

**Unit:**                    **Introduction to Engineering**

**Lecture:**                **Communication and Documentation**

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# 1. INTRODUCTION

## ***1.1 IMPORTANCE OF COMMUNICATION AND DOCUMENTATION FOR ENGINEERS***

- There is a lot of truth in the saying that engineers don't make products, they mainly make reports (oral and written) describing the products to be made by other members of the engineering team.
- Therefore, oral and written communication skills are very important for the engineer.
- Businesses and projects rely on well-structured reports to ensure accurate communication about goals and objectives, requirements, designs, measuring and recording progress, etc.
- The documentation process should always:
  - \* Provide traceability of the engineer's thinking process, reasons for decisions, assumptions made, etc.
  - \* Enable new team members to pick up where others have left off.

## ***1.2 SCOPE OF THIS LECTURE***

Although oral communication is briefly addressed under "basics of communication", the focus of this lecture is on documentation, and it provides students with an introduction to:

- Types of reports.
- The documentation process (setting objectives and determining structure).
- Generic elements of a written report.
- Report quality assurance.
- General advice on writing documents.

# 2. BASICS OF COMMUNICATION

- Ongoing diligent documentation is critical to the success of a design project.
- At the start of a project careful consideration must be given to how information is to be gathered, recorded, organised and stored.
- Back-ups are very important.
- It is also important to be aware of the limitations of the chosen backup media. E.g. back-ups using word-processing packages are vulnerable to incompatible upgrades - it may pay to keep a "text-only" version of critical text documents.
- Engineering reports must always be "designed", just like an engineering product (NAGLE 1996); and then they are built and tested.
- In general, a document should be designed to satisfy its ***purpose*** and ***audience***.
- It is important to know who the target audience is, and to make the report appropriate for them.

- Keep it simple: *Quantity* does not equal *Quality*.
- When making an oral presentation it is important to:
  - \* Adjust your tone of voice, and the rate at which you speak.
  - \* Keep eye contact with the audience.
  - \* Limit the number of slides used; and the amount of information per slide.
- Keeping track of thinking processes and decisions is extremely important in engineering.
- Therefore written communication is often more important than oral communication.
- Remember there are various sources of distortions and “noise” injected into any communication process, which can reduce the efficiency.
- People often hear and see what they think they should hear and see.
- It is your responsibility to ensure that the right message reaches the target audience.
- Getting **feedback** is one way of ensuring that the effects of distortions and noise are limited.
- Also ask yourself: How can my message possibly be misunderstood, and what can I do to make it clearer?

### 3. TYPES OF REPORTS

#### 3.1 EXAMPLES OF REPORT TYPES

A report may range from personal notes that are used to aid self-development, through to reports that record the complete history behind the design, development and manufacture of a new product. Examples of different report types, and where they are used, include:

University	-	Assignments
	-	Laboratory reports
	-	Final year project thesis
Research	-	Research proposal
	-	Grant application
	-	Research paper (written or oral)
Development	-	Reflective journals
	-	Professional development logs
Career	-	Curriculum vitae
	-	Project log books
	-	Manuals
	-	Project reports (written or oral)
	-	Product evaluation
	-	Product proposal

- Various technical and management reports (see GOUWS & GOUWS 2006a,b,c)

### ***3.2 THE ENGINEER'S LOGBOOK***

#### **Format**

- Permanently bound, A4 preferred
- Hard-cover
- Numbered pages
- Pages may have quadrille lines

#### **Purpose**

- Maintain a record of a project, including ideas, calculations, sketches, test results, correspondence.
- Used to generate technical reports, application notes, etc.

#### **Practices**

- Make regular entries
- Ban loose paper from the project
- Use sketches to visualise ideas
- Entries are written in ink
- Entries are dated
- Errors are crossed-out - they should not be deleted (for example, by using white-out).
- Rule across any unused section of blank paper
- Paste ancillary material (computer plots etc.) into the logbook
- Record your own work, not the work of others
- Index your work for later reference
- Work reflexively - question the purpose, significance and future of your work
- Where Intellectual Property may be an issue, pages should be signed by a supervisor - the Logbook may be used to claim inventorship.

