International Journal of Mathematical Archive-3(3), 2012, Page: 1000-1004
IJMA Available online through www.ijma.info ISSN 2229 – 5046

HOMOMORPHISM IN Q-INTUITIONISTIC L-FUZZY SUBNEARRINGS OF A NEARRING

[1]M. M. SHANMUGAPRIYA* & [2]K. ARJUNAN

[1]*Department of Mathematics, Karpagam University, Coimbatore -641021, Tamilnadu, India*
E-mail: mirdu.priya@rediffmail.com

[2]*Department of Mathematics, H. H. The Rajah's College, Pudukkottai-622001, Tamilnadu, India*
E-mail: arjunan_1975@yahoo.co.in, arjunan.karmegam@gmail.com

(Received on: 15-03-12; Accepted on: 28-03-12)

ABSTRACT

In this paper, we study some of the properties of Q-intuitionistic L-fuzzy subnearring of a nearring and prove some results on these.

2000 AMS SUBJECT CLASSIFICATION: *03F55, 08A72, 20N25.*

KEYWORDS: *(Q, L)-fuzzy subset, Q-intuitionistic L-fuzzy subset, Q-intuitionistic L-fuzzy subnearring, Q-intuitionistic L-fuzzy normal subnearring.*

INTRODUCTION

After the introdution of fuzzy sets by L. A. Zadeh [15], several researchers explored on the generalization of the notion of fuzzy set. The concept of intuitionistic L-fuzzy subset was introduced by K. T. Atanassov [4, 5], as a generalization of the notion of fuzzy set. Azriel Rosenfeld [6] defined fuzzy groups. Asok Kumer Ray [3] defined a product of fuzzy subgroups and A.Solairaju and R.Nagarajan[13,14] have introduced and defined a new algebraic structure called Q-fuzzy subgroups. We introduce the concept of Q-intuitionistic L-fuzzy subnearring of a nearring and established some results.

1. PRELIMINARIES:

1.1 Definition: Let X be a non-empty set and L = $(L, \leq)$ be a lattice with least element 0 and greatest element 1 and Q be a non-empty set. A **(Q, L)-fuzzy subset** A of X is a function A: XxQ $\to$ L.

1.2 Definition: Let $(L, \leq)$ be a complete lattice with an involutive order reversing operation N: L $\to$ L and Q be a non-empty set. A **Q-intuitionistic L-fuzzy subset** (QILFS) A in X is defined as an object of the form A={< (x, q), μ_A(x, q), ν_A(x, q) > / x in X and q in Q }, where μ_A : XxQ $\to$ L and ν_A : XxQ $\to$ L define the degree of membership and the degree of non-membership of the element $x \in X$ respectively and for every $x \in X$ satisfying $\mu_A(x) \leq N(\nu_A(x))$.

1.3 Definition: Let (R, +, .) be a nearring. A Q-intuitionistic L-fuzzy subset A of R is said to be a Q-intuitionistic L-fuzzy subnearring(QILFSNR) of R if it satisfies the following axioms:

(i) $\mu_A(x-y, q) \geq \mu_A(x, q) \wedge \mu_A(y, q)$
(ii) $\mu_A(xy, q) \geq \mu_A(x, q) \wedge \mu_A(y, q)$
(iii) $\nu_A(x-y, q) \leq \nu_A(x, q) \vee \nu_A(y, q)$
(iv) $\nu_A(xy, q) \leq \nu_A(x, q) \vee \nu_A(y, q)$, for all x and y in R and q in Q.

1.4 Definition: Let X and X′ be any two sets. Let f: X $\to$ X′ be any function and A be a Q-intuitionistic L-fuzzy subset in X, V be a Q-intuitionistic L-fuzzy subset in f(X) = X′, defined by $\mu_V(y, q) = \sup_{x \in f^{-1}(y)} \mu_A(x, q)$ and $\nu_V(y, q) = \inf_{x \in f^{-1}(y)} \nu_A(x, q)$, for all x in X and y in X′. A is called a preimage of V under f and is denoted by $f^{-1}(V)$.

