

**EDITED TITLE IMPROVED FROM AS IT APPEARS ON PROJECT PROPOSAL**

By: AUTHOR

**STUDENT NUMBER**

**DESIGN PROJECT III (EDP3011/2)**

**National Diploma: Engineering: Electrical**

***Faculty of Engineering, the Built Environment and Information Technology***

***School of Engineering***

***Department of Electrical Engineering***

**EXTERNAL MENTOR NAME: Qualification/Registration**

**NMMU MENTOR NAME: Qualification/Registration**

**Submission Date:**

# DECLARATION

This Project has not been submitted previously for qualification purposes. I declare that the evidence contained in this document is my own knowledge and understanding and effort and that where necessary the work and/or ideas of others has clearly been cited and referenced. I also declare that I have clearly indicated exactly what value I have added in the instances where I was required to improve or add to other person’s previous work in order to complete this Project. E.g. If the grid was already modelled for me in DigSilent PowerFactory, and I just had to add the Electrical Protection functionality, these facts have been clearly and openly acknowledged such that I will receive credit only for the Design work I have done. I declare that I have not plagiarised any part of this document because I have clearly acknowledging the work of others and through the use of EndNote Web I am confident the Referencing has been correctly done in the IEEE style. The work done by me the author of this document was done during the period of February 2011 - May 2011.

..................................................... .......................................

Full Names Date

# ACKNOWLEDGEMENTS

The following persons and companies are acknowledged for their valued participation that contributed to the successful completion of this project:

* List the person or place by name and briefly indicate what they did for you. One can never thank someone too much.
* This list should be limited to those that had a direct bearing on the success of this project.
* It may include the names of fellow students that assisted you in getting your simulation to function, or a lecturer that went out of their way to assist you, or a stranger that proof read your document to eliminate poor English grammar and spelling errors, etc.

# TABLE OF CONTENTS

[DECLARATION 1](#_Toc317144670)

[ACKNOWLEDGEMENTS 2](#_Toc317144671)

[TABLE OF CONTENTS 3](#_Toc317144672)

[CHAPTER 1 - INTRODUCTION 4](#_Toc317144673)

[1.1 INTRODUCTION OF THE PROJECT 4](#_Toc317144674)

[1.2 PROBLEM STATEMENT-RETICULATE A RDP DEVELOPMENT IN SUMMERSTRAND EXTENSION 2 4](#_Toc317144675)

[1.3 SUB-PROBLEMS 4](#_Toc317144676)

[1.3.1 Sub-Problem 1-Voltage regulation 4](#_Toc317144677)

[1.3.2 Sub-Problem 2-Protection study 4](#_Toc317144678)

[1.4 HYPOTHESIS 4](#_Toc317144679)

[1.5 DEFINITION OF CONCEPTS 5](#_Toc317144680)

[CHAPTER 2 - REVIEW OF RELATED LITERATURE 6](#_Toc317144681)

[2.1 INTRODUCTION 6](#_Toc317144683)

[2.2 RELEVANT STANDARDS 6](#_Toc317144684)

[2.3 SIMILAR PROJECTS 6](#_Toc317144685)

[2.3.1 ESKOM Standard Procedures 6](#_Toc317144686)

[2.4 TITLE 6](#_Toc317144687)

[2.4.1 Fault Current Assumptions 6](#_Toc317144688)

[2.5 CONCLUSION 7](#_Toc317144689)

[CHAPTER 3 – DESIGN CALCULATIONS AND APPLICABLE THEORY 8](#_Toc317144690)

[3.1 INTRODUCTION 8](#_Toc317144692)

[3.2 TITLE 8](#_Toc317144693)

[3.2.1 Sub-Title 8](#_Toc317144694)

[3.3 TITLE 8](#_Toc317144695)

[3.3.1 Sub-Title 8](#_Toc317144696)

[CHAPTER 4 - DATA COLLECTION, ANALYSIS AND INTERPRETATION 9](#_Toc317144697)

