

Preface

The present thesis is concerned with a study of Q -topological spaces, fuzzy closure spaces and their Sierpinski objects.

This thesis is organized into five chapters.

The first chapter is introductory. It contains a brief introduction of the subject related to the thesis, necessary definitions and results which are used in the thesis.

Next three chapters are devoted to a study of Q -topological spaces.

Chapter two is on exponential Q -topological spaces. In this chapter, we have given a characterization of exponential objects in the category $Q\text{-TOP}$ of Q -topological spaces with the help of the Q -Sierpinski space.

Chapter three is on injective objects and existence of injective hulls in the comma category $Q\text{-TOP}/(Y, \sigma)$. In this chapter, we have given a characterization of injective objects (with respect to the class of embeddings in the category $Q\text{-TOP}$ of Q -topological spaces) in the comma category $Q\text{-TOP}/(Y, \sigma)$, when (Y, σ) is a stratified Q -topological space, with the help of their T_0 -reflection. We have also proved, in this chapter, that for any Q -topological space (Y, σ) , the existence of an injective hull of $((X, \tau), f)$ in the comma category $Q\text{-TOP}/(Y, \sigma)$ is equivalent to the existence of an injective hull of its T_0 -reflection $((\tilde{X}, \tilde{\tau}), \tilde{f})$ in the comma category $Q\text{-TOP}/(\tilde{Y}, \tilde{\sigma})$ (and in the comma category $Q\text{-TOP}_0/(\tilde{Y}, \tilde{\sigma})$, where $Q\text{-TOP}_0$ denotes the category of T_0 - Q -topological spaces).

Chapter four is on some coreflective hulls in the category $\mathbf{Str}\text{-}Q\text{-TOP}$ of stratified Q -topological spaces. In this chapter, we have obtained the coreflective hull of $(Q, \langle \{id_Q\} \cup \{\underline{q} \mid q \in Q\} \rangle)$ in the category $\mathbf{Str}\text{-}Q\text{-TOP}$ of stratified Q -topological spaces. We have also obtained, in this chapter, the coreflective hulls of the categories $\mathbf{Str}\text{-Dis}\text{-}Q\text{-TOP}$ of discrete Q -topological spaces and $\mathbf{Str}\text{-Ind}\text{-}Q\text{-TOP}$ of stratified indiscrete Q -topological spaces in the category $\mathbf{Str}\text{-}Q\text{-TOP}$.

Chapter five is on a characterization of the category **FCS** of fuzzy closure spaces. In this chapter, we have introduced the Sierpinski fuzzy closure space and given a characterization of the category **FCS** using Sierpinski fuzzy closure space.

In the last, we have given conclusion and future scope of the work presented in the thesis.