***Corresponding author:** [1]*M. M. SHANMUGAPRIYA*, *E-mail: mirdu.priya@rediffmail.com*

1.5 Definition: Let (R, +, .) be a nearring. A Q-intuitionistic L-fuzzy subnearring A of R is said to be a Q-intuitionistic L-fuzzy normal subnearring(QILFNSNR) of R if

(i) $\mu_A(x+y, q) = \mu_A(y+x, q)$ and $\nu_A(x+y, q) = \nu_A(y+x, q)$, for all x and y in R and q in Q.
(ii) $\mu_A(xy, q) = \mu_A(yx, q)$ and $\nu_A(xy, q) = \nu_A(yx, q)$, for all x and y in R and q in Q.

2. SOME PROPERTIES OF Q-INTUITIONISTIC L-FUZZY SUBNEARRINGS OF A NEARRING:

2.1 Theorem: Let (R, +, .) and (R^I, +, .) be any two nearrings. The homomorphic image of a Q-intuitionistic L-fuzzy subnearring of R is a Q-intuitionistic L-fuzzy subnearring of $f(R) = R^I$.

Proof: Let (R, +, .) and (R^I, +, .) be any two nearrings Q be a non-empty set. Let $f: R \to R^I$ be a homomorphism. Then $f(x+y) = f(x) + f(y)$ and $f(xy) = f(x) f(y)$, for all x and y in R. Let A be a Q-intuitionistic L-fuzzy subnearring of R. We have to prove that V is a Q-intuitionistic L-fuzzy subnearring of $f(R) = R^I$.

Now, for f(x), f(y) in R^I and q in Q, $\mu_v(f(x) - f(y), q) = \mu_v(f(x - y), q) \geq \mu_A(x - y, q) \geq \mu_A(x, q) \wedge \mu_A(y, q)$, which implies that $\mu_v(f(x) - f(y) ,q) \geq \mu_v(f(x), q) \wedge \mu_v(f(y), q)$, for all f(x) and f(y) in R^I and q in Q.

Again, $\mu_v(f(x)f(y), q) = \mu_v(f(xy), q) \geq \mu_A(xy, q) \geq \mu_A(x, q) \wedge \mu_A(y, q)$, which implies that $\mu_v(f(x)f(y), q) \geq \mu_v(f(x),q)\wedge\mu_v(f(y), q)$, for all f(x) and f(y) in R^I and q in Q. Also, $\nu_v(f(x) - f(y), q) = \nu_v(f(x - y), q) \leq \nu_A(x - y, q) \leq \nu_A(x, q)\vee\nu_A(y, q)$, which implies that $\nu_v(f(x) -f(y), q) \leq \nu_v(f(x), q) \vee \nu_v(f(y), q)$, for all f(x) and f(y) in R^I and q in Q.

Again, $\nu_v(f(x)f(y) , q) = \nu_v(f(xy), q) \leq \nu_A(xy, q) \leq \nu_A(x, q) \vee \nu_A(y, q)$, which implies that $\nu_v(f(x)f(y), q) \leq \nu_v(f(x), q)\vee\nu_v (f(y), q)$, for all f(x) and f(y) in R^I and q in Q. Hence V is a Q-intuitionistic L-fuzzy subnearring of R^I.

2.2 Theorem: Let (R, +, .) and (R^I, +, .) be any two nearrings. The homomorphic preimage of a Q-intuitionistic L-fuzzy subnearring of $f(R)=R^I$ is a Q-intuitionistic L-fuzzy subnearring of R.

Proof: Let (R, +, .) and (R^I, +, .) be any two nearrings. Let $f : R \to R^I$ be a homomorphism. Then, $f(x+y) = f(x) + f(y)$ and $f(xy) = f(x) f(y)$, for all x and y in R. Let V be a Q-intuitionistic L-fuzzy subnearring of $f(R) = R^I$.

