Fuzzy Soft Ternary Γ-Semirings-II

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Abstract: In this paper we are introducing the notions of "fuzzy soft quasi TΓ-ideal(FSQTΓI), Fuzzy soft bi-TΓ-ideal(FSBTΓI)" are introduced. It is proved that (1) A "fuzzy soft set (q,P_1,Γ) over a ternary Γ-semiring(TΓ-SR)"T is a FSQTΓI over T iff $\forall$ a $\in P_1$, q(a) $\neq \emptyset$ is a "quasi-ideal of T". (2) Every "Fuzzy soft left (right, lateral) TΓ-ideal[FSLTΓI(FSMTΓI, FSRTΓI)] over a TΓ-SR T is a FSQTΓI over T": (3)Every "FSQTΓI is a fuzzy soft TΓ-SR over T": (4) Let "(r,A,Γ), (*l*,B,Γ) and (*m*,C,Γ) be FSLTΓI, FSMTΓI, FSRTΓI over T", respectively. Then "(r,A,Γ)$\wedge$(*l*,B,Γ)$\wedge$(*m*,C,Γ) is a FSQTΓI over T". (5) Let "(*f*,A,Γ) be a FSQTΓI and (*g*,B,Γ) a Fuzzy soft ternary Γ-semiring(FSTΓSR) over T". Then "(*f*,A,Γ) $\sqcap_R$ (*g*, B, Γ) is a FSQTΓI of (*g*, B, Γ)". (6) Let "(*f*,A Γ) and (*g*, B, Γ) be two non-empty fuzzy soft sets over a TΓ-SR T".Then the "fuzzy soft set (*h*, C, Γ) = (*f*, A Γ)o(T, E, Γ) o(*g*, B, Γ) is a FSBTΓI over T". Further many more properties are proved and some examples are given.

Index Terms: *TΓ-SR, FSTΓ-SR, FSTΓI, FSQTΓI.*

I. INTRODUCTION

Molodtsov introduced the new tool as soft set dealing with uncertainties. D. MadhusudhanaRao and SajaniLavanya introduced the concept of TΓ-SR. Further that MadhusudhanaRao and Revathi developed the TΓ-SR in terms fuzzy structures.MadhusudhanaRao and Ravi kumar developed the notion of "soft TΓ-ideals in TΓ-SR". MadhusudhanaRao, Revathi studied about "fuzzy TΓ-ideals in TΓ-SR". Further, they introduced the concept of fuzzy completely prime and prime ternary gamma ideals in TΓ-SR.

II. PRELIMINARIES

A "ternary Γ-semiring" (*T*, Γ, +, [ ],) is known as commutative if "$f_1\Gamma f_2\Gamma f_3 = f_2\Gamma f_3\Gamma f_1 = f_3\Gamma f_1\Gamma f_2 = f_2\Gamma f_1\Gamma f_3 = f_3\Gamma f_2\Gamma f_1 = f_1\Gamma f_3\Gamma f_2 \forall f_1, f_2, f_3 \in T$". A non-empty subset *S*of a ternary Γ-semiring*T*is known as a ternary Γ-subsemiring of *T*if$S\Gamma S\Gamma S\subseteq S$.By a L (R, M) ideal of a ternary Γ-subsemiring *V*, $V_1\subseteq V$such that $V\Gamma V\Gamma V_1\subseteq V_1$($V_1\Gamma V\Gamma V\subseteq V_1$,$V\Gamma V_1\Gamma V\subseteq V_1$). By a "two sided ideal", we mean a subset*A*which is both a L as well as a R-ideal of *T*. If anon-empty subsetisa L, R and a M-ideal of *T;* then it is known as an idealof*T*. A L (R, M, two sided) ideal $P_1$of a ternary Γ-semiring *T*is idempotentif$P_1\Gamma P_1\Gamma P_1 = P_1$. For more information refer to the references[6, 8].

III. . "Fuzzy Soft Quasi-tΓ-Ideal":

Def 3.1: A "fuzzy soft set(FSS) (*u*, V_1, Γ) over a ternary Γ-semiring(TΓ-SR)T"is called a "***fuzzysoft quasi-tΓ-ideal*(FSQTΓI)** over *T*"if (1)"$(u, V_1, \Gamma)o(q, V, \Gamma)o(q, V, \Gamma) \sqcap_R (q, V, \Gamma)o(u, V_1, \Gamma)o(q, V, \Gamma) \sqcap_R (q, V, \Gamma)o(q, V, \Gamma)o(u, V_1, \Gamma) \subseteq (u, V_1, \Gamma)$".

