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ALMOST PRIME NAGENDRAM Γ-SEMI SUB NEAR-FIELD SPACE OF A Γ-NEAR-FIELD SPACE OVER NEAR-FIELD

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ABSTRACT

In this manuscript we obtain the notion of almost prime Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field almost with few of their characterizations. We also present the interesting relations almost prime and primary Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field.

Keywords: *Prime, prime Nagendram Γ-semi sub near-field space, sub representation, representation,Γ-near-field space; Γ-Semi sub near-field space of Γ-near-field space; Semi near-field space of Γ-near-field space, Nagendram Γ-semi sub near-field space, Nagendram Γ-semi near-field space, closed, compact, connected Nagendram Γ-semi sub near-field spaces of a Γ-near-field space over near-field.*

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SECTION 1: INTRODUCTION AND PRELIMINARIES

Recently, the generalization of prime Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field i.e. almost prime Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field has been introduced and discussed.

Author established the fundamental results that (i) every irreducible is a prime Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field (ii) every irreducible in N is a zero divisor (iii) every irreducible element of N is nilpotent and (iv) every non unit in N is nilpotent.

Consequently the author declared the unique maximal Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field consists of non unit elements.

Definition 1.1: Almost prime Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field. A Nagendram Γ-semi sub near-field space ***K*** of a Γ-near-field space over near-field N is said to be almost prime Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field if for all a, b $\in$ N implies ab $\in K - K^2$ either a $\in$ N or b $\in$ N.

Note 1.2: All prime and idempotent Nagendram Γ-semi sub near-field space ***K*** of a Γ-near-field space over near-field N is almost prime Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field.

Definition 1.3: Almost Primary Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field. A proper Nagendram Γ-semi sub near-field space **L** of a Γ-near-field space over near-field N is almost primary Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field if for a, b $\in$ N such that ab $\in L - L^2$, then a $\in$ L or b $\in$ L for some positive integer n.

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Note 1.4: It is clear that every almost prime Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field in a noetherian domain N is primary.

Remark 1.5: Several Characterizations of almost primary Nagendram Γ-semi sub near-field spaces of a Γ-near-field space over near-field N.

Note 1.6: It is evident that primary Nagendram Γ-semi sub near-field spaces of a Γ-near-field space over near-field, almost prime Nagendram Γ-semi sub near-field spaces of a Γ-near-field space over near-field and idempotent Nagendram Γ-semi sub near-field spaces of a Γ-near-field space over near-field N are almost primary Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field. But converse is not true in each case.

Definition 1.7: (weakly prime element or) prime Nagendram Γ-semi sub near-field space. Let $r \neq 0$ be in N then r is prime Nagendram Γ-semi sub near-field space if, whenever r divides ab where $ab \neq 0$. Then r divides a or r divides b.

Definition 1.8: Weakly prime. Author declare that a non zero non unit $p \in N$ is weakly prime if $p|ab \neq 0$ implies p|a or p|b.

Definition 1.9: Weakly prime. Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field **K** of a commutative near field space N is called a weakly prime

Definition 1.10: Weakly prime. if $0 \neq ab \in K$ implies $a \in K$ or $b \in K$ and also p is weakly prime if and only if (p) is weakly prime.

Definition 1.11: Weakly prime. P is weakly prime Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field if and only if $0 \neq LM \subseteq P$, L and M are Nagendram Γ-semi sub near-field spaces of a Γ-near-field space over near-field N implies $L \subseteq P$ or $M \subseteq P$.

Note 1.12: Further every weakly prime Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field is an almost prime Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field.

In this note we first introduce the notion of almost prime ideal in Nagendram Gamma semi sub near-field spaces of a Gamma near-field space over a near-field along with few of their characterizations. Finally, author present the interesting relations of an almost prime with the prime and primary ideal in Nagendram Gamma semi sub near-field spaces of a Gamma near-field space over a near-field.

SECTION 2: ALMOST PRIME IDEAL IN NAGENDRAM GAMMA SEMI SUB NEAR-FIELD SPACES OF A GAMMA NEAR-FIELD SPACE OVER A NEAR-FIELD.

