**TITLE IN CAPITAL LETTERS, FONT SIZE 12,**

**TIMES NEWS ROMAN, CENTRED, BOLD**

**STUDENT’S NAME**

**A project report submitted in partial fulfilment of the**

**requirements for the award of Bachelor of Engineering**

**(Honours) Mechanical Engineering**

**Lee Kong Chian Faculty of Engineering and Science**

**Universiti Tunku Abdul Rahman**

**April 2019**

DECLARATION

I hereby declare that this project report is based on my original work except for citations and quotations which have been duly acknowledged. I also declare that it has not been previously and concurrently submitted for any other degree or award at UTAR or other institutions.

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| Date | : |  |

APPROVAL FOR SUBMISSION

I certify that this project report entitled **“TITLE TO BE THE SAME AS FRONT COVER, CAPITAL LETTER, BOLD”** was prepared by **STUDENT’S NAME** has met the required standard for submission in partial fulfilment of the requirements for the award of Bachelor of XXX (Honours) XXXXXXX at Universiti Tunku Abdul Rahman.

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| Supervisor | : |  |
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| Signature | : |  |
| Co-Supervisor | : |  |
| Date | : |  |

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ACKNOWLEDGEMENTS

I would like to thank everyone who had contributed to the successful completion of this project. I would like to express my gratitude to my research supervisor, Dr. XXXXX for his invaluable advice, guidance and his enormous patience throughout the development of the research.

In addition, I would also like to express my gratitude to my loving parents and friends who had helped and given me encouragement......

(This acknowledgements page shall be treated as reference only)

ABSTRACT

Many relief scenarios involve the discharge of a two-phase fluid mixture, and the proper method for sizing the relief valve for these conditions is the subject of considerable discussion. Sizing a valve is based on the flow through an isentropic nozzle, the pressure–density relation for the fluid properties, and a discharge coefficient (*Kd*) to match the calculated mass flux to that measured for the flow of air or water in the actual valve. For single-phase flow, this is straightforward, since the fluid properties are simple and measured values of *Kd* are available. For two-phase flow, the density–pressure relation is complex and no values of *Kd* are available, so a variety of ‘‘models’’ have been proposed in the literature to address this problem. Since the various models produce various results, the appropriate value of *Kd* required to match the model to the actual valve will depend on the model. This project utilizes a simple, rigorous method for sizing relief valves for two-phase flow that utilizes the fluid properties directly and hence does not require a ‘‘model’’ for these properties. It is shown how this method can be applied to two-phase frozen or flashing (equilibrium or non-equilibrium) nozzle flows, and how the available values for *Kd* for single-phase flow can be used directly with this method, depending on the critical state of flow in the nozzle, to accurately predict two-phase flow in any valve. The calculations are compared with data from the literature for frozen air/water and flashing steam/water flows in actual safety relief valves.

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LIST OF SYMBOLS / ABBREVIATIONS

*cp* specific heat capacity, J/(kg⋅K)

*h* height, m

*Kd* discharge coefficient

*M* mass flow rate, kg/s

*P* pressure, kPa

*Pb* back pressure, kPa

*R* mass flow rate ratio

*T* temperature, K

*v* specific volume, m3

*α* homogeneous void fraction

*η* pressure ratio

*ρ* density, kg/m3

*ω* compressible flow parameter

ID inner diameter, m

MAP maximum allowable pressure, kPa

MAWP maximum allowable working pressure, kPa

OD outer diameter, m

RV relief valve

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## INTRODUCTION

### General Introduction

The first paragraph in a subsection should align with left margin. General alignment for texts in paragraph should be “justified”.

Subsequence paragraphs should be indented 1.27 cm (0.5 inch) from the left margin. General alignment for texts in paragraph should be “justified”. Spacing between last line of text and the next subsection title is 1.5 lines.

### Importance of the Study

The first paragraph in a subsection should align with left margin. General alignment for texts in paragraph should be “justified”.

Subsequence paragraphs should be indented 1.27 cm (0.5 inch) from the left margin. General alignment for texts in paragraph should be “justified”. Spacing between last line of text and the equation is 1.5 lines.

 (1.1)

where

*G1* = specific mass flow rate, kg/s

*ρ* = density, kg/m3

*T* = temperature, K

*ho* = xxx, m

Spacing between the equation and first line of text is 1.5 lines.Equation should be centred, but its numbering should align with right margin.