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(2) "$(u, V_1, \Gamma)o(q, V, \Gamma)o(q, V, \Gamma) \cap_R (q, V, \Gamma)o(q, V, \Gamma)o(u, V_1, \Gamma)o(q, V, \Gamma)o(q, V, \Gamma) \cap_R (q, V, \Gamma)o(q, V, \Gamma o(u, V_1, \Gamma) \subseteq (u, V_1, \Gamma)$, where (q, V, Γ) is the absolute fuzzy soft set over T".

Th 3.2: A "fuzzy soft set (u, V_1, Γ) over a TΓ-SRT" is a FSQTΓI over Tif and only if $\forall v_1 \in V_1, u(v_1) \neq \emptyset$ is a "quasi-tΓ-ideal(QTΓI) of T".

Proof: Suppose that a "FSS (u, V_1, Γ)over $T$is a FSQTΓI over T". We showthat $u(v_1)$ is a QTΓI of T. By definition of restricted product,

"$(u, V_1, \Gamma)o(q, P, \Gamma)o(q, P, \Gamma) = (g, V_1 \cap P \cap P, \Gamma) = (g, V_1, \Gamma)$"$\rightarrow$(1)

"$(q, P, \Gamma)o(u, V_1, \Gamma)o(q, P, \Gamma) = (h, P \cap V_1 \cap P, \Gamma) = (h, V_1, \Gamma)$"$\rightarrow$(2)

"$(q, P, \Gamma)o(q, P, \Gamma o(u, V_1, \Gamma) = (i, P \cap P \cap V_1, \Gamma)= (i, V_1, \Gamma)$"$\rightarrow$(3)

"$(q, P, \Gamma)o(q, P, \Gamma)o(u, V_1, \Gamma)o(q, P, \Gamma) o(q, P, \Gamma) = (J, P \cap P \cap V_1 \cap P \cap P, \Gamma) = (j, V_1, \Gamma)$"$\rightarrow$(4)

From equation (1), (2) and (3) we can write

"$(u, V_1, \Gamma)o(q, P, \Gamma)o(q, P, \Gamma) \cap_R (q, P, \Gamma)o(u, V_1, \Gamma)o(q, P, \Gamma) \cap_R (q, P, \Gamma)o$

$(q, P, \Gamma) o(u, V_1, \Gamma) = (g, V_1, \Gamma) \cap_R (h, V_1, \Gamma) \cap_R (i, V_1, \Gamma)$"$\rightarrow$ (5)

"$(u, V_1, \Gamma)o(q, P, \Gamma)o(q, P, \Gamma) \cap_R (q, P, \Gamma)o(u, V_1, \Gamma)o(q, P, \Gamma) \cap_R (q, P, \Gamma)o$

$(q, P, \Gamma) o(u, V_1, \Gamma) = (w, V_1, \Gamma)$"$\rightarrow$ (6)

But (u, V_1, Γ) is a FSQTΓI over T. Therefore,

"$(u, V_1, \Gamma)o(q, P, \Gamma)o(q, P, \Gamma) \cap_R (q, P, \Gamma)o(u, V_1, \Gamma)o(q, P, \Gamma) \cap_R (q, P, \Gamma)o(q, P, \Gamma)o$ $(u, V_1, \Gamma) \subseteq (u, V_1, \Gamma)$"$\rightarrow$(7).

From equation (6) we have $(w, V_1, \Gamma) \subseteq (u, V_1, \Gamma)$that is $w(d_1) \subseteq u(d_1) \forall d_1 \in V_1$.

Again form equation (6), we can write

"$u(d_1)\alpha q(d_1)\beta q(d_1) \cap q(d_1)\alpha u(d_1)\beta q(d_1) \cap q(d_1)\alpha q(d_1)\beta u(d_1) = w(d_1)\forall d_1 \in V_1$.