We have to prove that A is a Q-intuitionistic L-fuzzy subnearring of R. Let x and y in R.

Then, $\mu_A(x - y, q) = \mu_v(f(x - y), q) = \mu_v(f(x)-f(y), q) \geq \mu_v(f(x), q)\wedge \mu_v(f(y), q)= \mu_A(x, q)\wedge\mu_A(y, q)$, which implies that $\mu_A(x- y, q) \geq\mu_A(x, q) \wedge \mu_A(y, q)$, for all x and y in R and q in Q.

Again, $\mu_A(xy, q) = \mu_v(f(xy) , q)= \mu_v(f(x)f(y) , q)\geq \mu_v(f(x), q)\wedge\mu_v(f(y), q)=\mu_A(x, q) \wedge \mu_A(y, q)$, which implies that $\mu_A(xy, q) \geq \mu_A(x, q) \wedge \mu_A(y, q)$, for all x and y in R and q in Q.

Also, $\nu_A(x -y, q) = \nu_v(f(x- y), q) = \nu_v(f(x) - f(y), q)\leq \nu_v(f(x), q) \vee \nu_v(f(y), q)= \nu_A(x, q) \vee \nu_A(y, q)$, which implies that $\nu_A(x-y, q) \leq \nu_A(x, q)\vee\nu_A(y, q)$, for all x and y in R and q in Q.

Again, $\nu_A(xy, q) = \nu_v(f(xy), q) = \nu_v(f(x)f(y), q) \leq \nu_v(f(x), q) \vee \nu_v(f(y), q)= \nu_A(x, q) \vee \nu_A(y, q)$, which implies that $\nu_A(xy, q) \leq \nu_A(x, q) \vee \nu_A(y, q)$, for all x and y in R and q in Q. Hence A is a Q-intuitionistic L-fuzzy subnearring of R.

2.3 Theorem: Let (R, +,.) and (R^I, +, .) be any two nearrings. The anti-homomorphic image of a Q-intuitionistic L-fuzzy subnearring of R is a Q-intuitionistic L-fuzzy subnearring of $f(R) = R^I$.

Proof: Let (R, +, .) and (R^I, +, .) be any two nearrings. Let $f : R \to R^I$ be an anti-homomorphism. Then, $f(x+y) = f(y) + f(x)$ and $f(xy) = f(y) f(x)$, for all x and y in R. Let A be a Q-intuitionistic L-fuzzy subnearring of R.

We have to prove that V is a Q-intuitionistic L-fuzzy subnearring of $f(R) = R^I$. Now, for f(x), f(y) in R^I and q in Q, $\mu_v (f(x) - f(y), q) = \mu_v(f(y- x), q) \geq \mu_A(y- x, q) \geq \mu_A(y, q) \wedge \mu_A(x, q) = \mu_A(x, q)\wedge\mu_A(y, q)$, which implies that $\mu_v(f(x) - f(y), q) \geq \mu_v(f(x), q) \wedge \mu_v(f(y), q)$, for all f(x) and f(y) in R^I and q in Q.

Again, $\mu_v(f(x)f(y), q) = \mu_v(f(yx), q) \geq \mu_A(yx, q) \geq \mu_A(y, q) \wedge\mu_A(x, q) = \mu_A(x, q)\wedge \mu_A(y, q)$, which implies that $\mu_v(f(x)f(y), q)\geq \mu_v(f(x), q)\wedge \mu_v(f(y), q)$, , for all f(x) and f(y) in R^I and q in Q. Also, $\nu_v(f(x) - f(y), q) = \nu_v(f(y - x), q)\leq\nu_A(y - x, q) \leq \nu_A(y, q) \vee\nu_A(x, q) = \nu_A(x, q)\vee\nu_A(y, q)$, which implies that $\nu_v(f(x) - f(y), q) \leq \nu_v(f(x), q) \vee \nu_v(f(y), q)$, for all f(x) and f(y) in R^I and q in Q.

