Sudan University of Science and technology
College of Engineering
Electrical Engineering

DESIGN OF HIGH VOLTAGE TRANSMISSION SUBSTATION

تصميم المحطة التحويلية ذات الجهد العالي

A Project Submitted In Partial Fulfillment for the Requirement of the Degree of B.Sc. (Honor) In Electrical Engineering

Prepared By:
1.Ola Hassan Abd_Alqadir Mubarak
2. Jafer Atif Jafer Alsaied
3. Mohmmed Emad Awad Alkareem
4.Abu baker Elsiddiq Altayeb Ali

Supervised By:
Dr.Salah Qasim

October 2018

الآيـة

يقول الله تعالى في محكم تنزيله:

(فَتَعَالَى اللهُ الْمَلِكُ الْحَقُّ وَلَا تَعْجَلْ بِالْقُرْآنِ مِنْ قَبْلِ أَنْ يُقْضَى أَلَيْكَ وَحْيُهُ وَقُلْ رَبِّ زِدْنِي عِلْمًا)

صدق الله العظيم

سورة طه الآية رقم (114)

DEDICATION

We dedicate this study to our loving parents. A special feeling of gratitude to many friends and each member of this group for making this research possible. We also dedicate this study to our teachers and colleagues for giving us moral support. And to all students of electrical engineering.And finally a big thank to Sudan university of Science and technology.

ACKNOWLEDGMENT

First and foremost, I have to thank my research supervisor, Dr. Salah Qasim, we have been extremely lucky to have a supervisor such like him.A very special thanks to Sudanese Electrical Distribution Company,Sudanese Electrical Transmission Company for Their worthy time and recommendations throughout the period of achieving this study.Without their assistance and dedicated involvement in every step throughout the process, this research would have never been accomplished.We also appreciate the effort of Dr. Amer Hashim for explaining and illustrating the necessary steps of how to create a project in accordance with ideal scientific manner.Finally, we would like to thank anyone who helped us technically or financially.

ABSTRACT

This research discusses electrical design of power transmission substation as solution of increasing of load and entering Al_Sounot project to grid by large capacity. thesis involves planning done by analytical method, short circuit, and load flow analysis studies done by simulation using e-tab program. These studies based on a real data from national Sudanese electrical companies. As a result of these studies site was selected, capacity of transformers, number of feeders, rating of other equipment and devices were determined.

المستخلص

يناقش هذا البحث التصميم الكهربي لمحطات القدرة الكهربية . ويشتمل على دراسات التخطيط الكهربي ودراسة إنسياب الحمولة ودراسة دوائر القصر. هده الدراسات اجريت عن طريق النمذجة والحسابات معا معتمدة على بيانات أخدت بطرق مختلفة من شركات الكهرباء القومية أيضا كنتيجة لهده الدراسات تم اختيار الموقع وتحديد السعة للمحولات والمعدات الموجودة في المحطة .

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

Y	Admittance
I	Current
R	Resistance
X	Reactance
A	Ampere
V	Volt
DF	Diversity Factor
GR	Growth Factor
TR	Transformer
CB	Circuit Breaker
CT	Current Transformer
VT	Voltage Transformer
GIS	Gas Insulated Substation
AIS	Air Insulated Substation
SK	Sikka Hadeed
MVA	Mega Volt Ampere
DC	Direct Current
AC	Alternate Current
SETCO	Sudanese Electric Transmission Company
SEDCO	Sudanese Electric Distribution Company

LIST OF SYMBOLS

P	Real power, MW
Q	Reactive power, MVAR
V	Voltage magnitude, KV
d	Voltage angle
I	Current, Ampere
Y	Admittance, Mho
R	Resistance, Ω
X	Reactance, Ω
IK	Steady state short circuit current, KA
IK"	Initial symmetrical short circuit current, KA
IB	Symmetrical short circuit breaking current, KA
IP	Peak short circuit current, KA