$\Rightarrow u(d_1)\alpha q(d_1)\beta q(d_1) \cap q(d_1)\alpha u(d_1)\beta q(d_1) \cap q(d_1)\alpha q(d_1)\beta u(d_1) \subseteq u(d_1)$"$\rightarrow$ (8)

Similarly, from (1), (3) (4)

"$(u,V_1, \Gamma)o(q,P, \Gamma)o(q,P, \Gamma) \cap_R (q,P, \Gamma)o(q,P, \Gamma)o(u,V_1, \Gamma)o(q,P, \Gamma)o(q,P, \Gamma) \cap_R$ $(q,P,\Gamma)o(q,P,\Gamma)o(u,P_1,\Gamma) = (l,V_1,\Gamma)$"$\rightarrow$(9)

As (u, V_1, Γ) is a FSQTΓI over T

"$(u,V_1,\Gamma)o(q,P,\Gamma)o(q,P,\Gamma)\cap_R (q,P,\Gamma)o(q,P,\Gamma)o(u,V_1,\Gamma)o(q,P,\Gamma)o(q,P,\Gamma)\cap_R (q, P, \Gamma)o(q, P, \Gamma o(u, P_1, \Gamma) \subseteq (u, V_1, \Gamma)$".

Therefore, "$(l,V_1,\Gamma) \subseteq (u,V_1,\Gamma)$, that is $l(d_1) \subseteq u(d_1)$ for all $d_1 \in V_1$."

From equation (9),

"$u(d_1)\ \alpha\ q(d_1)\ \beta\ q(d_1) \cap q(d_1)\ \gamma\ q(d_1)\ \alpha\ u(d_1)\ \beta\ q(d_1)\ \delta\ q(d_1) \cap q(d_1)\ \alpha\ q(d_1)\ \beta\ u(d_1)=l(d_1)$ $\forall d_1 \in V_1$."

$\Rightarrow$ "$u(d_1)\alpha q(d_1)\beta q(d_1) \cap q(d_1)\gamma q(d_1)\alpha u(d_1)\beta q(d_1)\delta q(d_1) \cap q(d_1)\alpha q(d_1)\beta u(d_1)$ $\subseteq u(d_1)$"$\rightarrow$(10)

From equation (8) and (10) we have, $u(d_1)$ is QTΓI.

Conversely, if $u(d_1) \neq \emptyset$ is a QTΓI of T for all $d_1 \in V_1$.

Now we claim that (u, V_1, Γ) is a FSQTΓI over T. By equations (1), (2) and (3)

"$(u,V_1,\Gamma)o(q,P,\Gamma)o(q,P,\Gamma)\,\mathrm{I}_R\,(q,P,\Gamma)o(u,V_1,\Gamma)o(q,P,\Gamma)\,\mathrm{I}_R\,(q,P,\Gamma)o(q,P,\Gamma)o(u,V_1,\Gamma) = (g,V_1,\Gamma)\,\mathrm{I}_R\,(h,V_1,\Gamma)\,\mathrm{I}_R\,(i,V_1,\Gamma) = (w,V_1,\Gamma)$".

By the definition "$u(d_1)\,\alpha\, q(d_1)\,\beta\, q(d_1)\,\mathrm{I}\; q(d_1)\,\alpha\, u(d_1)\,\beta\, q(d_1)\,\mathrm{I}\; q(d_1)\,\alpha\, q(d_1)\,\beta\, u(d_1) = w(d_1)$ for all $d_1 \in V_1$". Since $u(d_1)$ is a QTΓI of T".

$\therefore$, "$w(d_1) = u(d_1)\,\alpha\, q(d_1)\,\beta\, q(d_1)\,\mathrm{I}\; q(d_1)\,\alpha\, u(d_1)\,\beta\, q(d_1)\,\mathrm{I}\; q(d_1)\,\alpha\, q(d_1)\,\beta\, u(d_1) \subseteq u(d_1)$"

$\Rightarrow$ "$w(d_1) \subseteq u(d_1) \Rightarrow (w,V_1,\Gamma) \subseteq (u,V_1,\Gamma)$".

Thus "$(u,V_1,\Gamma)o(q,P,\Gamma)o(q,P,\Gamma)\,\mathrm{I}_R\,(q,P,\Gamma)o(u,V_1,\Gamma)o(q,P,\Gamma)\,\mathrm{I}_R\,(q,P,\Gamma)o(q,P,\Gamma)o(u,V_1,\Gamma) \subseteq (u,V_1,\Gamma)$" $\rightarrow$(11)

Now form equation (1), (3) and (4)

"$(u,V_1,\Gamma)o(q,P,\Gamma)o(q,P,\Gamma)\,\mathrm{I}_R\,(q,P,\Gamma)o(q,P,\Gamma)o(u,V_1,\Gamma)o(q,P,\Gamma)o(q,P,\Gamma)\,\mathrm{I}_R\,(q,P,\Gamma)o(q,P,\Gamma)o(u,P_1,\Gamma) = (g,V_1,\Gamma)\,\mathrm{I}_R\,(i,V_1,\Gamma)\,\mathrm{I}_R\,(j,V_1,\Gamma) = (l,V_1,\Gamma)$"