**** (1.2)

where

*G2* = specific mass flow rate, kg/s

*ρ* = density, kg/m3

Spacing between the equation and first line of text is 1.5 lines. Equation should be centred, but its numbering should align with right margin.

### Problem Statement

The first paragraph in a subsection should align with left margin. General alignment for texts in paragraph should be “justified”.

Subsequence paragraphs should be indented 1.27 cm (0.5 inch) from the left margin. General alignment for texts in paragraph should be “justified”. Spacing between last line of text and the next subsection title is 1.5 lines.

### Aim and Objectives

The first paragraph in a subsection should align with left margin. General alignment for texts in paragraph should be “justified”.

Subsequence paragraphs should be indented 1.27 cm (0.5 inch) from the left margin. General alignment for texts in paragraph should be “justified”. Spacing between last line of text and the next subsection title is 1.5 lines.

### Scope and Limitation of the Study

The first paragraph in a subsection should align with left margin. General alignment for texts in paragraph should be “justified”.

Subsequence paragraphs should be indented 1.27 cm (0.5 inch) from the left margin. General alignment for texts in paragraph should be “justified”. Spacing between last line of text and the next subsection title is 1.5 lines.

### Contribution of the Study

The first paragraph in a subsection should align with left margin. General alignment for texts in paragraph should be “justified”.

Subsequence paragraphs should be indented 1.27 cm (0.5 inch) from the left margin. General alignment for texts in paragraph should be “justified”. Spacing between last line of text and the next subsection title is 1.5 lines.

### Outline of the Report

The first paragraph in a subsection should align with left margin. General alignment for texts in paragraph should be “justified”.

Subsequence paragraphs should be indented 1.27 cm (0.5 inch) from the left margin. General alignment for texts in paragraph should be “justified”. A new paragraph should not begin on the last line of a page. A subsection title should not begin on the last line of a page. A new chapter must start on a new page.

## LITERATURE REVIEW

### Introduction

The first paragraph in a subsection should align with left margin. General alignment for texts in paragraph should be “justified”. (Warner, 2002).

**When presenting your research paper, it is important that you provide references to the sources of information you have used in your research. Referencing is a method of acknowledging the contributions and work of others in your writing. You will have to provide brief information in the text and full bibliographic details of all SOURCES consulted in your Reference List at the end of your piece of work. The “Harvard Referencing System” is an author-date system for citing and referencing sources of information. This guide provides examples of In-text citation and referencing according to the Harvard Referencing System for various information sources. Refer to the following:**

Table 2.1: Harvard citation style.

|  |  |
| --- | --- |
| Reference list format | In-Text Citation |
| One Author:  **Author, Initial(s)., Year. Title of journal article. *Title of journal (italicized)*, Volume (Issue or number), Page number(s).**  Huffman, L.M., 1996. Processing whey protein for use as a food ingredient. *Food Technology*, 50(2), pp. 49-52.  Two Authors:  **Author, Initial(s). and Author, Initial(s)., Year. Title of journal article. *Title of journal (italicized)*, Volume (Issue or number), Page number(s).**  Lamb, R. and Kling, R., 2003. Reconceptualizing users as social actors in information systems research. *MIS Quarterly*, 27(2), pp. 197-198. | (Huffman, 1996) … OR  Huffman (1996) …  (Lamb and Kling, 2003) …  OR  Lamb and Kling (2003) … |

Table 2.1 (Continued)

|  |  |
| --- | --- |
| Three Authors Format  **Author, Initial(s)., Author, Initial(s). and Author, Initial(s)., Year. Title of journal article. Title of journal (*italicized*), Volume (Issue or number), Page number(s).**  Bent, M., Campbell, J. and Spencer, C., 2007. Academic practice in computing and engineering. *Journal of Citation and Referencing*, 19(4), pp. 45-56.  Four Authors Or More  **Author, Initial(s)., Author, Initial(s)., Author, Initial(s)., Author, Initial(s)., Author, Initial(s)., Author, Initial(s). and Author, Initial(s)., Year. Title of journal article. Title of journal (*italicized*), Volume (Issue or number), Page number(s).**  Gillespie, N.C., Lewis, R.J., Pearn, J.H., Bourke, A.T., Holmes, M.J., Bourke, J.B. and Shields, W.J. 1986, Ciguatera in Australia: occurrence, clinical features, pathophysiology and management. Medical Journal of Australia, 145(11-12), pp. 584-590. | (Bent, Campbell and Spencer, 2007) …  OR  Bent, Campbell and Spencer (2007) …  (Gillespie, et al.,1986) …  OR  Gillespie, et al. (1986) … |
|  |  |

### Literature Review

The first paragraph in a subsection should align with left margin. General alignment for texts in paragraph should be “justified”.