#### **Reference**

The CSIRO Laboratory Notebook <http://www.publish.csiro.au/pid/1471.htm>

### ***3.3 PROFESSIONAL DEVELOPMENT LOG***

- This is a formal mechanism for assessing professional development of a person through their learning experiences.
- It is used by Engineers Australia to assess an engineer for registration as a Chartered Professional Engineer.

- Engineers map their experiences into recognized competency areas, e.g.:
  - \* Ability to apply knowledge of basic science and engineering fundamentals
  - \* Ability to communicate effectively, not only with engineers but also with the community at large
  - \* In-depth technical competence in at least one engineering discipline
  - \* Ability to undertake problem identification, formulation and solution
  - \* Ability to utilize a systems approach to design and operational performance
  - \* Ability to function effectively as an individual and in multi-disciplinary and multi-cultural teams, with the capacity to be a leader or manager as well as an effective team member
  - \* Understanding of the social, cultural, global and environmental responsibilities of the professional engineer, and the need for sustainable development
  - \* Understanding of the principles of sustainable design and development
  - \* Understanding of professional and ethical responsibilities and commitment to them, and
  - \* Expectation of the need to undertake lifelong learning, and capacity to do so.

### **3.4 REFLECTIVE JOURNALS**

This type of report is used to reflect on one's own experiences and practices – a very helpful tool for professional development.

#### **Self-review:**

- Do it *regularly*
- Be *honest* - don't try to kid yourself
- Be *positive* - what can I learn from this mess?
- *Revisit* early entries with later thoughts
- Limit entries to *relevant* experiences
- *Follow up* on any action items
- 

#### **Guidelines: SAID**

- **Situation** - what happened?
- **Affect** - why is it significant?
- **Interpretation** - what can I learn?
- **Decision** - what will I do?

#### **Example:**

#### *Learning Development Log*

*Name:*

*Unit:*

*Date:*

*Today's Most Significant Topic:*

<i>Situation – What was it?</i>
<i>Affect - Why was it significant?</i>
<i>Interpretation – What did I learn from it?</i>
<i>Decision – What will I do with it?</i>

### **Reference**

Value Added Career Start Program: [www.vacs.uq.edu.au](http://www.vacs.uq.edu.au)

## **3.5 SKILLS PORTFOLIO**

- Curriculum Vitae (CV) or *resumé* – which should be treated as an honest personal marketing tool, not merely as a catalogue of past experiences (KARIYA 2001).
- Cover Letter
- Skills list
- Sample Outputs e.g. project reports
- Testimonials and letters of recommendation
- Awards and honours
- Academic transcripts, degrees and other qualifications
- References and contact details
- Career summary and goals - description of your ethics, philosophy and aspirations
- Participation in professional development programs

## **4. THE DOCUMENTATION PROCESS**

The design of documentation is similar to the design of anything else:

- Define objectives: Why is it needed? Who will read it? Expected outcomes?
- Define a structure (framework / outline).
- Choose appropriate components: words, sentences, grammar, and format.
- Integrate components (production): fill in the framework, and identify gaps.
- Perform quality assurance: editing and document reviews.



Like any other design process, the design of the documentation is usually an **iterative process**, whereby the designer returns to earlier steps on the basis of additional information gained from later steps (**feedback**), and whereby **trade-offs** are necessary.