$\Rightarrow$ "$u(d_1)\;\alpha\; q(d_1\;\beta\; q(d_1)\;\mathrm{I}\; q(d_1)\;\gamma\; q(d_1)\;\alpha\; u(d_1)\;\beta\; q(d_1)\;\delta\; q(d_1)\;\mathrm{I}\; q(d_1)\;\alpha\; q(d_1)\;\beta\; u(d_1) = l(d_1)$ $\forall\, d_1 \in V_1$". $\Rightarrow$"$l(d_1) = u(d_1)\,\alpha\, q(d_1)\,\beta\, q(d_1)\,\mathrm{I}\; q(d_1)\,\gamma\, q(d_1)\,\alpha\, u(d_1)\,\beta\, q(d_1)\,\delta\, q(d_1)\,\mathrm{I}\; q(d_1)\,\alpha\, q(d_1)\,\beta\, u(d_1) \subseteq u(d_1)$"$\Rightarrow$"$(l, V_1, \Gamma) \subseteq (u, V_1, \Gamma)$"

$\Rightarrow$ "$(u,V_1,\Gamma)o(q,P,\Gamma)o(q,P,\Gamma)\,\mathrm{I}_R\,(q,P,\Gamma)o(q,P,\Gamma)o(u,V_1,\Gamma)o(q,P,\Gamma)o(q,P,\Gamma)\,\mathrm{I}_R\,(q,P,\Gamma)o(q,P,\Gamma)o(u,P_1,\Gamma) \subseteq (u,V_1,\Gamma)$"$\longrightarrow$ (12).

Therefore, from equations (11) and (12) we can say that (u,V_1,Γ) is a FSQTΓI over T.

Th 3.3: "Let (r, P_1, Γ); (l, P_2, Γ) and (m, P_3, Γ) be FSRTΓI, FSLTΓI and FSMTΓIs over T, respectively. Then $(r, P_1, \Gamma)\,\mathrm{I}_R\,(m, P_3, \Gamma)\,\mathrm{I}_R\,(l, P_2, \Gamma)$ is a FSQTΓI over T".

Proof: Straightforward.

Th 3.4: "Let (r, P_1, Γ); (l, P_2, Γ) and (m, P_3, Γ) be FSRTΓI, FSLTΓI and FSMTΓIs over T, respectively, such that $P_1 \cap P_2 \cap P_3 \neq \emptyset$. Then $(r, P_1, \Gamma)\,\mathrm{I}_E\,(m, P_3, \Gamma)\,\mathrm{I}_E\,(l, P_2, \Gamma)$ is a FSQTΓI over T".

Proof: By the definition we have "$(h, P_4, \Gamma) = (r, P_1, \Gamma)\,\mathrm{I}_E\,(m, P_2, \Gamma)\,\mathrm{I}_E\,(l, P_3, \Gamma)$",

Where, "$P_4 = P_1 \cup P_2 \cup P_3$, $P_1 \cap P_2 \cap P_3 = \emptyset$" and "$h(v) = \begin{cases} r(v) \text{ if } v \in P_1 - P_2\,\mathrm{I}\; P_3 \\ m(v) \text{ if } v \in P_3 - P_1\,\mathrm{I}\; P_2 \\ l(v) \text{ if } v \in P_2 - P_1\,\mathrm{I}\; P_3. \end{cases}$"

For any $v \in P_4$. In each of the case $h(v)$ is a QTΓI of T. As every LTΓI, MTΓI, RTΓI of TΓSR T is QTΓI of T, $\Rightarrow$ by definition "$(h,P_4,\Gamma) = (r,P_1,\Gamma) \cap_E (m,P_2,\Gamma) \cap_E (l,P_3,\Gamma)$ is a FSQTΓI over T".

IV. EXPERIMENTS AND RESULTS DESCRIPTION

Proof: Let (l,P_1,Γ) be a FSLTΓI over *T*. Then $l(p_1)$ is a LTΓI of *T*. As each LTΓI of T is a QTΓI of *T*, $\therefore$ $l(a)$ is a QTΓI of *T*. Hence $(L, P, \Gamma)$is a FSQTΓI over T.

Note: "The converse of the th 4.5, is not true".

