INTRODUCTION

The theory of groups and rings has long been studied. The additive structure of any ring is an abelian group. By the definitions, hypergroups are a generalization of groups and hyperrings are a generalization of rings. The additive structure of any hyperring is a canonical hypergroup which is a generalization of an abelian group. The study of hypergroups and hyperrings has drawn considerable attention in the field of algebra (e.g., [1], [2], [3], [4], [5]).

There are many standard and well-known theorems in ring theory, for examples, the isomorphism theorems of rings, the embedding theorem of an integral domain into a field. It is natural to ask whether similar results hold for hyperrings.

The multiplicative structure of any ring and any hyperring is by definition a semigroup. Semigroups admitting ring structure have been studied in the area of semigroups (e.g., [6], [7], [8], [9]). Transformation semigroups are considered important in the field of semigroups and many standard transformation semigroups admitting ring structure were characterized (see [9]), so there should be some study of transformation semigroups that admit a hyperring structure.

There are two main purposes in this research. The first one is to give some certain theorems of hyperrings which generalize some standard theorems in ring theory. The second one is to characterize various transformation semigroups admitting hyperring structure.

The notations and preliminaries used for this work are given in Chapter I. We study in Chapter II some general properties of

hyperrings and especially many significant theorems of hyperrings which generalize standard theorems of rings are introduced in this chapter. In Chapter III, we characterize various transformation semigroups, including well-known ones, which admit a hyperring structure.