PREFACE

Fuzzy set theory provides us not only a meaningful and powerful representation of measurement of uncertainties, but also a meaningful representation of vague concepts expressed in natural languages. Because every crisp set is fuzzy set but not conversely; the mathematical embedding of conventional set theory into fuzzy sets is as natural as the idea of embedding the real numbers into complex plane. Thus the idea of fuzziness is one of enrichment, not of replacement.

One of the first important papers on fuzzy graph theory was by Rosenfeld [55]. Although the first definition of a fuzzy graph was by Kaufman(1973) [31], Rosenfeld’s paper, together with Yeh and Bang’s paper [61] is the cornerstone paper for the fuzzy graph theory. Rosenfeld introduced an elegant definition of a metric in a fuzzy graph, called the $\mu$-distance $\delta(x, y)$, defined as the smallest $\mu$-length of a path as the sum of the reciprocals of the membership values of edges called weights.

This thesis “A Study on Fuzzy Detour Distance in Fuzzy Graphs” consists of seven chapters.
In Chapter I, the fundamental concepts of fuzzy set theory and the review of literature of fuzzy graph theory are discussed.

In Chapter II, fuzzy detour \( \mu \)-distance is defined and it is seen that it is a metric on the vertex set of every connected fuzzy graph. For any fuzzy graph \( G \), new terms like fuzzy detour radius, fuzzy detour diameter and fuzzy detour eccentricity are defined and properties relating them are presented. The number of fuzzy detours of a fuzzy graph is determined.

In Chapter III, fuzzy detour centre and its properties are discussed. Also the properties relating fuzzy detour centre and fuzzy detour diameter are presented. This chapter concludes with the properties relating fuzzy cut vertices and fuzzy detour.

In Chapter IV, the idea of Hamiltonian path that can be determined using fuzzy detours is discussed. An algorithm is presented for computation of fuzzy detour from some vertex of a fuzzy graph and seen as a Hamiltonian path in the case of a complete fuzzy graph.
In Chapter V, the characteristics of fuzzy detour boundary vertices are examined. Properties relating fuzzy detour boundary vertices and fuzzy detour neighbours are presented.

In Chapter VI, the definition of unique fuzzy detour eccentric vertex is introduced. A relationship between the fuzzy detour circumference and fuzzy detour diameter is made out. Further, properties based on fuzzy detour radial number and fuzzy detour diametric number are presented.

In Chapter VII, the application of fuzzy detour and its properties at various levels are presented.