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Title: On Some Ideals in Algebraic Structures

Abstract

In Abstract Algebra, the concept of ideals, quasi-ideals, bi-ideals and (m, n) -ideals are well known. A lot of work has been done on these ideals by many algebraists in different algebraic structures. However, the very fundamental results of generalized ideals, covered lateral ideals in Γ -structures with involution, ternary structures with involution, fuzzy ideals and soft ideals in a ternary semigroup with involution etc. remained untouched. Therefore a need was felt to study and generalize these ideals in different algebraic structures. The present thesis comprises eight chapters consisting of various sections.

Chapter-1. In Chapter one, some basic definitions and results which are needed to prove the results in the subsequent Chapters have been stated. Most of the results and definitions are available in standard references on the subject. It serves the purpose to acquaint the reader with the terminology and basic facts often used and also to make thesis as much self-contained as possible.

Chapter-2. In Chapter two, we study (m, n) -regular ordered Γ -semigroups through ordered (m, n) - Γ -ideals. It is shown that if (S, Γ, \cdot, \leq) is an ordered Γ -semigroup, where m, n are non-negative integers and $A_{(m,n)}$ is the set of all ordered (m, n) - Γ -ideals of S . Then, S is (m, n) -regular $\Leftrightarrow A = (A^m \Gamma S \Gamma A^n]$, $\forall A \in A_{(m,n)}$. We also give some examples in support of our discussion. The content of this chapter is published in **Bol. Soc. Paran. Mat. (BSPM)(Brazil)**.

Chapter-3. Chapter three deals with involution in Γ -semigroups. We define bi- Γ -ideals in Γ -semigroups with involution and prove many interesting results characterizing Γ -semigroups with involution by using bi- Γ -ideals. Further, we introduce involution in ordered Γ -semigroups. Also, we define bi- Γ -ideals in ordered Γ -semigroups with involution and prove some results characterizing ordered Γ -semigroups with involution through bi- Γ -ideals and quasi- Γ -ideals. We also give some examples in support of our discussion. The content of this chapter is published in **Italian Journal of Pure and Applied Mathematics (Italy)**.

Chapter-4. In Chapter four, we study some useful results of ordered (p, q) -lateral ideals in ordered ternary semigroups. Further, we characterize the relationship between minimal (resp., maximal) ordered (p, q) -lateral ideals and (p, q) -lateral simple ordered ternary semigroups. Finally, we define covered lateral ideals of ordered ternary semigroups and study their properties. We also give some examples in support of our discussion. The contents of this

Chapter are published in **Applications and Applied Mathematics-An International Journal (USA)** and **Quasigroups and Related Systems (Moldova)**.

Chapter-5. Chapter five is devoted to the study po-bi-ternary Γ -semigroups that satisfies the compatibility condition. Here, we introduced po-bi quasi- Γ -ideals, po-bi- Γ -ideals and generalized po-bi quasi- Γ -ideals in po-bi-ternary Γ -semigroups. Also, we define po-bi α -right Γ -ideals, po-bi (ξ, ζ) -lateral Γ -ideals and po-bi β -left Γ -ideals in po-bi-ternary Γ -semigroups. Some intersection properties of po-bi $(\alpha, (\xi, \zeta), \beta)$ -quasi Γ -ideals have been investigated. Moreover, we introduced these notions in terms of minimal po-bi $(\alpha, (\xi, \zeta), \beta)$ -quasi- Γ -ideals in po-bi-ternary Γ -semigroups. Finally, α right simple, (ξ, ζ) -lateral simple, β -left simple, and $(\alpha, (\xi, \zeta), \beta)$ -quasi simple po-bi-ternary Γ -semigroups are introduced. Also, we give some examples in support of our discussion. This chapter is published in **AIP Conference Proceedings (USA)**.

Chapter-6. In Chapter six, we introduce ideals in ternary semigroups with involution. Further, we define fuzzy ideals and fuzzy filters in ternary semigroups with involution. Further, we explore some properties using involution theoretic concepts in ternary semigroups for fuzzy ideals and fuzzy filters. We also give some examples in support of our discussion. The content of section 2 of this chapter is published in **Discussiones Mathematicae-General Algebra and its Applications (Poland)** and remaining part is communicated to **TWMS Journal of Applied and Engineering Mathematics (Turkey)**.

Chapter-7. In Chapter seven, we introduce soft ideals and soft filters in ternary semigroups with involution and shows that how a soft set effects on a ternary semigroup with involution with the help of intersection and insertion of sets. We also give an example in support of our discussion. The content of this chapter is published in **Discussiones Mathematicae-General Algebra and its Applications (Poland)**.

Chapter-8. In Chapter eight, we have collected the findings and conclusions of the Chapters of the thesis. Also, we have discussed the future work that can be done on these structures.

In the end, a comprehensive bibliography with the author's name in alphabetical order is given enlisting books and papers which have been referred to in the thesis.