## **4.1 OBJECTIVES**

- The design of a document will depend on answers to the questions of **why** and **who**?
- Why will the document be written?
  - \* To inform?
  - \* To persuade?
  - \* To request?
- A document has a primary purpose and maybe a secondary (covert) purpose, e.g.:
  - \* A primary purpose may be to recommend an action to the manager.
  - \* A secondary purpose may be to improve one's career prospects.
- It is necessary to consider the nature of the target audience:
  - \* their attitude                    -        hostile, sceptical or sympathetic?
  - \* their background               -        technical expertise; culture
  - \* their priorities                 -        busy people have little time to read verbose documents

## **4.2 STRUCTURE**

**Contents follow structure:**

- First carefully think about, and decide upon a report's structure, and then systematically fill in the contents.
- It is often when bits and pieces of contents are randomly gathered and combined, that irrelevant ideas are included in a report.
- Many report writers are reluctant to discard good-looking and nice-sounding ideas, once it had been gathered with great effort.
- However, when a report structure is defined first, the gathering of information becomes focused, and unnecessary material is either not collected at all, or it can be filtered out systematically.

A possible process for deciding upon a document structure is:

- Brainstorming.
- Mind mapping.
- Clustering.
- Compile the structure / framework.

(Refer to GOUWS & GOUWS 2006a,b,c for numerous examples of frameworks for engineering and management reports.)

### **4.3 WRITE THE DOCUMENT**

- Once the structure had been defined, the contents can be filled in.
- Often, while the content of a document is being gathered, new insights emerge into the best structure for the document.
- It is thus important to use **feedback** in order to adapt the structure, if necessary, when the content is filled in.
- Sometimes **trade-offs** are also necessary – e.g. reduce the scope of the document in order to fit in with the available time and money for the document.
- Don't give up when you reach a point of unavailable information. Mark that section "**TBD**" (*to be determined*), and continue with the rest.
- It is not uncommon for the initial issues of documents on large projects to contain many *TBDs*.
- Each iteration of the documentation process then removes some of these unknowns.
- It is a useful management tool to make a list of all the *TBDs* in a document, in order that these can be addressed systematically.

## **5. GENERIC ELEMENTS OF A WRITTEN REPORT**

This section provides an overview of the typical major elements of engineering (and management) reports. It is emphasised that the layout and contents of each of these elements must be tailored to suit specific requirements.

### **5.1 TITLE PAGE**

The title page of a report should typically show the report's title, the authors' names, the issue date, name of the organisation issuing the report, report reference number, revision status (edition number), and a list of people to whom the report is distributed.

### **5.2 EXECUTIVE SUMMARY / ABSTRACT**

Providing a concise summary of engineering and management reports tells readers what the report is all about and enables them to ascertain whether the report contains relevant information for them, or maybe rather for someone else in their team. The summary should provide an overview of the whole report, and should not merely be a copy of the introduction or the final conclusions. It is normally included just before or just after the table of contents, but it might also be a section in the introductory chapter. After reading the executive summary / abstract, there should be no doubt in the reader's mind about:

- the reasons why the report was compiled;
- the issues addressed in the report; and

- the main conclusions and/or recommendations made in the report.

### ***5.3 TABLE OF CONTENTS***

Besides a normal table of contents, a list of appendices, a list of tables, and a list of figures and/or photographs, plus the relevant page numbers, can also be included in order to:

- provide the reader with an overview of what information is provided in the report by means of appendices, tables, figures, and photographs; and
- to make it easier for the reader to locate these when referred to in the text.

### ***5.4 ABBREVIATIONS AND TERMINOLOGY***

Excessive use of non-standard abbreviations and terminology can make it difficult to read a report, and should therefore be avoided. It is good practice to provide an alphabetical list of all non-standard abbreviations and special terminology used, and their meanings - even when the report is prepared for a very specific audience who are familiar with the abbreviations and terminology used. This list can be included just after the table of contents, or as an appendix at the end of the report, or as a section in the introductory chapter. (Sometimes non-standard abbreviations and terminology are deliberately used without a list explaining their meanings, as a security measure making it difficult for third parties to read the report.)