Ex: "Let T = $\left\{\begin{pmatrix}0&0\\0&0\end{pmatrix},\begin{pmatrix}1&0\\0&0\end{pmatrix},\begin{pmatrix}0&1\\0&0\end{pmatrix},\begin{pmatrix}0&0\\1&0\end{pmatrix},\begin{pmatrix}0&0\\0&1\end{pmatrix}\right\}$ and Γ = $\left\{\begin{pmatrix}0&0\\0&0\end{pmatrix},\begin{pmatrix}1&0\\0&1\end{pmatrix}\right\}$ be a TΓ-SR under usual addition and matrix ternary multiplication. Let P_1 = $\{\alpha\}$ and q: $P_1 \longrightarrow P(T)$ defined as $q(\alpha) = \left\{\begin{pmatrix}0&0\\0&0\end{pmatrix},\begin{pmatrix}1&0\\0&0\end{pmatrix}\right\}$. Then ($q$, P_1, Γ) be a FSQTΓI over T, but it is not a LSTΓI, MSTΓI as well as RSTΓI over T".

Th: Every FSLTΓI (FSMTΓI, FSRTΓI) over T is a FSTΓ-SR over T.

Proof: Straight forward.

Th: Every FSQTΓI over T is a FSTΓ-SR over T.

Proof: Straight forward.

Th: "Let (l, P_1, Γ),(m, P_2, Γ) and (r, P_3, Γ) be FSLTΓI, FSMTΓI as well as FSRTΓIs over T, respectively. Then (l, P_1, Γ) ∧(m, P_2, Γ)∧(r, P_3, Γ)is a FSQTΓI over T".

Proof:By the definition "(h, P_4, Γ) = (l, P_1, **Γ**) ∧ (m, P_2, **Γ**) ∧ (r, P_3, **Γ**) where $P_4 = P_1 \times P_2 \times P_3$", and for any "$(f_1, f_2, f_3) \in P_1 \times P_2 \times P_3$, $h(f_1, f_2, f_3) = l(f_1) \cap m(f_2) \cap l(f_3)$ is a QTΓI of T". Since the "intersection of a LTΓI, RTΓI, MTΓI is a QTΓI of T, thus,(l, P_1, **Γ**) ∧ (m, P_2, **Γ**) ∧ (r, P_3, **Γ**) is a FSQTΓI over T".

Th: Let (t, P_1, Γ), (w, P_2, Γ) be two FSQTΓIs over a TΓ-SR T. Then

(1) (t, P_1, Γ) I $_R$ (w, P_2, Γ) is a FSQTΓI over T.

(2) (t, P_1, Γ) I $_E$ (w, P_2, Γ) is a FSQTΓI over T.

(3) (t, P_1, Γ) ∧(w, P_2, Γ) is a FSQTΓI over T.

(4) (t, P_1, Γ) U$_E$ (w, P_2, Γ) is a FSQTΓI over T, if $P_1 \cap P_2 = \emptyset$ are hold.

Th: Let (t, P_1, Γ) be a FSQTΓI as well as (w, P_2, Γ)a FSTΓ-SR T. Then,(t, P_1, Γ) I $_R$ (w, P_2, Γ) is a FSQTΓI of (w, P_2, Γ).

Proof: By definition "(m, P, Γ)=(t, P_1, **Γ**) I $_R$ (w, P_2, **Γ**), where $P = P_1 \cap P_2 \neq \emptyset$, $m(p) = t(p) \cap w(p)$ $\forall$ $p \in P$, as $m(p) \subseteq t(p)$, $m(p) \subseteq w(p)$. We show that $m(p)$is a QTΓI of $w(p)$. $\because$ $m(p) \subseteq w(p)$",

$$\text{“}m(p)\Gamma w(p)\Gamma w(p)\cap w(p)\Gamma m(p)\Gamma w(p)\cap w(p)\Gamma w(p)\Gamma m(p)$$
$$\subseteq w(p)\Gamma w(p)\Gamma w(p)\cap w(p)\Gamma w(p)\Gamma w(p)\cap w(p)\Gamma w(p)\Gamma w(p)$$
$$\subseteq w(p)\Gamma w(p)\Gamma w(p)\subseteq w(p)\text{”}$$

Because, $w(p)$ is a TΓ-SSR of T.

$$\Longrightarrow \text{“}m(p)\Gamma w(p)\Gamma w(p)\cap w(p)\Gamma m(p)\Gamma w(p)\cap w(p)\Gamma w(p)\Gamma m(p)\subseteq w(p)\text{”}\longrightarrow (1)$$

