OPTIMIZING ON LOAD TAP CHANGING (OLTC) FOR LOSS MINIMIZATION USING ARTIFICIAL IMMUNE SYSTEM (AIS)

This project thesis is presented in partial fulfillment for the award of the Bachelor of Electrical Engineering (Honours)
UNIVERSITI TEKNOLOGI MARA

AHMAD RIDZUAN BIN BRAHIM
FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITI TEKNOLOGI MARA
40450 SHAH ALAM,
SELANGOR DARUL EHSAN

ACKNOLEDGEMENT

In the name of ALLAH S.W.T, The most Beneficent, The most Merciful. It is with the deepest sense of the Al-Mighty Allah that gives me the strength and ability to complete this project. All good aspirations, devotions and prayers are due to ALLAH whose blessing and guidance have helped me throughout the entire project.

I would like to acknowledge and express my sincere gratitude towards my supervisor P.M Dr. Titik Khawa Abdul Rahman for her concern, valuable time of consultation and advice, guidance and patience in supervising my project from the beginning until the completion of this project thesis.

My heartiest goes to Cik Rafidah for his dedication in advice and willingly gives his ideas and suggestions for completing my project especially in how to use MATLAB software.

Finally, my deepest appreciation goes to my beloved family for their moral and spiritual supports. Last but not least, I would like to take opportunity to express my appreciation to those that directly or indirectly contributed towards the progress of this thesis.

ABSTRACT

This project report present an application of the Artificial Immune System (AIS) approach to search the optimal on load tap changing (oltc) setting in order to minimize the line losses. The optimal on load tap changing setting were determined with an objective to minimize system losses and at the same time improve the voltage profile in the power system. The performance of this Artificial Immune System technique was tested using standard IEEE 14-bus system and analysis of results is presented.

Keyword

Artificial Immune System, Transformers tap, Objective function, Cloning, Mutation, Fitness, Selection.

TABLE OF CONTENTS

1.2 Losses In Power System

Transmission losses become a major factor to be considered when it is needed to transmit electric energy over long distance or in the case of relatively low load density over a vast area. The active power losses (I^2R) may amount to 20 to 30% of total generation in some situation.

Minimization of losses is important because it can lead to a move economic operation of power system. If more losses can be minimized, the power can be consumed efficiently. Existing power generation and transmission can be used effectively without having to build new installations and at same time save the cost of losses. Losses in power system can arise from the following mechanism.

1) Line and cable losses
2) Transformer losses
3) Machine losses (core and copper)
4) Eddy current losses in metal housing

Thus, losses increase the operating cost of running a power system and determine how to operate various generating plants. In addition to that, thermal losses reduce the overall lifetime of the electrical equipments.