Again, $\nu_v(f(x)f(y), q) = \nu_v(f(yx), q) \leq \nu_A(yx, q) \leq \nu_A(y, q) \vee \nu_A(x, q) = \nu_A(x, q) \vee \nu_A(y, q)$, which implies that $\nu_v(f(x)f(y), q) \leq \nu_v(f(x), q) \vee \nu_v(f(y), q)$, for all f(x) and f(y) in R^l and q in Q. Hence V is a Q-intuitionistic L-fuzzy subnearring of R^l.

2.4 Theorem: Let (R, +, .) and (R^l, +, .) be any two nearrings. The anti-homomorphic preimage of a Q-intuitionistic L-fuzzy subnearring of f(R) = R^l is a Q-intuitionistic L-fuzzy subnearring of R.

Proof: Let (R, +, .) and (R^l, +, .) be any two nearrings. Let f: R $\rightarrow$ R^l be an anti-homomorphism.

Then, f(x+y) = f(y) + f(x) and f(xy) = f(y) f(x), for all x and y in R. Let V be a Q-intuitionistic L-fuzzy subnearring of f(R) = R^l.

We have to prove that A is a Q-intuitionistic L-fuzzy subnearring of R.

Let x and y in R, then $\mu_A(x-y, q) =\mu_v(f(x-y) ,q) = \mu_v(f(y) -f(x), q) \geq \mu_v(f(y), q)\wedge\mu_v(f(x), q)= \mu_v(f(x), q)\wedge\mu_v(f(y), q) = \mu_A(x, q) \wedge \mu_A(y, q)$, which implies that $\mu_A(x - y, q) \geq \mu_A(x) \wedge \mu_A(y)$, for all x and y in R and q in Q.

Again, $\mu_A(xy, q) = \mu_v(f(xy), q) =\mu_v(f(y)f(x), q) \geq \mu_v(f(y), q) \wedge \mu_v(f(x), q) = \mu_v(f(x), q) \wedge \mu_v(f(y), q)= \mu_A(x, q) \wedge \mu_A(y, q)$, which implies that $\mu_A(xy, q) \geq \mu_A(x, q) \wedge \mu_A(y, q)$, for all x and y in R and q in Q.

Also, $\nu_A(x -y, q) = \nu_v(f(x - y), q) = \nu_v(f(y) -f(x), q) \leq \nu_v(f(y), q)\vee\nu_v(f(x), q)= \nu_v(f(x), q)\vee\nu_v(f(y), q)= \nu_A(x, q) \vee \nu_A(y, q)$, which implies that $\nu_A(x -y, q) \leq \nu_A(x, q)\vee \nu_A(y, q)$, for all x and y in R and q in Q.

Again, $\nu_A(xy, q) = \nu_v(f(xy), q) = \nu_v(f(y)f(x), q) \leq \nu_v(f(y), q) \vee \nu_v(f(x), q) = \nu_v(f(x), q) \vee\nu_v(f(y), q) = \nu_A(x, q) \vee \nu_A(y, q)$, which implies that $\nu_A(xy, q) \leq \nu_A(x, q) \vee \nu_A(y, q)$, for all x and y in R and q in Q. Hence A is a Q-intuitionistic L-fuzzy subnearring of R.

2.5 Theorem: Let (R, +, .) and (R^l, +, .) be any two nearrings. The homomorphic image of a Q-intuitionistic L-fuzzy normal subnearring of R is a Q-intuitionistic L-fuzzy normal subnearring of f(R) = R^l.

Proof: Let (R, +, .) and (R^l, +, .) be any two nearrings and f : R $\rightarrow$ R^l be a homomorphism. Then f(x+y) = f(x)+ f(y) and f(xy) = f(x) f(y), for all x and y in R.

Let A be a Q-intuitionistic L-fuzzy normal subnearring of a nearring R. We have to prove that V is a Q-intuitionistic L-fuzzy normal subnearring of a nearring R^l.

