# CONSERVATION VOLTAGE REDUCTION TECHNIQUE: AN APPLICATION GUIDELINE FOR SMARTER GRID.

A PROJECT REPORT

Submitted by

**JESTIN JAISON**

**UNI.REG.NO**

**to**

the A P J Abdul Kalam Technological University

in partial fulfillment of the requirements for the award of the Degree

of

Bachelor of Technology

In

Electrical and Electronics Engineering


**DEPT. OF ELECTRICAL & ELECTRONICS ENGINEERING**

COLLEGE OF ENGINEERING

KIDANGOOR

MAY 2020

## DECLARATION

I undersigned hereby declare that the project report ( "Title of project") , submitted for partial fulfillment of the requirements for the award of degree of Master of Technology of the APJ Abdul Kalam Technological University, Kerala is a bonafide work done by me under supervision of ( Name of supervisor(s)). This submission represents my ideas in my own words and where ideas or words of others have been included, I have adequately and accurately cited and referenced the original sources. I also declare that I have adhered to ethics of academic honesty and integrity and have not misrepresented or fabricated any data or idea or fact or source in my submission. I understand that any violation of the above will be a cause for disciplinary action by the institute and/or the University and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been obtained. This report has not been previously formed the basis for the award of any degree, diploma or similar title of any other University.

Place

Name of the student

Date

**DEPT. OF ELECTRICAL & ELECTRONICS ENGINEERING**

**COLLEGE OF ENGINEERING**

**KIDANGOOR**

**2018 - 2019**


## CERTIFICATE

This is to certify that the report entitled **Conservation Voltage Reduction Technique: An Application Guideline For Smarter Grid** submitted by **Jestin Jaison**, to the APJ Abdul Kalam Technological University in partial fulfillment of the B.tech. degree in Electrical and Electronics Engineering is a bonafide record of the project work carried out by him/her under my/our guidance and supervision.. This report in any form has not been submitted to any other University or Institute for any purpose.

**Project Coordinator**

Mr. Anith Krishnan.
Assistant Professor
Dept. of Electrical & Electronics
College of Engineering Kidangoor

**Head of the Department**

Dr. Indhu P. Nair
Associate Professor
Dept. of Electrical & Electronics Engineering
College of Engineering Kidangoor

# ACKNOWLEDGEMENT

I take this opportunity to express my deep sense of gratitude and sincere thanks to all who helped me to complete the work successfully. My first and foremost thanks goes to God Almighty who showered in immense blessings on my effort.

I wish to express my sincere thanks to **Prof. K. G. Viswanathan. Principal College of Engineering Kidangoor** for providing me with all the necessary facilities and support.

I would like to express my sincere gratitude to **Dr. Indhu P. Nair( Head of the department)**, for her support and co-operation. I wish to express my sincere gratitude towards all the teaching and non teaching staff members of our Department.

Finally I thank my parents, all my friends, near and dear ones who directly and indirectly contribute to the successful of this work.

**JESTIN JAISON**

**Abstract**

Overall electric energy conservation and improvement in electrical energy efficiency has been a topic of interest to the electric power industry for long time, since 40% of total primary energy used is in the form of electricity. There are many facets to the energy conservation and/or energy efficiency techniques. Energy conservation by voltage reduction popularly called "CVR" has recently gained some momentum, in particular, to reduce the peak demand. This is also an integral part of the discussion in the future smarter grid technology. This paper addresses the pros and cons of the Conservation Voltage Reduction application including a thorough literature search, practical applications and a quantifiable measure of its actual amount of energy saving from utilities and the cost associated with it. It is expected that this paper will serve as a foundation to all practicing engineers addressing the issue of CVR.

# Contents

# List of Figures

# List of Tables

## ABBREVIATIONS

HAS High Altitude Simulation

LMTD Logarithmic Mean Temperature Difference

PDF Probability Density Function

## NOTATION

A Area, $m^2$

E Voltage, V

Re Reynolds number

T Temperature, K

# Chapter 1

# INTRODUCTION

Introduction

## 1.1 GENERAL BACKGROUND

# Chapter 2

# LITERATURE SURVEY

## 2.1 THEORETICAL INVESTIGATIONS

Theoritical Investigation

### 2.1.1 Optimisation studies

Check the code corresponding to below figure for the steps of how to add image file to sharelatex. Steps also written before the code. Use the same step for add images. And this is mention of figure 2.1 in this paragraph.

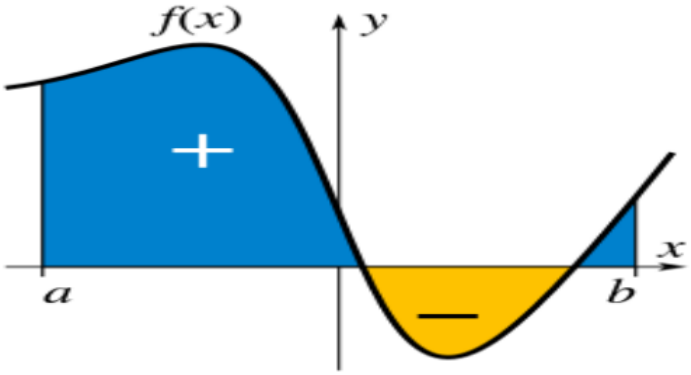


Figure 2.1: Name of the image

.

### 2.1.2 Sample Equation

This is sample of equation 2.1

$$CVR_f = \sqrt{\frac{\%ReductionofQuantities + V_{rms(MAX)} + V^{(ref)}}{\%VoltageReduction}} \tag{2.1}$$

### 2.1.3 Sample Table

Sample table 2.1 based on American papers [1]

| **Sl.No** | **Heading 1** | **Heading 2** | **Heading 3** |
|---|---|---|---|
| 1 | Detial 1 | Detial 2 | Detial 3 |
| 2 | Detial 4 | Detial 5 | Detial 6 |
| 3 | Detial 7 | Detial 8 | Detial 9 |

Table 2.1: Sample table

# Chapter 3

# MODELLING

# Chapter 4

# RESULTS AND DISCUSSION

# Chapter 5

# Conclusion

# Bibliography

[1] Wikipedia

[2] Google.com