

UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

SIMULATED ANNEALING FOR  
VEHICLE ROUTING PROBLEM

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IN THE NAME OF ALLAH, THE MOST GRACIOUS, THE MOST MERCIFUL.

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## **ABSTRACT**

This thesis will concentrate on a very interesting problem, which is Vehicle Routing Problem (VRP). The basic VRP is concerned with finding efficient routes for a fleet of vehicles which have to service a specified number of retail outlets from a central depot. On the other hand, in transportation network, the nodes represent origins and destinations as well as intersections. Travelers or users of the transportation networks seek, in the case of user-optimization, to determine their cost-minimizing routes of travel. Our objective is to design a set of least cost vehicle routes for a given set of customer requirements. In this paper, we present a Simulated Annealing algorithm (SA) to deal with this problem.

# **1 INTRODUCTION**

## **1.1 Introduction**

Traveling from one place to another is sometimes quite tiring if the route taking is far. To experience shorter way taking, someone must know the demographic features of some place. But, it takes time to remember every shortcut that exists in order to travel. Each person who travels must prefer to use the shortest way. So that it can cut cost and also able to minimum the duration of traveling. Therefore, traveling holds the same criteria in vehicle routing problem (VRP) as the main objective of VRP is to minimize problem. In this case, we want to get shortest way for traveling purpose.

There are considerable numbers of research conducted on vehicle routing problem during past decades. Traveling Salesman Problem (TSP) is one of the earliest and also the simplest routing problem. In this problem, a salesman who starts from and ends at the same city has to know the shortest tour to visit a number of cities in advance. After some time, TSP was extended to the Multiple Traveling Salesman Problem (m-TSP). This problem involves many salesmen and they are starting and returning at the same city, known as depot. Dantzig and Ramser (1959) have introduced the Vehicle Routing Problem (VRP) in the late 50s and it is a vital issue arises in the transportation, distribution and logistics sector. VRP is an integer programming and combinatorial optimization problem that find the optimal set of routes for a group of vehicles to traverse for delivering a number of goods to the customer. This issue can be viewed as an m-TSP which relates with capacity of vehicle and customer demands. The classical VRP targets