

ABSTRACT

Mappings on algebraic structures play an important role in their representations [22] as well as in their preservations [41]. Therefore, it would not be wrong to say that, without the concept of mappings, every field of the modern sciences remains unflourished cum meaningless. For instance, every abstract group or associative algebra can be considered as a part of certain set of mappings. This is the major sources of inspiration for a mathematician of this modern age to study the certain kind of mappings like commutators, derivations and homomorphisms or representations.

In this dissertation, we shall discuss certain kind of mappings on semirings such as commutators and derivations in the framework of semirings as well as Γ -hemirings.

The theory of commutators plays an important role in the study of different kinds of algebraic structures like Lie algebra [38], prime rings [55] C^* -algebra and various other branches of functional analysis. It has abundant applications in the theory of derivations of rings and modules.

So far as semirings concerned, it is of course, not easy to define commutators exactly on the ring theoretical lines due to lack of additive inverse element in semirings. The hurdle in defining an analogue notion for semirings are that additive inverse of each element of a semiring does not exist.

Keeping in view all the above aspects, this dissertation is organized in the following way.

In chapter one, we includes some necessary preliminaries to make dissertation self-contained in particular, we discuss a special class of semirings (additively regular hemirings).

In chapter two, we introduce commutators for an additively regular hemiring. The main purpose of this chapter is to initiate the study of commutators on semirings (hemirings) and to develop its first order theory, which is indeed the generalization of the commutators of rings. Here, we are able to establish fundamental (theorem 2.2) of commutators for additively regular hemirings and also all the basic identities of commutators are formulated.

Chapter three is devoted to generalize a few results of ring derivations for semirings. In section 3.2, we introduce certain types of mappings and develop relations with derivations and commutators of semirings. Section 3.3, is devoted to discuss the derivations of polynomial semirings.

In chapter four, we introduced the notion of Γ -hemirings, which is indeed the generalization of the notion of Γ -rings introduced by [42]. In this connection a few examples of Γ -hemirings are also formulated the ideal theory of Γ -hemirings is also initiated and different kind of ideals are introduced for Γ -hemirings.

By using the ideal theory of Γ -hemirings, we are able to introduced the notion factor Γ -hemirings consequently, we are able to establish isomorphism theorems of Γ -hemirings in section 4.3. In section 4.4, we introduce the derivations of Γ -hemiring and generalized a few results of Γ -rings.

The thesis is ended with an open problem and references.