In this section author introduce almost prime ideal in Nagendram Gamma semi sub near-field spaces of a Gamma near-field space over a near-field. Furthermore, author also present its implications with some ideals, we start with the following preliminary definition.

Definition 2.1: Let M be Nagendram Gamma semi sub near-field space and P be a prime ideal of M then P is almost prime ideal if $a, b \in N$, $ab \in P - P\Gamma P$, either $a \in P$ or $b \in P$.

Example 2.2: Suppose $Z_8 = \{0, 1, 2, 3, 4, 5, 6, 7\}$ and $\Gamma = \{0, 2, 4\}$. Let $P = 2Z_8 = \{0, 2, 4\}$ be a prime ideal in Z_8 and consider $P\Gamma P = \{0, 6\}$, $P - P\Gamma P = \{2, 4\}$. Here $2, 3 \in Z_8$ and $2.2.3 = 4 \in P - P\Gamma P$ where $2 \in P$ and $3 \notin P$. Similarly we can check for other elements as well. Hence P is an almost prime ideal in Nagendram Gamma semi sub near-field spaces of a Gamma near-field space over a near-field.

Example 2.3: Suppose K is a Nagendram Gamma semi sub near-field space of algebraic integers such that the integral closure of Z in C. Suppose that I be a radical ideal of K say $I\Gamma I = I$, if $\alpha \in I$ then $\beta \in K$ exist such that $\beta\Gamma\beta = \alpha$. Since $\beta\Gamma\beta = \alpha \in I$ implies $I = I\Gamma I$.

Example 2.4: Consider the Nagendram Gamma semi sub near-field spaces of a Gamma near-field space over a near-field $N = \{0, 1, 2, 3\}$ and $\Gamma = \{0, 2\}$ such that addition and multiplication defined as

$$\begin{pmatrix} + & 0 & 1 & 2 & 3 \\ 0 & 0 & 1 & 2 & 3 \\ 1 & 1 & 0 & 3 & 2 \\ 2 & 2 & 3 & 0 & 1 \\ 3 & 3 & 2 & 1 & 0 \end{pmatrix} \quad \begin{pmatrix} . & 0 & 1 & 2 & 3 \\ 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 2 & 3 \\ 2 & 0 & 2 & 0 & 2 \\ 3 & 0 & 3 & 2 & 1 \end{pmatrix}$$

Suppose P = {0, 2} = 2N be a prime ideal of N because for all a, b ∈ N and aγb ∈ P implies either a ∈ P or b ∈ P. As PΓP = {0} then P - PΓP = {2}, then for all a, b ∈ N such that aγb ∈ P - PΓP either a P or b ∈ P which is almost prime ideal in Nagendram Gamma semi sub near-field space of a Gamma near-field space over a near-field.

Proposition 2.5: Every prime ideal in a Nagendram Gamma semi sub near-field space of a Gamma near-field space over a near-field is almost prime ideal.

Proof: Suppose P is a prime ideal of Nagendram Gamma semi sub near-field space of a Gamma near-field space over a near-field but not almost prime. Assume aγb ∈ P – PΓP ⇒ aγb ∈ P. If aγb ∉ PΓP ⇒ a ∈ P or b ∈ P then contradiction arise to our supposition. Hence P must be a prime. This completes the proof of proposition.

Note 2.6: If I is maximal ideal of Nagendram Gamma semi sub near-field space of a Gamma near-field space over a near-field M then it is prime or MΓM = I.

Example 2.7: Let M = {0, 1, 2, 3} is a Nagendram Gamma semi sub near-field space of a Gamma near-field space over a near-field N where Γ = {0, 2} and ideal I = 2M = {0, 2} that is maximal in M. clearly, I is prime ideal in M also MΓM = I.

Lemma 2.8: Suppose N is a Nagendram Gamma semi sub near-field space of a Gamma near-field space over a near-field and for any γ ∈ Γ there is an element which is Γ - unit then every maximal ideal I of M is prime.