Now, for f(x), f(y) in R^l, clearly V is a Q-intuitionistic L-fuzzy subnearring of the nearring R^l, since A is a Q-intuitionistic L-fuzzy subnearring of a nearring R.

Now, $\mu_v(f(x) + f(y), q) = \mu_v(f(x + y), q) \geq \mu_A(x + y, q) = \mu_A(y + x, q) \leq \mu_v(f(y + x), q) = \mu_v(f(y) + f(x), q)$, which implies that $\mu_v(f(x) + f(y), q) = \mu_v(f(y) + f(x), q)$, for all f(x) and f(y) in R^l and q in Q.

Also, $\nu_v(f(x) + f(y), q) = \nu_v(f(x + y), q) \leq \nu_A(x + y, q) = \nu_A(y + x, q) \geq \nu_v(f(y + x), q) = \nu_v(f(y) + f(x), q)$, which implies that $\nu_v(f(x) + f(y), q) = \nu_v(f(y) + f(x), q)$, for all f(x) and f(y) in R^l and q in Q.

Now, $\mu_v(f(x)f(y), q) = \mu_v(f(xy), q) \geq \mu_A(xy, q) = \mu_A(yx, q) \leq \mu_v(f(yx), q) = \mu_v(f(y) f(x), q)$, which implies that $\mu_v(f(x)f(y), q) = \mu_v(f(y) f(x), q)$, for all f(x) and f(y) in R^l and q in Q.

Also, $\nu_v(f(x)f(y), q) = \nu_v(f(xy), q)\leq \nu_A(xy, q) = \nu_A(yx, q) \geq \nu_v(f(yx), q) =\nu_v(f(y) f(x), q)$, which implies that $\nu_v(f(x)f(y), q) = \nu_v(f(y) f(x), q)$, for all f(x) and f(y) in R^l and q in Q. Hence V is a Q-intuitionistic L-fuzzy normal subnearring of a nearring R^l.

2.6 Theorem: Let (R, +, .) and (R^l, +, .) be any two nearrings. The homomorphic preimage of a Q-intuitionistic L-fuzzy normal subnearring of f(R) = R^l is a Q-intuitionistic L-fuzzy normal subnearring of R.

Proof: Let (R, +, .) and (R^l, +, .) be any two nearrings and f : R $\rightarrow$ R^l be a homomorphism. Then f(x+y) = f(x) + f(y) and f(xy) = f(x) f(y), for all x and y in R. Let V be a Q-intuitionistic L-fuzzy normal subnearring of a nearring f(R) = R^l.

We have to prove that A is an intuitionistic L-fuzzy normal subnearring of a nearring R. Let x and y in R and q in Q. Then, clearly A is a Q-intuitionistic L-fuzzy subnearring of a nearring R, since V is a Q-intuitionistic L-fuzzy subnearring of a nearring R^l.

Now, $\mu_A(x + y, q) = \mu_v(f(x + y), q) = \mu_v(f(x) + f(y), q)= \mu_v(f(y) + f(x), q) = \mu_v(f(y + x), q) = \mu_A(y + x, q)$, which implies that $\mu_A(x + y, q) = \mu_A(y + x, q)$, for all x and y in R and q in Q.

Also, $\nu_A(x + y, q) = \nu_v(f(x + y), q) = \nu_v(f(x) + f(y), q) = \nu_v(f(y) + f(x), q) = \nu_v(f(y + x), q) = \nu_A(y + x, q)$, which implies that $\nu_A(x + y, q) = \nu_A(y + x, q)$, for all x and y in R.

Now, $\mu_A(xy, q) = \mu_v(f(xy), q) = \mu_v(f(x)f(y), q) = \mu_v(f(y)f(x), q) = \mu_v(f(yx), q) = \mu_A(yx, q)$, which implies that $\mu_A(xy, q) = \mu_A(yx, q)$, for all x and y in R and q in Q.

