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Study of some important theorem on a fuzzy prime radical and fuzzy prime ideal of Gamma- Ring

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Abstract
Fuzzy Prime radical and fuzzy primary ideal of a $\Gamma - ring$ and have derived several interesting and appealing result on it.

Keywords: Fuzzy ideal, Γ -ring, fuzzy prime radical, fuzzy primary ideal

1. Introduction

The notion of fuzzy ideal in Γ -ring was introduced by Y.B. Jun and C.Y. Lee in 1992. Some earlier work on fuzzy ideals of Γ -ring may be found in the work of Dutta & Chanda, Jun & Lee, Hang & Jun, Jun and Jun & Lee. In this paper our aim is to introduce the notions of fuzzy prime radical and fuzzy primary ideal of a Γ -ring and study them. We will obtain a characterization of fuzzy primary ideal of a Γ -ring M.

1.1 Γ -RING: Let M and Γ be two additive abelian groups. M is called a Γ -ring if there exists a mapping $F: M \times \Gamma \times M \to M$, $f(a, \alpha, b)$ is denoted by aαb, ab∊M,α $\in \Gamma$, satisfying the following conditions for all a,b,c ∊ M and for all α,β,γ∊ Γ ;

(i) $(a+b)\alpha c = a\alpha c + b\alpha c,$

(ii) $a(\alpha+\beta)b = a\alpha b + a\beta b,$

(iii) $a\alpha(b+c) = a\alpha b + a\alpha c,$

(iv) and $a\alpha(b\beta c) = (a\alpha b)\beta c,$

1.2 Left Ideal of Γ -Ring: A subset A of a $\Gamma - ring$ M is called a left ideal of M if A is an additive subgroups of M and mαa ∊A for all m ∊M, α∊ Γ , a∊A.

1.3 Right Ideal of $\Gamma -$ Ring: The subset A of the $\Gamma - ring$ M, be called a right ideal of M if A is an additive sub group of M and aαm∊A for all m∊M, α∊ Γ , a ∊ A. if A is a left and right of M, then A is called a two sided ideal of M or simply an ideal of M

1.4 Left Primary Ideal & Right Primary Ideal

$\Gamma - ring$ M is said to be left primary if for any two ideal A and B, $A\Gamma B \subseteq Q$ implies $A \subseteq Q$ or $B \subseteq PR(q),$ Where PR(Q) is the prime radical of Q. Similarly we can define right primary ideal. If in a commutative $\Gamma - ring$ each left primary ideal is also a right primary ideal and conversely; we call it a primary ideal.

1.5 Fuzzy Left Ideal: A non empty fuzzy subset μ (i.e. μ(x)≠0 for some x∊ M) of a Γ -ring M is called a fuzzy left ideal of M if,

1. μ (x-y)≥min{ μ(x), μ(y)},
2. μ(x∝y) ≥ μ(y), for all x,y ∊M and for all $\alpha \in \Gamma$.

1.6 Fuzzy Right Ideal: A non empty fuzzy subset μ (μ(x) ≠0 for some x ∊M) of a Γ -ring M is called a fuzzy right ideal of M if

1. μ (x-y)≥min{ μ(x), μ(y)},
2. μ(x∝y) ≥ μ(x), for all x, y∊M and for all ∝∊Γ .

A non- empty fuzzy subset μ of a Γ -ring M is called a fuzzy ideal of M if it is a fuzzy left ideal and a fuzzy right ideal of M.

1.7 Fuzzy Prime Ideal:- A non constant fuzzy ideal μ of a Γ ring M is called a fuzzy prime ideal of M, if for any two fuzzy ideals σ and θ of M, σ Γ θ⊆ μ implies that either $\sigma \subseteq \mu$ or $\theta \subseteq \mu$.

We denote the set of all fuzzy prime ideals of M and the set of all fuzzy prime ideals of R by FpI(M) and FpI(R) respectively.

Theorem 1.1:- A fuzzy ideal μ of a Γ - ring M is fuzzy prime if and only if μ(o_m) =1, IM$_\mu$={1,α },α∊[0,1] and $\mu_0 = \{X \in M : \mu(X) = \mu(o_m)\}$ is a prime ideal of M.

Proof: - It is obvious from the definition of fuzzy ideal and fuzzy prime ideal.
Let G an H be two groups, A and B a t-fuzzy sub groups of G and H, respectively. Then the t-level subset $(A \times B)_r^\Gamma$ for r∊ [0, 1] is a sub group of GxH, where eG and eH are identities of G and H respectively.

Theorem 1.2:- Let μ be a non-constant fuzzy ideal of a Γ - ring M, then the following conditions are equivalent:

1. μ is a fuzzy semi prime ideal of M;
2. For any a ∊M, inf

$$\{\mu(a\gamma_1 m\gamma_2 a), m \in M, \gamma_1\gamma_2 \in \Gamma\} = \mu(a)$$

Proof: - It follows from that A, B be fuzzy subsets of the sets G and H respectively. Γ be a t-norm and r∊[0,1]. Then $A_r^\Gamma \times B_r^\Gamma = (A \times B)_r^\Gamma$.

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