### ***5.5 INTRODUCTION***

The introductory chapter should discuss the purpose and the scope of the report, making the reasons why the report was compiled very clear. The purpose of the report can be clarified by providing some background information and a well-formulated problem statement. Writing a report without having first defined its purpose, is like trying to answer an undefined question. In defining the purpose of a report, the author should have a clear idea of who the *target audience* is. *Purpose* and *audience* represent the top-level “design requirements” of a report - just as any properly structured technical development starts with defining the requirements. If this is not done, the end result is often a sloppy solution looking for a suitable problem.

The *scope of the report* summarises the main issues addressed - typically for each chapter and for the appendices. (Important related issues that are not addressed can also be listed, with the reasons why they were not addressed.) Most readers of engineering and management reports don't enjoy suspense and surprises in such reports. By defining the report's purpose and scope, the reader will know exactly what to expect; and whether it will be worthwhile to read the report or not.

### ***5.6 MAIN CONTENTS***

Each chapter of a report must be well focused. It is ineffective to attempt a *shotgun approach*,

whereby too many different issues are addressed in one chapter. Chapters should logically follow upon each other; and a proper “story line” must develop – even for engineering and management reports! From problem statement to final conclusions or recommendations, nothing should be left to the reader’s imagination – albeit without becoming unnecessarily elaborate. The reader should know where the story comes from, where it is leading to, and finally what the conclusions are. The reader should be made eager to continue reading, without having to battle through long-windedness and unnecessary cross-referencing. A “padded report” is often merely an attempt to hide poor quality by irrelevant material. Such a report bores the reader, and fails to convey useful information.

Always ask yourself: How much background material is needed in the document, and how much technical detail is necessary?

Many engineering documents are intended for non-technical readers, such as accountants, managers or the general public. In these cases, avoid technical details, especially the use of jargon and acronyms.

Do not assume that a technically competent reader has the same background knowledge and thought processes as the writer. This can be a problem when writing a research document such as the final year project thesis. ***Students can easily forget that while the subject has been the centre of their attention for the past year, this has not been the case for the examiner.*** A useful test procedure is to leave the document for a week and then re-read it. In this way the writer will get a sense of the reader’s perspective.

A wide-ranging readership may require a document with a hierarchical structure. This allows the different readers to limit their readings only to those sections of the document relevant to them. The summary is at the top of this structure (which may be the only thing that is read by upper management who will finance the project), while appendices are at the bottom (for the technicians who will actually build and test the project).

Include variety in sentence and paragraph construction, by sometimes changing word order and by mixing sentence types. Check for boredom by reading out your report aloud.

## ***5.7 CONCLUSIONS / RECOMMENDATIONS***

Many engineering and management reports should lead to some conclusions and / or recommendations; and these should be summarised concisely at the end of the report. (Exceptions are reports such as specifications, where the whole report is in essence a set of recommendations regarding how to solve a stated problem.) If goals and objectives were stated initially, the conclusions / recommendations should address each of the goals and objectives individually (and in the same order). From this part of the report it should become very clear how the originally stated problem had

been solved, or why it was impossible to solve it. Do not expect the readers to make their own conclusions.

## ***5.8 APPENDICES***

Material that will disturb the continuity of the presentation (e.g. information about specific test equipment, large sets of data, etc.) can be included in appendices – if it is really important to include this material at all. As far as possible, an appendix should be an independent report, which can be interpreted on its own. An appendix can have its own appendices, with the latter normally called *annexures*.

## ***5.9 LITERATURE REFERENCES***

The purpose of providing literature references in a report is to:

- acknowledge the work of others in the same field;
- provide the interested reader with a source where more information can be found about the specific topic; and
- link the present report with preceding work in this regard.

There is no universal standard for listing details of literature reference cited. However, the convention chosen should be used consistently throughout a report. The essence of proper referencing is to provide enough information to enable the reader to locate a copy of the cited reference document, if required. (Internet searching makes it reasonably easy to locate literature.) Two methods commonly used to compile a list of literature references, are:

- in alphabetical order according to authors' surnames; or
- numerically according to reference numbers used in the text.