Also, $\nu_A(xy, q) = \nu_v(f(xy), q) = \nu_v(f(x)f(y), q) = \nu_v(f(y)f(x), q) = \nu_v(f(yx), q) = \nu_A(yx, q)$, which implies that $\nu_A(xy, q) = \nu_A(yx, q)$, for all x and y in R. Hence A is a Q-intuitionistic L-fuzzy normal subnearring of a nearring R.

2.7 Theorem: Let (R, +, .) and (R^l, +, .) be any two nearrings. The anti-homomorphic image of a Q-intuitionistic L-fuzzy normal subnearring of R is a Q-intuitionistic L-fuzzy normal subnearring of $f(R) = R^l$.

Proof: Let (R, +, .) and (R^l, +, .) be any two nearrings and $f : R \to R^l$ be an anti-homomorphism. Then $f(x+y) = f(y) + f(x)$ and $f(xy) = f(y) f(x)$, for all x and y in R. Let A be a Q-intuitionistic L-fuzzy normal subnearring of a nearring R.

We have to prove that V is a Q-intuitionistic L-fuzzy normal subnearring of a nearring $f(R) = R^l$. Now, for f(x), f(y) in R^l, clearly V is a Q-intuitionistic L-fuzzy subnearring of a nearring R^l, since A is a Q-intuitionistic L-fuzzy subnearring of a nearring R.

Now, $\mu_v(f(x) + f(y), q) = \mu_v(f(y + x), q) \geq \mu_A(y + x, q) = \mu_A(x + y, q) \leq \mu_v(f(x + y), q) = \mu_v(f(y) + f(x), q)$, which implies that $\mu_v(f(x) + f(y), q) = \mu_v(f(y) + f(x), q)$, for all f(x) and f(y) in R^l and q in Q.

Also, $\nu_v(f(x) + f(y), q) = \nu_v(f(y + x), q) \leq \nu_A(y + x, q) = \nu_A(x + y, q) \geq \nu_v(f(x + y), q) = \nu_v(f(y) + f(x), q)$, which implies that $\nu_v(f(x) + f(y), q) = \nu_v(f(y) + f(x), q)$, for all f(x) and f(y) in R^l and q in Q.

Now, $\mu_v(f(x)f(y), q) = \mu_v(f(yx), q) \geq \mu_A(yx, q) = \mu_A(xy, q) \leq \mu_v(f(xy), q) = \mu_v(f(y) f(x), q)$, which implies that $\mu_v(f(x)f(y), q) = \mu_v(f(y) f(x), q)$, for all f(x) and f(y) in R^l and q in Q. Also, $\nu_v(f(x)f(y), q) = \nu_v(f(yx), q) \leq \nu_A(yx, q) = \nu_A(xy, q) \geq \nu_v(f(xy), q) = \nu_v(f(y) f(x), q)$, which implies that $\nu_v(f(x)f(y), q) = \nu_v(f(y) f(x), q)$, for all f(x) and f(y) in R^l and q in Q. Hence V is a Q-intuitionistic L-fuzzy normal subnearring of the nearring $f(R) = R^l$.

2.8 Theorem: Let (R, +, .) and (R^l, +, .) be any two nearrings. The anti-homomorphic preimage of a Q-intuitionistic L-fuzzy normal subnearring of $f(R) = R^l$ is a Q-intuitionistic L-fuzzy normal subnearring of R.

Proof: Let (R, +, .) and (R^l, +, .) be any two nearrings and $f : R \to R^l$ be an anti-homomorphism. Then $f(x+y) = f(y) + f(x)$ and $f(xy) = f(y) f(x)$, for all x and y in R. Let V be a Q-intuitionistic L-fuzzy normal subnearring of the nearring $f(R) = R^l$.

We have to prove that A is a Q-intuitionistic L-fuzzy normal subnearring of a nearring R. Let x and y in R, then, clearly A is a Q-intuitionistic L-fuzzy subnearring of a nearring R, since V is a Q-intuitionistic L-fuzzy subnearring of the nearring $f(R) = R^l$.