Subsequence paragraphs should be indented 1.27 cm (0.5 inch) from the left margin. General alignment for texts in paragraph should be “justified”.

All tables must be numbered with respect to the chapter using Arabic numeric. For example, Table 2.2 is the second table that appears in Chapter 2. All tables must have a caption, which should be positioned at the top of the table. Spacing between the last line of text and table is 1.5 lines. A new table must start on a new page.

Table 2.2: Processing Time (in hours) of Bread for Different Production Line in ABC Company.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Bread** | **Production Line** | | | | |
| **1** | **2** | **3** | **4** | **5** |
| **A** | 30 | 18 | 26 | 17 | 15 |
| **B** | 23 | 22 | 32 | 25 | 30 |
| **C** | 17 | 31 | 24 | 22 | 29 |

Spacing between the table and first line of text is 1.5 lines. If the caption is written in a single line, it should be centred. If the caption is more than one line, it should be align to the left. A table should be positioned after it has been cited for the first time in the text. All tables in the chapter can also be grouped together and positioned at an appropriate location. Tables which are presented in landscape format should be bound with the top of the table to the spine.

### Subsection Title

The first paragraph in a subsection should align with left margin. General alignment for texts in paragraph should be “justified”.

Subsequence paragraphs should be indented 1.27 cm (0.5 inch) from the left margin. General alignment for texts in paragraph should be “justified”. Spacing between last line of text and the next subsection title is 1.5 lines.

#### Sub-subsection Title

The first paragraph in a subsection should align with left margin. General alignment for texts in paragraph should be “justified”.

All figures must be numbered with respect to the chapter using Arabic numeric. For example, Figure 2.1 is the first figure that appears in Chapter 2. All figures must have a caption, which should be positioned at the bottom of the figure and written in Title Case. If the caption is written in a single line, it should be centred. If the caption is more than one line, it should be align to the left.

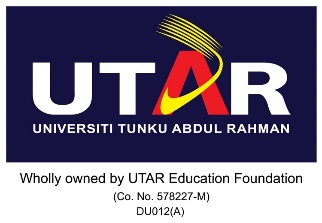


Figure 2.1: Universiti Tunku Abdul Rahman Logo.

Spacing between figure caption and first line of text is 1.5 lines. Figure should be positioned after it has been cited for the first time in the text. All figures in the chapter can also be grouped together and positioned at an appropriate location. Figures which are presented in landscape format should be bound with the top of the figure to the spine.

#### Listing Format

Texts of the list must be written in one (1) sentence. Long sentences should be avoided. Each list must describe an item or subject. The following guideline should be observed:

No spacing between last line of text and first line of list.

Lists are numbered with Roman numerals (i, ii, iii etc).

The numbering should be indented 1.27 cm (0.5 inch) from the left margin.

The text should be indented 2.54 cm (1 inch) from the left margin.

All the lists should be ended with a full stop (.).

The spacing between the last line of list and first line of text, table or figure etc. is 1.5 line spacing.

### Summary

The first paragraph in a subsection should align with left margin. General alignment for texts in paragraph should be “justified”.

A new paragraph should not begin on the last line of a page. A subsection title should not begin on the last line of a page. A new chapter must start on a new page.

A new paragraph should not begin on the last line of a page. A subsection title should not begin on the last line of a page. A new chapter must start on a new page.

## METHODOLOGY AND WORK PLAN

### Introduction

The first paragraph in a subsection should align with left margin. General alignment for texts in paragraph should be “justified”.

Subsequence paragraphs should be indented 1.27 cm (0.5 inch) from the left margin. General alignment for texts in paragraph should be “justified”.