[4.1 INTRODUCTION 9](#_Toc317144699)

[4.2 TITLE 9](#_Toc317144700)

[4.3 TITLE 9](#_Toc317144701)

[4.4 DATA COLLECTION AND APPLICATION 9](#_Toc317144702)

[4.5 DATA ANALYSIS OF RESULTS 9](#_Toc317144703)

[4.6 DATA INTERPRETATION AND EVALUATION 10](#_Toc317144704)

[CHAPTER 5 - CONCLUSIONS AND RECOMMENDATIONS 11](#_Toc317144705)

[5.1 CONCLUSIONS 11](#_Toc317144707)

[5.2 RECOMMENDATIONS 11](#_Toc317144708)

[CHAPTER 6 - LIST OF REFERENCES 12](#_Toc317144709)

Please note by “Right-clicking” on the Table of Contents area above you may select “Update field” then either the “Update page numbers only” or the “Update entire field” option.

“Updating page numbers only” will ensure the page numbers coincide with the actual page number on which the associated heading now resides once you have typed in all your information.

“Updating entire field” will ensure the page numbers and the headings in this contents list match the headings and page numbers in the document as you edited them. So edit in your document not on the Contents page above.

Pressing “Ctrl” + right clicking on a page number above will jump you directly to that page.

# CHAPTER 1 - INTRODUCTION

## INTRODUCTION OF THE PROJECT

A brief paragraph giving some background to the project – it can include information on the project area. This should consist of 1 paragraph having not more than 10 lines. This paragraph is to tell the reader what the project is about so that they may choose to read it if it is in their field of interest or choose not to if it isn’t. As this is an electrical engineering project please include the main electrical engineering data relevant to this project e.g. The MVA of the project load, the voltages in kV, the sizes and types of transmission lines supplying the area, and of course the region in RSA where this project is situated. Also state whether this is a Load Profile project or a Protection Study project etc.

Use a font of 12.

## PROBLEM STATEMENT-RETICULATE A RDP DEVELOPMENT IN SUMMERSTRAND EXTENSION 2

A project is usually undertaken to solve some or other electrical engineering problem. This is a problem for which a solution needs to be found. The objective of the problem statement is therefore to formulate or define the problem clearly so that a solution can be found. The problem statement should therefore be clear and concise. It must not even hint at your solution as this is not a Solution Statement.

Use a font of 12.

## SUB-PROBLEMS

### Sub-Problem 1-Voltage regulation

Each problem may have a number of distinct components, which have to be individually approached and solved to come to a final solution These would be sub-problems that need to be taken into account. Only state the sub-problem, not any solutions thereof.

Use a font of 10.

### Sub-Problem 2-Protection study

Use a font of 10.

## HYPOTHESIS

A hypothesis is a simple statement of what you believe the best solution will be for this project and its stated problems and sub-problems. The hypothesis you give here is important as it forms a basis for the reasoning you made during your project investigation. In effect it is an assumption that you made at the start of the investigation. In the Conclusion and Recommendations at the end of this document you will refer to this hypothesis and state whether it was upheld by the results you obtained or was it refuted because the expected results did not materialise.

Use a font of 12.

## DEFINITION OF CONCEPTS

It is well known that one word can have many interpretations and, as a result, misunderstandings often occur. At the same time, a project can in itself be such that it has some new concepts which the examiner or mentor are not familiar with.

To avoid any problems in this regard, it is always prudent to compile a list of words (which you think may create confusion or those which you think the examiner or mentor may not have come across) with a brief definition for each.

Use a font of 12.

# CHAPTER 2 - REVIEW OF RELATED LITERATURE



## INTRODUCTION

A literature review must be conducted. This involves reviewing publications of what has been done to solve similar problems elsewhere in the world. The material you have read through (via the Web / technical journals / reference books / technical brochures / manufacturers handbooks or datasheets from Library databases etc.) must give you some background that you should use before deciding on a possible solution to the problem you need to solve.

