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# Homomorphism and Anti homomorphism in Interval Valued Q-L Fuzzy Subhemirings of a Hemiring

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**ABSTRACT** *In this paper, we study some of the properties of interval valued Q-L fuzzy subhemiring of a hemiring under homomorphism, antihomomorphism and prove some results on these.*

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**KEYWORDS :** Interval valued fuzzy subset, interval valued Q-L fuzzy subhemiring, and interval valued Q-L fuzzy normal subhemiring.

**INTRODUCTION:** There are many concepts of universal algebras generalizing an associative ring (R, +, .). Some of them in particular, near rings and several kinds of semirings have been proven very useful. Semirings (called also half rings) are algebras (R,+ ,.) share the same properties as a ring except that (R, +) is assumed to be a semi group rather than a commutative group. Semi rings appear in a natural manner in some applications to the theory of automata and formal languages. An algebra (R,+ ,.) is said to be a semi ring (R, +) and (R ,.) are semi groups satisfying a.(b+c)=a.b+a.c and (b+c).a=b.a+c.a for all a,b and c in R. A semi ring R is said to be additively commutative if a+b=b+a for all a, b and c in R. A semi ring R may have an identity 1, defined by 1.a=a=a.1 and a zero 0, defined by 0+a=a=a+0 and a.0=0=0.a for all a in R. A semi ring R is said to be a hemi ring if it is an additively commutative with zero. Interval valued fuzzy sets were introduced independently by Zadeh [13], Grattan-Guiness [4], Jahn [6], in the seventies, in the same year. An interval valued fuzzy set (IVF) is defined by an interval-valued membership function Jun. Y.B and Kin.K [7] defined an interval valued fuzzy R-subgroups of nearrings. Solairaju. A and Nagarajan.R [10] defined the characterization of interval valued Anti fuzzy Left h-ideals over hemirings. Azriel Rosenfeld [2] defined fuzzy groups. Osman Kazanci, Sultan yamark and serife yilmaz in [8] have introduced the Notion of intuitionistic Q-fuzzification of N-subgroups (subnear rings) in a near-ring and investigated some related properties. Solairaju. A and Nagarajan.R [11], have given a new structure in the construction of Q-fuzzy groups and subgroups [12]. We introduced the concept of interval valued Q-L fuzzy subhemiring of a hemiring under homomorphism, anti homomorphism and established some results.

## PRELIMINARIES:

**1.1 Definition:** Let X be a non-empty set and L= (L,≥) be a lattice with least element 0 and greastest element 1.

**1.2 Definition:** Let X be any nonempty set. A mapping $[M]: X \to D[0,1]$ is called an interval valued L-fuzzy subset(briefly, IVLFS) of X, where D[0,1] denoted the family of all closed subintervals of [0,1] and [M](x)=$[M^-(x), M^+(x)]$ ,for all x in X, where $M^-$and $M^+$ are fuzzy subsets of X such that $M^-(x) \le M^+(x)$ , for all x in X. Thus [M](x) is an interval (a closed subset of [0,1]) and not number from the intervak [0,1] as in the case of fuzzy subset. Note that [0] = [0,0] and [1]=[1,1].

**1.3 Definition**: Let X be a non-empty set and Q be a non-empty set. A Q, L--fuzzy subset A of X is function $A: X \times Q \to [0,1]$.

**1.2 Remark:** Let $D^X$ be the set of all interval valued L-fuzzy subsets of X, where D means D[0,1].

**1.4Definition:**Let$[M] = \{\langle (x,q), [M^-(x,q), M^+(x,q)]\rangle / x \in X, q \text{ in } Q\}$, $[N] = \{\langle (x,q), [N^-(x,q), N^+(x,q)]\rangle / x \in X, q \text{ in } Q\}$ be any two interval valued L -fuzzy subsets of x. We define the following relations and operations:

i)$[M] \subseteq [N]$ if and only if $M^-(x,q) \le N^-(x,q)$ and $M^+(x,q) \le N^+(x,q)$ ,for all x in X.

ii)[M]= [N] if and only if $M^-(x,q) = N^-(x,q)$ and $M^+(x,q) = N^+(x,q)$ ,for all x in X.

iii)$[M] \cap [N]$ =$\{\langle (x,q), [\{M^-(x,q) \wedge N^-(x,q)\}, \{M^+(x,q) \wedge N^+(x,q)\}]\rangle / x \in X, q\text{in } Q\}$.

iv)$[M] \cup [N]$ =$\{\langle (x,q), [\{M^-(x,q) \vee N^-(x,q)\}, \{M^+(x,q) \vee N^+(x,q)\}]\rangle / x \in X, q\text{in } Q\}$.

v)$[M]^C = [1] - [M] = \{\langle (x,q)[1 - M^+(x,q), 1 - M^-(x,q)\rangle / x \in X, q \text{ in } Q\}$

**1.5 Definition**: Let (R, +, .) be a hemiring. A interval valued Q-L fuzzy subset [M] of R is said to be an interval valued Q – L fuzzy subhemiring (IVFSHR) of R if the following conditions are satisified:

(i) $[M](x+y,q) \ge ([M](x,q) \wedge, [M](y,q))$

(ii)$[M](xy,q) \ge ([M](x,q) \wedge [M](y,q))$ , for all x and y in R, and q in Q.

**1.6 Definition**: Let (R, +, .) be a hemiring. A interval valued Q-fuzzy subhemiring [A] of R is said to be an interval valued Q-fuzzy normal subhemiring (IVFNSHR) of R if [A](xy,q)=[A] (yx,q) , for all x and y in R and q in Q.