There are many ways for including a list of references, e.g. at the end of the main report, as the last appendix, as a section in the introductory chapter, as footnotes, etc. The method chosen should be dictated by aspects such as providing the reader with a complete overview of all the references cited, easy cross-referencing, and easy reading.

Sometimes, a distinction is made in the list of references between reports specifically referred to in the text, and others that are only listed as relevant additional reading for the interested reader. Another distinction that can be made is to list books, magazine articles, conference papers, internet websites, specifications, standards, etc. under separate sub-headings. Referring to websites should include the date on which information was taken from the site for the report, because websites can be regularly changed.

Complete details of the referencing format that has been adopted by ECU are given in *The ECU*

Referencing Guide, which is available on-line at: <http://www.ecu.edu.au/LDS/pdf/refguide.pdf> .

## **5.10 INDEX**

Modern word processors make it easy to compile an index (of keywords and page numbers) for a report. For large reports this can be a helpful feature - typically included right at the back of the report - to help locate specific topics in the text.

# **6. REPORT QUALITY ASSURANCE**

## **6.1 ENSURING GOOD QUALITY REPORTS**

Poor reports can be limited if documentation is recognised and managed as an integral and essential part of a business or a project, instead of being considered as just another *necessary evil*. Project team members tend to think much more carefully about their ideas when they are expected to write it down concisely and clearly. Providing them with possible frameworks for their reports is a great help in this regard. Other aspects to ensure proper report quality include attention to diligent editing, structured report reviews, and configuration management.

## **6.2 EDITING**

It is important to use proper grammatical style and correct spelling throughout a report. If these aspects are neglected, it can be perceived as a sign of the author's disrespect for the readers; and it reflects poorly on the author and his organisation. Although modern word processors can check grammar (to a limited extent) and spelling, careful proofreading by a skilled human is still essential. Good writing style helps to convey the **true meaning** of the document to the reader.

Learning about writing style is best done "on the job" while writing your own documents. Most books on writing skills (e.g. NAGLE 1996) are written as **handbooks** with this purpose in mind.

Major faults made during writing include the following, and proper editing can alleviate these faults:

- Lack of clarity
- Poor organisation
- Wordiness
- Excessive jargon, acronyms, etc.
- Poor spelling
- Dullness
- Inaccuracy
- Lack of substance

Another common mistake is to gather information for inclusion into a report without critically assessing it. Beware of merely copying information from the internet. There are many urban legends floating around! A wise old professor once said “Be critical about everything you read; and always verify it independently.”

### **6.3 REPORT REVIEWS**

The better an author knows the topic addressed in a report, the more difficult it becomes for the author to spot problem areas such as gaps in the story line, poor editing, and mistakes. In order to overcome this problem, it is essential to have report reviews, whereby a knowledgeable sub-set of the target audience, of peers, and of superiors is given the report to read and to comment on it. This process can be informal, whereby the readers merely give their written comments back to the author for consideration; or it can be formalised, whereby the report and the comments are discussed by all the reviewers and the author. In the latter case, all critical issues should be discussed, decided upon formally, and minuted. For complex reports, multiple rounds of review are necessary.

A proper review process is especially important where a report can have contractual or other serious implications for the organisation issuing it. Through a formal review, involving relevant experts and decision-makers, the author can ensure that the report is in line with the organisational goals and policies. It can also help to fill in any unknown information. To conduct a proper report review, it is essential to:

- review the report, and not its author;
- schedule report reviews as part of the project plan;
- issue the same version of the report to be reviewed, to all the reviewers;
- involve reviewers who can contribute to the improvement of the report;
- discuss the report and the comments in a structured manner;
- reach conclusions on all the important issues discussed; and
- note the decisions taken, for incorporation into a revised version of the report.