Now, $\mu_A(x + y, q) = \mu_v(f(x + y), q) = \mu_v(f(y) + f(x), q) = \mu_v(f(x) + f(y), q) = \mu_v(f(y + x), q) = \mu_A(y + x, q)$, which implies that $\mu_A(x + y, q) = \mu_A(y + x, q)$, for all x and y in R and q in Q.

Also, $\nu_A(x + y, q) = \nu_v(f(x + y), q) = \nu_v(f(y) + f(x), q) = \nu_v(f(x) + f(y), q) = \nu_v(f(y + x), q) = \nu_A(y + x, q)$, which implies that $\nu_A(x + y, q) = \nu_A(y + x, q)$, for all x and y in R and q in Q.

Now, $\mu_A(xy, q)=\mu_v(f(xy), q) = \mu_v(f(y)f(x), q) = \mu_v(f(x)f(y), q) = \mu_v(f(yx), q) =\mu_A(yx, q)$, which implies that $\mu_A(xy, q) = \mu_A(yx, q)$, for all x and y in R and q in Q.

Also, $\nu_A(xy, q)=\nu_v(f(xy), q) = \nu_v(f(y)f(x), q) = \nu_v(f(x)f(y), q) = \nu_v(f(yx), q) =\nu_A(yx, q)$, which implies that $\nu_A(xy, q) = \nu_A(yx, q)$, for all x and y in R and q in Q.Hence A is a Q-intuitionistic L-fuzzy normal subnearring of the nearring R.

REFERENCE

1. Ajmal.N and Thomas. K.V., Fuzzy lattices, Information sciences 79 (1994), 271-291.
2. Akram.M and Dar.K.H, On fuzzy d-algebras, Punjab university journal of mathematics, 37(2005), 61-76.
3. Asok Kumer Ray, On product of fuzzy subgroups, fuzzy sets and systems, 105, 181-183 (1999).

4. Atanassov.K., Intuitionistic fuzzy sets, fuzzy sets and systems, 20(1), 87-96 (1986).
5. Atanassov.K., Stoeva.S., Intuitionistic L-fuzzy sets, Cybernetics and systems research 2 (Elsevier Sci. Publ., Amsterdam, 1984), 539-540.
6. Azriel Rosenfeld, Fuzzy Groups, Journal of mathematical analysis and applications 35, 512-517 (1971).
7. Chakrabarty, K., Biswas, R., Nanda, A note on union and intersection of intuitionistic fuzzy sets , Notes on intuitionistic fuzzy sets , 3(4), (1997).
8. Davvaz.B and Wieslaw. A. Dudek, Fuzzy n-ary groups as a generalization of rosenfeld fuzzy groups, ARXIV-0710.3884VI(MATH.RA)20 OCT 2007,1-16.
9. Goran Trajkovski, An approach towards defining L-fuzzy lattices, IEEE, 7(1998), 221-225.
10. Mohammad M. Atallah, On the L-fuzzy prime ideal theorem of distributive lattices, The journal of fuzzy mathematics, Vol.9, No.4, 2001.
11. Palaniappan.N and Arjunan.K, The homomorphism, anti-homomorphism of a fuzzy and anti fuzzy ideals, Varahmihir journal of mathematical sciences, Vol.6 No.1 (2006), 181-188.
12. Rajesh Kumar, Fuzzy Algebra, Volume 1, University of Delhi Publication Division, July -1993.
13. Solairaju.A and Nagarajan.R, A new structure and construction of Q-fuzzy groups, Advances in fuzzy mathematics, Volume 4, Number 1 (2009) pp 23-29**.**
14. Solairaju.A and Nagarajan.R, Lattice Valued Q-fuzzy left R-submodules of near rings with respect to T-norms, Advances in fuzzy mathematics,Vol 4, Num. 2, 137-145(2009).
15. Zadeh.L.A., Fuzzy sets , Information and control ,Vol.8, 338-353 (1965).

****