Also $m(p) \subseteq t(p)$. So

$$\text{“}m(p)\Gamma w(p)\Gamma w(p)\cap w(p)\Gamma m(p)\Gamma w(p)\cap w(p)\Gamma w(p)\Gamma m(p)$$
$$\subseteq t(p)\Gamma w(p)\Gamma w(p)\cap w(p)\Gamma t(p)\Gamma w(p)\cap w(p)\Gamma w(p)\Gamma t(p)$$
$$\subseteq t(p)\Gamma q(p)\Gamma q(p)\cap q(p)\Gamma t(p)\Gamma q(p)\cap q(p)\Gamma q(p)\Gamma t(p)\subseteq t(p)\text{”}$$

Because, $t(p)$ is a QTΓI of T. Thus

$$\text{“}m(p)\Gamma w(p)\Gamma w(p)\cap w(p)\Gamma m(p)\Gamma w(p)\cap w(p)\Gamma w(p)\Gamma m(p)\subseteq t(p)\text{”}\longrightarrow (2)$$

From equation (1) and (2) we have

$$\text{“}m(p)\Gamma w(p)\Gamma w(p)\cap w(p)\Gamma m(p)\Gamma w(p)\cap w(p)\Gamma w(p)\Gamma m(p)\subseteq t(p)\cap w(p) = m(p)\text{”}\longrightarrow (3)$$

Similarly, we can show that

$$\text{“}m(p)\Gamma w(p)\Gamma w(p)\cap w(p)\Gamma w(p)\Gamma m(p)\Gamma w(p)\Gamma w(p)\cap w(p)\Gamma w(p)\Gamma m(p)\subseteq m(p)\text{”} \longrightarrow (4)$$

From equation (3) and (4) we have $m(p)$ is a QTΓI of $w(p)$. “$(t, P_1, \mathbf{\Gamma})\ \mathrm{I}_R\ (w, P_2, \mathbf{\Gamma})$ is a FSQTΓI of $(w, P_2, \mathbf{\Gamma})$”.

V. CONCLUSION

By using FSS theory one can develop further algebraic structures of TΓ-SR.

REFERENCES:

1. M. I. Ali, F. Feng, X. Y. Liu, W. K. Min and M. Shabir, On some new operations in soft set theory, Comput. Math.Appl. 57 (2009) 1547{1553.
2. F. Feng, X. Y. Liu, V. Leoreanu-Fotea and Y. B. Jun, Soft sets and soft rough sets, Inform.Sci. 181 (2011) 1125{1137.
3. F. Feng, Y. B. Jun and X. Zhao, Soft semirings, Comput.Math.Appl.56 (2008) 2621{2628.
4. P. K. Maji, R. Biswas and A. R. Roy, Soft set theory, Comput. Math.Appl. 45 (2003) 555-562.
5. D. Molodtsov, Soft set theory-First results, Comput. Math. Appl. 37 (4-5) (1999) 19-31.
6. B. Ravi Kumar, D. MadhusudhanaRao, T. Satish, B. SankarRao, M. Vasantha-Soft Ternary Γ-Semiring-I, International Journal of Recent Technology and Engineering(IJRTE), ISSN:2277-3878, Volume-8, Issue IS3, Joun 2019.
7. K. Revathi,P. Sundarayya, D. MadhusudhanaRao, P. Siva Prasad-Compositions of Fuzzy TΓ-Ideals in Ternary Γ-Semi ring**,**International Journal of Advanced in Management, Technology and Engineering Sciences, ISSN NO : 2249-7455, Volume 07, Issue 12, December, 2017, pp: 135-145.
8. T. Satish, D. MadhusudhanaRao, M. Vasantha, K. Anuradha-Fuzzy Soft Ternary Γ-Semiring-I-International Journal of Recent Technology and Engineering(IJRTE), ISSN:2277-3878, Volume-8, Issue IS3, Joun 2019.
9. K.SriLatha, , D.MadhusudhanaRao, G.ShobhaLatha, Right Derivation of Ternary Γ-semirings- American International Journal of Research in Science, Technology, Engineering & Mathematics (AIJRSTEM) ISSN: 2328-3491, 2018, pp: 30-33.
10. M. Vasantha, D. MadhusudhanaRao, K. Praveenkumar, T. Satish- On Regular Ternary **Γ**-Semigroups**,** International Journal of Pure and Applied Mathematics, Volume 118, No 2, 2018, 181-194.