### **6.4 CONFIGURATION MANAGEMENT**

It is important to formally keep track of a report’s revision status, and to clearly indicate this on the report. (This is called configuration management.) Once a report had been issued, changes to the report should be made in a controlled manner. It can lead to chaos if different team members use different versions of a report. In large organisations, there is normally a documentation configuration management department whose task it is to keep track of a report’s development and distribution status; and who formally controls any changes made to reports.

A useful practice to assist with document configuration management is to “number” draft issues of a report alphabetically (*Issue A, Issue B, Issue C, etc.*), and to number the real issues numerically

(*Issue 1, Issue 2, Issue 3*, etc.). The “letter issue” reports are normally for internal use and still subject to major changes, while the “number issue” reports are the more final ones and for external distribution (if applicable). When only small changes are made to a “number issue” report, designations like *Issue 1.1, Issue 1.2*, etc. can be used.

## 7. GENERAL ADVICE ON DOCUMENTATION

### 7.1 WORDS

- **Variety** - Avoid boredom; use a Thesaurus, but avoid using alternatives that lack the required precision.
- **Strength** - Use qualifiers (“weasel words” – WATSON 2004) to maintain a *defensible* position. However too many weasel words may reduce the information content to zero, e.g.:
  - \* *The protection transistor will prevent the chip from failing.* – Overconfident, and open to claims of liability.
  - \* *The protection transistor should prevent the chip from failing.* – Just the truth.
  - \* *It is possible that the protection transistor may prevent the chip from failing.* – Does this sentence say anything useful?
- **Simplicity** - Avoid inflated language. For example, avoid using noun forms of verbs in place of the original verb:
  - \* *The transistor is used for the protection of the circuit against accidental short-circuits.*
  - \* *The transistor protects the circuit against accidental short-circuits.* – Better option.
- **Precision** - Replace generalist low-content words with specific high content words:
  - \* *Next, put the resistor on the protoboard.*
  - \* *Next, insert the resistor into the protoboard.* – More precise description.

### 7.2 SENTENCES

- In general simple sentences work best.
- In general, it is better if the words flow in the direction that the reader expects:
  - \* cause ►► effect;
  - \* general ►► specific;
  - \* past ►► future;
  - \* familiar ►► unfamiliar.
- Use **active** rather than passive sentences:
  - \* *The protection transistor is activated by a short circuit.* (Passive.)
  - \* ***A short circuit activates the protection transistor.*** (Active.)
- Definite and indefinite articles



- \* We carried out an experiment in the laboratory. – The emphasis is on what we did in the lab.
- \* We carried out the experiment in the laboratory. – The emphasis is on the experiment itself.
- It is normally assumed that the subject immediately following the phrase will be the subject of that phrase, but this is not always the case:
  - \* Being in a dilapidated condition, I knew the circuit would not work.
  - \* ***Being in a dilapidated condition, the circuit would not work.***

### **7.3 APOSTROPHES**

- Pay attention to correct use of apostrophes.
- There **is** a difference between:
  - \* theirs / there's
  - \* your / you're
  - \* its (belonging to "it") / it's (it is)
  - \* transistors / transistor's / transistors'
  - \* reports / report's / reports'
  - \* .....

### **7.4 PARAGRAPHS, LISTS AND NOTES**

- Each paragraph should develop a *single* idea.
- Use one sentence to define the idea – usually the first sentence, followed by supporting sentences.
- Avoid excessively long paragraphs. Short paragraphs can be used to make ideas stand out.
- Lists:
  - \* Use a lead-in word or sentence and a colon to introduce the items.
  - \* Bulleted list – no particular order.
  - \* Numbered list – order is important.
  - \* It is better if each item in the list has a similar word / sentence structure.
- Where necessary, critical notes, cautions, and warning should stand out, and should precede the material to which they refer.