### Requirement/ Specification/ Standards (Optional)

The first paragraph in a subsection should align with left margin. General alignment for texts in paragraph should be “justified”.

Subsequence paragraphs should be indented 1.27 cm (0.5 inch) from the left margin. General alignment for texts in paragraph should be “justified”.

#### Sub-subsection Title

The first paragraph in a subsection should align with left margin. General alignment for texts in paragraph should be “justified”.

Subsequence paragraphs should be indented 1.27 cm (0.5 inch) from the left margin. General alignment for texts in paragraph should be “justified”.

Table 3.1: Processing Time of Bread for Different Production Line.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Bread** | **Production Line** | | | | |
| **1** | **2** | **3** | **4** | **5** |
| **A** | 30 | 18 | 26 | 17 | 15 |
| **B** | 23 | 22 | 32 | 25 | 30 |
| **C** | 17 | 31 | 24 | 22 | 29 |

Spacing between the table and first line of text is 1.5 lines. Spacing between the last line of text and figure is 1.5 lines.

Source

Reflected

Figure 3.1: Reflection from Smooth Surface.

Spacing between the figure and first line of text is 1.5 lines. Subsequence paragraphs should be indented 1.27 cm (0.5 inch) from the left margin.

### Summary

The first paragraph in a subsection should align with left margin. General alignment for texts in paragraph should be “justified”.

Subsequence paragraphs should be indented 1.27 cm (0.5 inch) from the left margin. General alignment for texts in paragraph should be “justified”.

A new paragraph should not begin on the last line of a page. A subsection title should not begin on the last line of a page. A new chapter must start on a new page. Spacing between the last line of text and equation is 1.5 lines.

## RESULTS AND DISCUSSION

### Introduction

The first paragraph in a subsection should align with left margin. General alignment for texts in paragraph should be “justified”.

Subsequence paragraphs should be indented 1.27 cm (0.5 inch) from the left margin. General alignment for texts in paragraph should be “justified”.

### Subsection Title

The first paragraph in a subsection should align with left margin. General alignment for texts in paragraph should be “justified”.

Subsequence paragraphs should be indented 1.27 cm (0.5 inch) from the left margin. General alignment for texts in paragraph should be “justified”.

### Subsection Title

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Subsequence paragraphs should be indented 1.27 cm (0.5 inch) from the left margin. General alignment for texts in paragraph should be “justified”.

A new paragraph should not begin on the last line of a page. A subsection title should not begin on the last line of a page. A new chapter must start on a new page. Spacing between the last line of text and equation is 1.5 lines.

#### Sub-subsection Title

The first paragraph in a subsection should align with left margin. General alignment for texts in paragraph should be “justified”.

Subsequence paragraphs should be indented 1.27 cm (0.5 inch) from the left margin. General alignment for texts in paragraph should be “justified”.

A new paragraph should not begin on the last line of a page. A subsection title should not begin on the last line of a page. A new chapter must start on a new page. Spacing between the last line of text and equation is 1.5 lines.

Table 4.1: Processing Time of Bread for Different Production Line.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Bread** | **Production Line** | | | | |
| **1** | **2** | **3** | **4** | **5** |
| **A** | 30 | 18 | 26 | 17 | 15 |
| **B** | 23 | 22 | 32 | 25 | 30 |
| **C** | 17 | 31 | 24 | 22 | 29 |

Spacing between the table and first line of text is 1.5 lines. Spacing between the last line of text and figure is 1.5 lines.

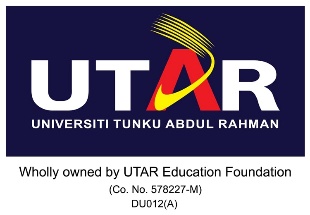


Figure 4.1: UTAR Logo.

Spacing between the figure and first line of text is 1.5lines. Subsequence paragraphs should be indented 1.27 cm (0.5 inch) from the left margin.

### Summary

The first paragraph in a subsection should align with left margin. General alignment for texts in paragraph should be “justified”.

Subsequence paragraphs should be indented 1.27 cm (0.5 inch) from the left margin. General alignment for texts in paragraph should be “justified”.

A new paragraph should not begin on the last line of a page. A subsection title should not begin on the last line of a page. A new chapter must start on a new page. Spacing between the last line of text and equation is 1.5 lines.