Proof: If for one γ ∈ Γ the element e is γ - one of M then MγM = {$m_1γm_2$: m_1; m_2 ∈ M} = M since for any m ∈ M, m = mγe. Because M ≠ I the equation is not true MΓM = I, when M = I or M = 0 then equation is true so M is simple and MΓM ≠ 0 as a result M is a prime. This completes the proof of lemma.

Proposition 2.9: Suppose I be a P-primary ideal of a Nagendram Gamma semi sub near-field space of a Gamma near-field space over a near-field such that PΓP = IΓI ⇒ I is an almost prime.

Proof: Suppose a, b ∈ N, aγb ∈ I – IΓI, a ∉ I and b ∉ I. As a ∉ I and I is a P-primary ideal it implies that b ∈ P. Also a ∈ P thus aγb ∈ PΓP = IΓI, which is a contradiction.

Lemma 2.10: Suppose that N be a near integral domain and c be a non-zero non-unit element of N. If element c is other than prime element then there exist a ∉ NΓc, b ∉ NΓc such that aγb ∈ NΓc but aγb ∉ $NΓc^2$.

Proof: Suppose an ideal Nc is not prime then there exist a∉NΓc, b ∉ NΓc such that aγb ∈ NΓc. if the case aγb ∈ $NΓc^2$ then for d = (b + c) γ ∉ NΓc and aγd ∈NΓc. If aγd ∈ $NΓc^2$ ⇒ aγc ∈ $NΓc^2$ as aγb∈ $NΓc^2$ ⇒ a ∈ NΓc, is a contradiction to our supposition. This completes the proof of the lemma.

Example 2.11: Let Z be a Nagendram Gamma semi sub near-field space of a Gamma near-field space over a near-field and Γ = {0, 1, 2, 3} consider c = 6 be an non – prime element of Z then ZΓ6 is non prime ideal because 3 ∉ ZΓ6 and 4 ∉ ZΓ6 but 12 ∈ ZΓ6 and 12 ∉ $ZΓ6^2$.

Proposition 2.12: Suppose that N be Nagendram Gamma semi sub near-field space of a Gamma near-field space over a near-field and c be a non-zero non unit element of N. If c is not a prime element then there exists a∈NΓc and b ∈NΓc such that aγb ∈NΓc and aγb ∈ $NΓc^2$.

Proof: Suppose an ideal NΓc is not prime and consider a ∈ NΓc, b ∈ NΓc such that aγb ∈ NΓc. If the case, aγb ∉ $NΓc^2$ then for d = {b + c} ∈ NΓc and aγd ∈ NΓc. consider aγd ∉ $NΓc^2$ implies ac∉ $NΓc^2$ and because aγb ∉ $NΓc^2$ implies ac ∉ NΓc, a contradiction ⊗ to our hypothesis. Hence the result is valid. This completes the proof of the proposition.

Theorem 2.13: Suppose N be a Nagendram Gamma semi sub near-field space of a Gamma near-field space over a near-field with identity and P be an almost prime ideal of N. If P is not prime then PΓP = P.

Corollary 2.14: Consider N a Nagendram Gamma semi sub near-field space of a Gamma near-field space over a near-field having identity and containing an ideal P is almost prime and $(P\Gamma P : P) \subseteq P$ then P is prime.

Theorem 2.15: If $c \neq 0$ is a non-unit element in Nagendram Gamma semi sub near-field space of a Gamma near-field space over a near-field N then ideal $N\Gamma c$ is prime if and only if $N\Gamma c$ is an almost prime.

Lemma 2.16: Suppose I be an almost prime ideal in a Nagendram Gamma semi sub near-field space of a Gamma near-field space over a near-field N. Then (a) If element b is a zero divisor in N/I in that case $b\Gamma I \subseteq I\Gamma I$. (b) If for any ideal J of N such that $I \subseteq J$ where J consists of zero divisors on N/I then $J\Gamma I = I\Gamma I$ and (c) If I an invertible ideal then I is prime.

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