

ABSTRACT

Topology, as so many other branches of mathematics, evolved out of the revolutionary changes in the field of geometry during the nineteenth century. It depends strongly on the ideas of set theory, developed by George Cantor in the later part of the 19th century. Through this branch of Mathematics, we elucidate and investigate the ideas of continuity, within the frame work of Mathematics. The study of topological spaces, their continuous mappings and general properties makes up one branch of topology known as General Topology.

The research work presented in this dissertation is carried out on the basis of the earlier and traditional studies. In this research work, a new type of set called $g\eta$ -closed set is defined in a topological space.

This thesis consists of nine chapters.

In Chapter 1, preliminary definitions and results on various existing closed sets which are necessary for the further study of $g\eta$ -closed sets in topological spaces and topological ordered spaces are consolidated.

In Chapter 2, the developments of topology contributed by various authors are mentioned and the definitions cited by them are presented.

Chapter 3 contains a new class of $g\eta$ -closed sets in topological spaces which are defined using the notion of η -open sets. Fundamental properties of this new class of $g\eta$ -closed sets are studied and illustrated with examples. Necessary and sufficient conditions for the existence of $g\eta$ -closed sets and $g\eta$ -open sets are derived. It is proved that the intersection of any two $g\eta$ -closed sets is not a $g\eta$ -closed set and the union of any two $g\eta$ -closed sets is not a $g\eta$ -closed set. Construction of $g\eta$ -neighbourhoods system the relations among topological ordered spaces are also dealt in this chapter.

In Chapter 4 $g\eta$ -continuous functions, $g\eta$ -irresolute functions in topological spaces and topological ordered spaces are defined and their basic properties, interrelations are studied. It is proved that the composition of any two $g\eta$ -continuous functions is not a $g\eta$ -continuous functions. Some of the results related to the product

of mappings is obtained. Interrelations between other continuous mappings and $g\eta$ -continuous functions are established with suitable examples.

In Chapter 5, contra $g\eta$ -continuous functions, contra $g\eta$ -irresolute functions in topological spaces and contra $g\eta$ -continuous functions in topological ordered spaces are defined and its relation with various contra continuous functions are analyzed.

In Chapter 6, a new class of $g\eta$ -closed maps, $g\eta$ -open maps and $g\eta$ -homeomorphisms in topological spaces and topological ordered spaces are introduced. Some characteristics of $g\eta$ -closed maps and $g\eta$ -open maps are given. Also the association of these maps with other existing maps and their properties are studied.

Chapter 7 is devoted to the study of the properties of $g\eta$ -closed sets regarding separation axioms in topological spaces. New spaces, called $g\eta$ - T_k spaces for $k = 0, 1, 2$, $g\eta$ - D_k spaces for $k = 0, 1, 2$ and $g\eta$ - R_k spaces for $k = 0, 1$ are introduced and interrelation between several types of separation axioms and their properties are established as applications of $g\eta$ -closed sets.

In Chapter 8, the concept of $\tau_1\tau_2$ $g\eta$ -closed sets in topological spaces with its corresponding $\tau_1\tau_2$ $g\eta$ -closure of a set, $\tau_1\tau_2$ $g\eta$ -open sets, $\tau_1\tau_2$ $g\eta$ -neighbourhoods are introduced and some of their basic properties are studied.

In Chapter 9 we have summarized the significant results derived in the above chapters.

To summarize, in this dissertation we have introduced the $g\eta$ -closed set in the topological spaces. Using $g\eta$ -continuous maps, $g\eta$ -contra continuous maps, $g\eta$ -irresolute maps, $g\eta$ -closed maps, $g\eta$ -open maps, $g\eta$ -homeomorphism some theorems are developed in topological spaces and topological ordered spaces. $g\eta$ -separation axioms and $g\eta$ -bitopological spaces are also developed.