## CONCLUSIONS AND RECOMMENDATIONS

### Conclusions

The first paragraph in a subsection should align with left margin. General alignment for texts in paragraph should be “justified” (Warner, 2002).

Subsequence paragraphs should be indented 1.27 cm (0.5 inch) from the left margin. General alignment for texts in paragraph should be “justified”.

### Recommendations for future work

The first paragraph in a subsection should align with left margin. General alignment for texts in paragraph should be “justified”.

Subsequence paragraphs should be indented 1.27 cm (0.5 inch) from the left margin. General alignment for texts in paragraph should be “justified”.

A new paragraph should not begin on the last line of a page. A subsection title should not begin on the last line of a page. A new chapter must start on a new page. Spacing between the last line of text and equation is 1.5 lines.

## ADDITIONAL CHAPTER(S) IF REQUIRED

The first paragraph in a subsection should align with left margin. General alignment for texts in paragraph should be “justified”.

Subsequence paragraphs should be indented 1.27 cm (0.5 inch) from the left margin. General alignment for texts in paragraph should be “justified”.

A new paragraph should not begin on the last line of a page. A subsection title should not begin on the last line of a page. A new chapter must start on a new page. Spacing between the last line of text and equation is 1.5 lines.

## REFERENCES

General alignment for texts should be “justified”. Spacing between the references is 1.0 line. A new reference should not begin on the last line of a page.

Reference style for journal:

Hanna, K., 2007. Adsorption of aromatic carboxylate compounds on the surface of synthesized iron oxide-coated sands. *Applied Geochemistry,* 22, pp. 2045-2053.

Zhang, B., Cohen, J., Ferrence, R. and Rehm, J., 2006. The impact of tobacco tax cuts on smoking initiation among Canadian young adults. *American Journal of Preventive Medicine,* 30, pp. 474-479.

Reference style for book:

**Single author**  
Matthews, J., 1999. *The art of childhood and adolescence: The construction of meaning.* London, England: Falmer Press.

**Two authors**  
Colclough, B. and Colclough, J., 1999. *A challenge to change*. London, England: Thorsons.

**Three to seven authors**  
Rosenthal, R., Rosnow, R. L. and Rubin, D. B., 2000. *Contrasts and effect sizes in behavioral research: A correlational approach*. Cambridge, England: Cambridge University Press.

Online resources:

**Whole Internet site**  
Goldberg, I., 2000. *Dr. Ivan's depression central*. Retrieved from http://www.psycom.net/depression.central.html

Murray, G., 2005. A duty of care to children and young people in Western Australia: Report on the quality assurance and review of unsubstantiated allegations of abuse in care: 1 April 2004 to 12 September 2005. Available through: Western Australia, Department of Child Protection website:

<<http://www.community.wa.gov.au/NR/rdonlyres/851183A4-A822-4592-AB66-C410E453AEEC/0/DCDRPTGwennMurrayreportwithcover2006.pdf>> [Accessed 25 May 2016].

Reference style for conference proceeding:

Bickman, L. and Ellis, H., 1990. *Preparing psychologists for the 21st century: Proceedings of the National Conference on Graduate Education in Psychology, University of Utah, 1988*. Hillsdale, NJ: L. Erlbaum.

Others: Please refer to Harvard Referencing System

## APPENDICES

APPENDIX A: Graphs

Spacing between subsection and graph is 1.5 lines and it should be centred. Graph which is presented in landscape format should be bound with the top of the graph to the spine. All graphs must be numbered with respect to the appendix. For example, GraphA-1 is the first graph that appears in Appendix A. All graphs must have a caption, which should be positioned at the bottom of the graph and written in Title Case. If the caption is written in a single line, it should be centred. If the caption is more than one line, it should be align to the left. Spacing between the graphs is 1.5 lines.

APPENDIX B: Tables

Spacing between subsection and table is 1.5 lines and it should be centred. Table which is presented in landscape format should be bound with the top of the table to the spine. All tables must be numbered with respect to the appendix. For example, TableB-1 is the first table that appears in Appendix B. All tables must have a caption, which should be positioned at the top of the table and written in Title Case. If the caption is written in a single line, it should be centred. If the caption is more than one line, it should be align to the left. Spacing between the tables is 1.5 lines.