Abstract

In this thesis, different types of m-polar fuzzy graphs (mPFGs) have been considered. The major problems considered in the thesis are generalized mPFGs and their properties, operations on mPFGs, degree of vertices of m-polar fuzzy graphs, density of mPFGs, mPF planar graphs, isomorphism and weak self complement mPFGs, edge regular mPFGs, the applications of mPFGs, generalized regular BFGs and product bipolar fuzzy line graphs.

This thesis consists of ten chapters. In the first chapter, the basic definitions of graph and different types of fuzzy graphs which are needed in the subsequent chapters are provided. Also, a history of the problems are cited.

In Chapter 2, super-strong and strong mPFV of mPFGs using the concept of strong mPFE are introduced. The strength of connectedness of path etc. are investigated. Also, the strong and strong mPFP are defined and presented with several properties. Then, an investigation is made on these nodes. An application of strong path problems is also given at the end.

In Chapter 3, at first mPFP, mPFC in an mPFG are defined. The strength of a connectedness of mPFP is introduced. Next, the strongest and strong mPFP, mPFBs, mPFCNs, mPFT and mPFFs in an mPFG are considered.

In Chapter 4, (m-polar fuzzy genus graph) mPFGG is defined and studied its genus value, strong and weak mPFGG. Also, discussed isomorphism properties of mPFGG. A relation between planarity value and genus value of an mPFG is established. Also, the Euler polyhedral equation is established in terms of the genus value of the mPFGG. Finally, a useful application of mPFGG is given on the topological surface.

In Chapter 5, mPF detour g-distance, mPF detour g-interior node, mPF detour g-boundary node are defined and explained their relations. Also, some properties of these parameters are investigated in detail.

In Chapter 6, the connectivity index for mPFG is discussed. The upper and lower boundary of connectivity index for mPFG are presented. If an edge is deleted from a mPFG then its effects of the connectivity index in mPFG is discussed in this chapter.

In Chapter 7, five new operations on Dombi mPFG, viz. direct product, cartesian product and semi strong product, strong product, lexicographic product are defined. It is proved that any of the products of Dombi mPFG are again a Dombi mPFG.

Next, ring sum, union of two Dombi mPFG are defined. Then complement and self complement of Dombi mPFG are defined. And different properties on Dombi mPFGs are presented.

Finally, Chapter 8, contains some concluding remarks and scopes of further research on the problems that have been studied in the thesis.