#### **WARNING**

**Ensure that the power is turned off before  
making any alterations to the circuit.**

- This is much better than: *Replace the resistor, but first, turn off the power.*

## **7.5 EMPHASIS AND PUNCTUATION**

- Use *italics*, **bold** or underlining to add emphasis, but do not overdo these effects.
- Treat punctuation like body language. Reading aloud may help to place, as well as to choose, the appropriate punctuation mark – comma, semicolon, period, etc.
- Commas, dashes and parenthesis can be used to group thoughts in a sentence, e.g.:
  - \* *An excitation pulse, unlike an inhibition pulse, encourages a local cell to fire*
  - \* *An excitation pulse - as described earlier in this report – encourages a local cell to fire.*
- Punctuation in the wrong place can alter the meaning completely, e.g. (TRUSS 2006):
  - \* *A panda is a mammal that eats shoots and leaves.*
  - \* *A panda is a mammal that eats, shoots, and leaves.* (Not the intended meaning.)

## **7.6 ETHICAL ISSUES**

It is very important to maintain high ethical standards when compiling documents, and to pay specific attention to:

- **Honesty**
  - \* Maintain integrity of the data.
  - \* Do not merely ignore results that disagree with preconceived ideas.
  - \* Report negative results too, since these may be useful for future work.
- **Objectivity**
  - \* Documents typically require some form of assessment – proposed solutions to problems; recommended courses of action; significance of results; evaluation of a product; etc.
  - \* Keep the assessment as objective as possible.
  - \* A different perspective may validate a different assessment outcome.
  - \* Be aware of bias and the use of “loaded” words.
  - \* Have others review your document for unintended bias.
- **Credits**
  - \* Acknowledge the *work* and the *support* of colleagues, management and financial backers.
  - \* Acknowledge references sources.
- **Plagiarism - passing off another’s work as one’s own**
  - \* Direct copying of someone else’s work – it’s a primitive form of cheating.
  - \* Direct copying of a source without acknowledgement.
  - \* Superficial paraphrasing of a source without acknowledgement.
  - \* Taking an idea of a source without acknowledgement.
  - \* Often the context invalidates plagiarised material. (That is, often the plagiarised material answers a different question.)
  - \* Remember: It is very easy for an attentive reader to spot different writing styles in one document – often a sure sign of plagiarism.

- \* Plagiarism has become very easy with the internet and with electronic media. Don't fall into this trap!!
- **Inclusiveness**
  - \* Check for language that may discriminate against gender, ethnicity, age, disability etc.
  - \* Check for idioms that may not be understood by the target audience.

## **7.7 INFORMATION RESTRICTIONS**

When compiling engineering reports, the following restrictive and legal aspects must be considered:

- Protection of proprietary information: Restricted information on company products and processes.
- Protection of confidential information: Restricted information on non-technical issues – personnel, marketing strategies, etc.
- Liability Law: What if something goes wrong?
- Intellectual Property Law (Patents and Copyright): Protection by others; and protection against others.

## **7.8 FORMATTING**

When reading text books and other documents, observe what works best from your own perspective; and decide what about the presentation of the document makes you want / not want to read it. Pay special attention to:

- Character Format
  - \* Type face: *Serif* types (e.g. Times New Roman) versus *San Serif* types (e.g. Arial).
  - \* Type style: **bold**, *italic*, **bold italic**
  - \* Font size: 8 point, 10 point, 12 point, **etc.**
- Paragraph Format
  - \* Optimum line length for reading is from 6 to 10 cm; however this can be wasteful of A4 paper.
  - \* Allow a left margin for binding, and maybe a wide right margin for hand-written notes.
  - \* Line or one-half line spacing between paragraphs.
  - \* Maintain consistent Heading formats – word processing packages provide style sheets for this purpose plus links to an **outline view**.

## **8. REFERENCES**

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## **9. SELF-ASSESSMENT**

### **9.1 TRUE / FALSE QUESTIONS**

Indicate which of the following statements are TRUE and which are FALSE.