Discuss how each relevant source found by you is similar to your projects context which gives your project a sense of authority because other engineers have written up their findings into similar problems. Also discuss where the source deviates from your proposed study. This leads you to discuss how your project is necessary and will add to the literature available for others after you to use if they have similar problems to solve.

Do NOT simply copy entire paragraphs and use a different word order in some of the sentences. To do so is a form of plagiarism. Rather give your own thoughts and ideas and cite/refer to sources that support or agree with your thoughts.

The Titles and Sub-titles below must be edited to be relevant titles for the Field of Literature being reviewed. E.g. Relevant Standards and Procedures could be a title and then sub-titles could be SOUTH AFRICAN STANDARDS and MUNICIPAL STANDARD OPERATING PROCEDURES and Company “x” standard procedure, etc. Edit these titles here and then use the Update field function to update the Table of Contents automatically.

Use a font of 12.

## RELEVANT STANDARDS

Use a font of 12.

## SIMILAR PROJECTS

Use a font of 12.

### ESKOM Standard Procedures

Use a font of 12.

## TITLE

Use a font of 12.

### Fault Current Assumptions

Use a font of 12.

## CONCLUSION

Once you have finished discussing all the literature relevant to your project, you should make some concluding statements summarising how the literature has influenced your study.

E.g. The reader is reminded that in this document a voltage level at the consumer may be within “+/- 10%” not the usual regulated tolerance of +/- 5% as mentioned in the Municipal Standards. The calculations and analysis that follow will therefore use a +/- 10% tolerance for acceptable voltage levels etc.

Use a font of 12.

# CHAPTER 3 – DESIGN CALCULATIONS AND APPLICABLE THEORY



## INTRODUCTION

Briefly mention the Level II, and III theories that were applied by you in the project implementation phase. This introduction will inform the reader of the Design work you have done (YOU PERSONALLY!). The design calculations that you performed as you applied the theory must be done in the sections below and given relevant titles and sub-titles. In this section you must highlight any assumptions you made in order to implement the project. Perhaps some information from the Industrial Mentor was not available e.g. the power factor of the loads, or the incoming grid fault level. Clearly indicate that such assumptions have been made and the resulting answers and conclusions/recommendations may need to be changed once the information is made available. If you are presenting Simulation results and demonstrating the Simulation as evidence of your Project Design, then you do NOT need to do all the calculations here. However, you must do an example calculation to show you know how to obtain the results yourself and to show that there is justification in trusting the results of the Simulation that will be presented in the next chapter of this document. E.g. your grid may contain several branches, but you only need to show the detailed hand calculations here for one of those branches to prove you could do it for all of them. Remember to cite/refer, (using EndNote Web) to the applicable STANDARDS/PROCEDURES you alluded to in your Literature review, each time you apply/use a guideline from such documents.

The Titles and Sub-titles below must be edited to be relevant titles for the Design Calculations and/or Applicable Theory that was used. E.g. Voltage Levels could be a title and then sub-titles could be Power Factor Correction and Converting Radial to Ring Feed, etc. Edit these titles here and then use the “Update field function” to update the Table of Contents automatically.

Use a font of 12.

## TITLE

Use a font of 12.

### Sub-Title

Use a font of 12.

## TITLE

Use a font of 12.

### Sub-Title

Use a font of 12.

# CHAPTER 4 - CONSTRUCTION



## hardware components

Indicate what hardware components were used to construct the final project (e.g. plastic wheels, wood, wire, etc.) and what they were used for.

Use a font of 12.

## drawings

If possible, provide a drawing of the hardware for the project with labels and descriptions. You can do this by hand or even better with a CAD package or using the drawing aids of MS Word.

Use a font of 12.

## construction difficulties

Specify construction problems that you came across and how you solved it

Use a font of 12.

