INTRODUCTION

Many real world situations are easily explained by Graph theoretic modeling. In view of recent developments in Science and technology, several practical problems like transportation networks, electrical networks, circuits layouts, flow-problem have come into the fold of graph theoretic modeling. Graph theory has special relevance to problems arising in Computer Science.

In this dissertation, some interesting Graph theoretic problems which are of frequent occurrence have been considered. These problems in Graph theory have well laid out mathematical solutions and are also expressed in the form of algorithms, so as to be amenable for Computer Programming. These problems involve large computations for evaluation and therefore have to be solved on a Computer.

Given an algorithm and the size of the input, the efficiency of an algorithm depends upon memory requirement to produce the output and also the computation time. Programs for some of the algorithms have already been developed in languages such as FORTRAN, ALGOL and APL. In this dissertation, C - language has been used because of the following advantages.

1. C - language is highly structured and supports a wide class of libraries and functions so that the programs are easily understood by the users.

2. It allows the use of pointers so that memory can be directly addressed and the computation time will be less.
Chapter 1 deals with the problem of finding the Shortest Path from a specified vertex to another specified vertex. This is one of the classical problems in Graph theory, which have many applications. Dijkstra and Hiller have given independently efficient algorithms for finding the shortest path from a specified vertex to another specified vertex. A program is developed in C-language and tested with familiar examples.

In Chapter 2 an extension of the problem discussed in Chapter 1 is considered. The problem of finding the shortest path from a vertex to all vertices has several interesting applications and efficient algorithms for solving this problem are available in standard treatises. A program in C has been developed and tested on a computer with suitable examples. The output is supplemented.

In Chapter 3, the most interesting problem in graph theory namely determining whether a Graph is Planar or not, is considered. Testing Planarity for large graphs is quite tedious. Efficient algorithms exist and are given by Steenli and Grown. This algorithm itself involves deep concepts in Graph Theory. The Problem developed will be helpful in determining the planarity for large Graphs also.

In conclusion, some problems in Graph Theory, which are of utmost importance and applicable to several areas of practical importance are attempted for programming. The Program are written in such a user friendly way that they will be helpful to any researcher in Graph theory with little acquaintance with C.