1. Engineers often make reports (oral and written) describing the products to be made by other members of the engineering team.
2. Engineering reports must also be "designed", just like an engineering product.
3. For engineers, written communication is often more important than oral communication.
4. All documents should be written for non-specific audiences (i.e. suitable for any reader).
5. Engineering documents are not novels, and should therefore not have a "story line".
6. Literature references have no place in technical reports.
7. Project team members tend to think much more carefully about their ideas when they are expected to write it down concisely and clearly.
8. Proper grammatical style and correct spelling are *nice to have*s in technical documents.
9. The internet is an infallible source of accurate information, which can often be copied without the necessity to evaluate it critically.
10. Maintaining high ethical standards (such as honesty) is essential when compiling engineering reports.

### **9.2 MULTIPLE CHOICE QUESTIONS**

Choose the one most correct answer for each of the following questions:

- 1) For engineers, oral and written communication skills are:
  - a) Equally important.
  - b) Not very important.
  - c) A necessary evil.
  - d) None of the above.
- 2) When making an oral presentation it is important to:
  - a) Adjust your tone of voice, and the rate at which you speak.
  - b) Keep eye contact with the audience.
  - c) Limit the number of slides used; and the amount of information per slide.
  - d) All of the above.
- 3) Which of the following is not a guideline for writing a reflective journal:
  - a) **Situation** - what happened?
  - b) **Affect** - why is it significant?
  - c) **Interpolation** – how can I get more results?
  - d) **Decision** - what will I do?
- 4) The design of documentation includes:
  - a) Define objectives and structure.
  - b) Choose appropriate components and integrate them.
  - c) Perform quality assurance.
  - d) All of the above.
- 5) “Contents follow structure” means:
  - a) Get a structure for a document and the contents will follow by itself.
  - b) First carefully think about, and decide upon a report’s structure, and then systematically fill in the contents.
  - c) Gather bits and pieces of contents randomly and they will eventually fall into place.
  - d) Never discard good-looking and nice-sounding ideas, because they will fit in somewhere if you have the right structure.
- 6) An executive summary:
  - a) Is probably the least useful part of any document.
  - b) Tells readers what the report is all about and enables them to ascertain whether the report contains relevant information for them.
  - c) May not be read by non-executives.
  - d) Should be a copy of the introduction or the final conclusions.
- 7) Excessive use of non-standard abbreviations and terminology:
  - a) Is good practice, because if you can’t convince them, confuse them.
  - b) Helps develop our language skills.
  - c) Can make it difficult to read a report, and should therefore be avoided.
  - d) Essential to protect our intellectual property rights.
- 8) Engineering and management reports should not contain separate conclusions and / or recommendations, because:

- a) The readers must make their own conclusions.
  - b) Conclusions should be made as the report is written.
  - c) Both the above.
  - d) None of the above.
- 9) The purpose of providing literature references in a report is to:
- a) Acknowledge the work of others in the same field.
  - b) Provide the interested reader with a source where more information can be found about the specific topic.
  - c) Link the present report with preceding work in this regard.
  - d) All of the above.
- 10) One of the requirements to conduct a proper report review, is to:
- a) Involve completely independent reviewers, who know nothing about the report's subject.
  - b) Note the decisions taken, for incorporation into a revised version of the report.
  - c) Review the author, not the report.
  - d) Surprise the author with regular reviews

### ***9.3 SHORT ESSAY QUESTIONS***

*(Typically these are 10 mark questions.)*

1. Discuss the importance of communication (oral and written) for engineers.
2. Discuss the typical functions and structure of an engineer's logbook.
3. What are the main drivers for determining a document's objectives?
4. Identify one of the generic elements of a typical engineering report, and briefly discuss it.
5. Briefly discuss document reviews as a technique to ensure document quality.
6. Identify and discuss at least five right and five wrong uses of the apostrophe in common written communication.

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