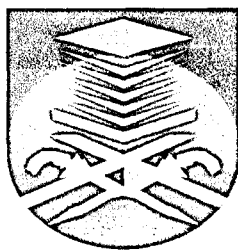


**DEVELOPING TOOLS OF SHORT-TERM RELIABILITY  
EVALUATION USING A FAST SORTING TECHNIQUE (FST)**

This thesis is presented in partial fulfillment for the award of the  
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*In the name of Allah S.W.T, the Most Beneficent, the Most Gracious and the Most Merciful*

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## **ABSTRACT**

This project discusses the application of Fast Sorting Technique (FST) in order to evaluate the reliability of components, equipments or systems. The technique that have been developed by Institution of Engineering and Technology is considering the speed and accuracy requirements so this technique will quickly select the required number of systems state in descending order probability. After several calculations using sorting procedure, the stopping rule for the evaluation will be met. This stopping rule is defined as the relative accuracy of a given reliability index. Next, the value of Expected Demands Not Supply, EDNS is calculated using the appropriate equation. Fast Sorting Technique only needed a small number of system states to achieve the high accuracy of the short-terms reliability and this will take a minimum evaluation of comparisons and also the number of comparisons.

### *Keywords*

Power systems, Reliability Evaluation, Fast Sorting Technique (FST)

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# CHAPTER 1

## INTRODUCTION

### 1.0 INTRODUCTION

Nowadays, the need for reliable power systems is very important since the world is growing fast. Most of the product in this world are using electric even some of people have invented vehicle to use electric in order to save the usage of fuel. Unreliable electrical energy will cause a lot of trouble to the consumer, no matter from what background there are come from either industrial, business or the mankind. Without reliable power systems, in examples, the consumer will be in the darkness or a businessman could lose a billion ringgit when there is no electricity. Thus, a lot of techniques to calculate the reliability have been developed. This reliability evaluation comes from power system planning and operation [5, 9, 19].

Generally, reliability can be known as a performance of equipments, machines, components or systems when it is operating [4]. In order to calculate the reliability, the probability method is applied. This is because the calculation of reliability are considering fail and operating conditions. To make it more clear, as example, given that the probability of reliability is equal to 0.9, it is mean that the components can operate well at 90 percent and the probability of this component fail to operate is 10 percent. So, if the reliability is equal to 1, the component or the systems are successfully operates. But, in order to have an ideal system is mostly impossible. This is because nothing in this world can perfectly and permanently operates.

There is a lot of methods that have been used in calculating the reliability of power systems such as by using Markov's theory, decision tree theory and also could be another method that have been developed. In this project, one method that evaluates the reliability of power systems is presented. The method that depends on the time-dependent state probabilities of the components is called as Fast Sorting Technique, FST [9].