very fussy.

1.8.1 Headings

Use headings and subheadings to break up the text and to guide the reader. They should be based on the logical sequence which you identified at the planning stage but with enough sub-headings to break up the material into manageable chunks. The use of numbering and type size and style can clarify the structure as follows;

3. METHODS OF HARNESSING WAVE ENERGY

3.1 Shore – Based Systems

3.2 Deep – Water Sytems

3.2.1 ‘Duck’ Devices

3.2.2 Rafts

1.8.2 References to Diagrams, Graphs, Tables and Equations

- In the main text you must always refer to any diagram, graph or table which you use.
- Label diagrams and graphs as follows;

  Figure 1.2 Graph of energy output as a function of wave height.

In this example, the second diagram in section 1 would be referred to by “…see figure 1.2…”

- Label tables in a similar fashion;

  Table 3.1 Performance Specifications of a range of commercially available concrete mixers

  In this example, the first table in section 3 might be referred to by “…with reference to the performance specifications provided in Table 3.1…”
- Number equations as follows

  $F(dB) = 10\log_{10}F$ (3.6)

In this example, the sixth equation in section 3 might be referred to by “…noise figure in decibels as given by eqn (3.6)…”

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1.9 Originality and Plagiarism

Whenever you make use of other people’s facts or ideas, you must indicate this in the text with a number which refers to an item in the list of references. Any phrases, sentences or paragraphs which are copied unaltered must be enclosed in quotation marks and referenced by a number.

Information that is not referenced is assumed to be either common knowledge or your own work or ideas; if its not, then it is assumed to be plagiarised i.e. you have knowingly copied someone else’s words, facts or ideas without reference, passing them off as your own. This is a **serious**

offence. If the person copied from a fellow student, then this offence is known as collusion and is equally serious. Examination boards can, and do, impose penalties for these offenses ranging from loss of marks to disqualification from the award of a degree.

This warning applies equally to information obtained from the Internet. It is very easy for markers to identify words and images that have been copied directly from websites. If you do this without acknowledging the source of your information and putting the words in quotation marks then your report will be sent to the Investigating Officer and you may be called before a disciplinary panel.

1.10 Finalising the Report

Your report should now be nearly complete with an introduction, main text in sections, conclusions, properly formatted references and bibliography and any appendices. Now you must add the page numbers, contents and title pages and write the summary.

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1.11 Proofreading

This refers to the checking of every aspect of a piece of written work from the content to the layout and is an absolutely necessary part of the writing process. You should acquire the habit of never sending or submitting any piece or written work, from email to course work, without atleast one and preferably several processes of proofreading. In addition, it is not possible for you, as the author of a long piece of writing, to proofread accurately yourself; you are too familiar with what you have written and will not spot all the mistakes. When you have finished your report, and before you staple it, you must check it very carefully yourself. You should then give it to someone else, e.g. one of your fellow students, to read carefully and check for any errors in content, style, structure and layout. You should record the name of this person in your acknowledgements.

1.12 Word Processing / Desktop Publishing

Advantages	Diadvantages
Word processing and desktop publishing packages offer great scope for endless revision of a document. This includes words, word order, style and layout.	Word processing and desktop publishing packages never make up for poor or inaccurate content.
They allow for the incremental production of a long document in portions which are stored and combined later.	They can waste a lot of time by slowing down writing and distracting the writer with the mechanics of text and graphics manipulation.
They can be used to make a document look stylish and professional	Excessive use of 'cut and paste' leads to tedious repetition and sloppy writing.
They make the process of proofreading and revision extremely straightforward	If the first draft is word processed, it can look so stylish that the writer is fooled into thinking that it does not need proofreading and revision!

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Two important things to be noted down:

- Do not bother with style and formatting of a document until the penultimate or final draft.
- Do not try to get graphics finalised until the text content is complete.