## Final PRODUCT

Provide an actual photo of the final project in this section

Use a font of 12.

## TITLE

Use a font of 12.

The student must choose one of the following topics for Chapter 5, depending if it was a control project or a pure electronic/communication project without any software elements. If the student wants, he/she can choose to do BOTH topics to provide an even better understanding of the project.

# CHAPTER 5 – SOFTWARE

## Flowcharts

Show the relevant flowcharts/pseudocode that you had to use to implement certain control logic to your project.

Use a font of 12.

## CODE

Shows sections of the code that had a major impact on the control software and describe the code.

Do not show all your code here, just the more relevant pieces of code.

Use a font of 12.

## COMMUNICATION PROTOCOL

Describe any communication protocols that you had to implement

Use a font of 12.

**OR / AND**

# CHAPTER 5 – CIRCUIT ANALYSIS

Use this chapter to describe how the circuit performed in terms of the components that you used and the calculations that you did. E.g. in a transmitter and receiver circuit, describe what distances you could reach, what the transmission pattern looked like, what the amplifier’s performance was etc. Compare this with the theoretical design and calculations that you did. Show actual waveforms and measurements that you did on the circuit (not the theoretical values). Also maybe draw a conclusion as to why certain aspects of the circuit didn’t work and why they failed.

I.e. analyse the circuit that you built and describe it in terms of measurements and a conclusion. Use relevant sub-headings.

# CHAPTER 6 - OPERATION

## operation description

Describe the operation of the project. What happens in what sequence

Use a font of 12.

## operational manual

Provide a manual for use the project. E.g. if you have a line-following robot, where do I connect the power supply, what supply should it be, do I first switch on the supply or the circuit first, in what position must the switches be, what does the LEDs indicate, what warning signals will be there.

Use a font of 12.

## fault finding

If the project stops working, what could be the possible problems. What steps could be followed to solve the most common fault. E.g. the power LED does not light up – means the power supply is faulty or not available – find another supply or battery, etc.

Use a font of 12.

## TITLE

Use a font of 12.

# CHAPTER 7 - CONCLUSIONS AND RECOMMENDATIONS



## CONCLUSIONS

Once you have shown through your Analysis and Evaluation that your project and its outputs are reasonable and trustworthy, you must use the results to make conclusions regarding the solutions you obtained. Perhaps the results show that your solution is not adequate. Conclude that the hypothesis has been refuted and the solution you implemented is inadequate to solve the problem and sub-problems. OR Perhaps the results show the solution you implemented is a workable solution, then make the relevant conclusion of this that the hypothesis is shown to be correct. Perhaps it is partly workable but not completely satisfactory. Discuss this in the conclusion you make.

Use a font of 12.

## RECOMMENDATIONS

Recommendations are necessary almost all the time even if the solution you implemented is workable, improvements can be suggested. Suggest such improvements. Obviously if the solution you implemented did not work or only worked partially, then you will have much more to recommend to your readers regarding a future investigation that can make use of your recommendations to hopefully get a better workable solution. You are informing others of what can be done to learn from your “experience” gained from this investigation/project.

Use a font of 12.

# CHAPTER 8 - LIST OF REFERENCES

This reference list will be automatically filled in and edited if you are using EndNote Web to Cite While You Write (CWYW).

Note that it is **compulsory** for you to use **EndNote Web** software from 2011 because it is freely available to you as a student through the library subscription to ISI Web of Knowledge database, AND because you were given workshops in its set-up and use by your lecturer and/or you were invited to such workshops by the EBEIT Faculty Librarian.

Note furthermore that failure to make use of EndNote Web may result in the document being returned to you unmarked to remedy this deficiency. In other words **the staff of the EBEIT Faculty may refuse to mark this document until it has been cited and referenced perfectly**. End Note Web is a free tool to assist you in perfecting your citation and referencing of this document. Use it or risk being failed for poor referencing skill which makes you automatically guilty of the offence of **PLAGIARISM**.