**1.7 Definition**: Let XxQ and $X'XQ$ be any two sets. Let $f: XxQ \to X'XQ$ be any function and [A] be an interval valued Q-fuzzy subset in X, [V] be an interval valued Q-fuzzy subset in $f(X) = X'$, defined by $[V](y,q) = \sup_{x \in f^{-1}(y)} [A](x,q)$ for all x in X and y in $X'$ and q in Q. Then [A] is called a pre-image of [V] under f and is denoted by $f^{-1}([V])$.

**1. PROPERTIES OF INTERVAL VALUED Q-FUZZY SUBHEMIRINGS**

**2.1 Theorem**: Let (R, +,.) and ($R'$, +, .) be any two hemirings. The homomorphic image of an interval valued Q-L fuzzy subhemiring of R is an interval valued Q-L fuzzy subhemiring of $R'$.

**Proof:** Let (R, +,.) and ($R'$, +, .) be any two hemirings. Let $f: R \to R'$ be a homomorphism.Then,$f(x+y,q) = f(x,q) + f(y,q)$ and $f(xy,q) = f(x,q)f(y,q)$, for all x and y in R.Let [V] = f ([A]) , where [A] is an interval valued Q-L fuzzy subhemiring of R. We have to prove that [V] is an interval valued Q-L fuzzy subhemiring of $R'$. Now, for $f(x)$, $f(y)$ in $R'$ & $q$ $in$ $Q$.

$[V]\big((f(x),q) + (f(y),q)\big) = [V](f(x+y, q) \geq [A](x+y,q) \geq \{[A](x,q) \wedge [A](y,q))\}$

Which implies that $[V]\big((f(x), q) + (f(y),q)\big) \geq \big([V](f(x),q) \wedge [V](f(y),q)\big)$. Again, $[V]\big((f(x),q)(f(y),q)\big) = [V]((f(xy),q)) \geq [A](xy,q) \geq \{[A](x,q) \wedge [A](y,q))\}$ which implies that $[V]\big((f(x),q)(f(y),q)\big) \geq \big([V](f(x),q) \wedge [V](f(y),q)\big)$.Hence [V] is an interval valued Q-L fuzzy subhemiring of $R'$.

**2.2 Theorem**: Let (R, +,.) and ($R'$, +,.) be any two hemirings. The homomorphic preimage of an interval valued Q-L fuzzy subhemiring of $R'$ is interval valued Q-L fuzzy subhemiring of R.

**Proof:** Let (R, +, .) and ($R'$, +, .) be any two hemirings. Let $f: R \to R'$ 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] = f([A]), where [V] is an interval valued Q-L fuzzy subhemiring of $R'$. We have to prove that [A] is an interval valued Q – L fuzzy subhemiring of R. Let x and y in R and q in Q. Then$[A]\ (x+y,\ q) = [V]\ (f(x+y,q)) \geq [V](f(x,q) + f(y,q)) \geq \{[V](f(x),q) \wedge [V](f(y,q))\} = \{[A](x,q) \wedge [A](y,q)\}$, which implies that $[A]\ (x+y,q) = \{[A]\ (x,q) \wedge [A]\ (y,q)\}$

Again,$[A]\ (xy,q) = [V]\big(f(xy,q)\big) \geq [V]\big(f(x,q)f(y,q)\big) \geq \big\{[V](f(x),q) \wedge [V]\big(f(y),q)\big)\big\}$ $= \{[A](x,q) \wedge [A](y,q)\}$ which implies that $[A](xy,q) = \{[A](x,q) \wedge [A](y,q)\}$.

Hence [A] is an interval valued Q-L fuzzy subhemiring of R.

**2.3 Theorem**: Let (R, +, .) and ($R'$, +, .) be any two hemirings. The anti-homomorphic image of an interval valued Q-L fuzzy subhemiring of R is an interval valued Q-L fuzzy subhemiring of $\mathbf{R'}$.

**Proof:** Let (R, +,.) and (R$'$, +,.) be any two hemirings.Let $f: R \rightarrow R'$ be a 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]= f([A]), where [A] is an interval valued Q-L fuzzy subhemiring of R. We have to prove that [V] is an interval valued Q-L fuzzy subhemiring of R$'$.Now, for f(x) , f(y) in R$'$& $q$ *in* $Q$ . *Now*, $[V]\big((f(x), q) + (f(y), q)\big) = [V]\big(( f(y) ,q) + (f(x) ,q)\big) \geq [A]( y + x ,q) \geq \{[A](y ,q) \wedge [A]( x ,q))\}$ which implies that $[V]\big((f(x) , q) + (f(y) ,q)\big) \geq \big([V](f(x) ,q) \wedge [V](f(y) ,q)\big)$.
Again,$[V]\big((f(x), q)(f(y), q)\big) = [V](f(yx), q) \geq [A](yx, q) \geq \{[A](y, q) \wedge [A](x, q))\}$ $=\{[A](x, q) \wedge [A](y, q))\}$, which implies that $[V]\big((f(x), q)(f(y), q)\big) \geq \big([V](f(x), q) \wedge [V](f(y), q)\big)$.Hence [V] is an interval valued Q-fuzzy subhemiring of R$'$.

**2.4 Theorem**: Let (R, +,.) and (R$'$, +, .) be any two hemirings. The anti-homomorphic preimage of an interval valued Q-L fuzzy subhemiring of R$'$is an interval valued Q-L fuzzy subhemiring of R.

**Proof:** Let (R, +,.) and (R$'$, +,.) be any two hemirings. Let $f: R \rightarrow R'$ be a 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 $[V] = f([A])$where V is an anti $Q - L$ fuzzysubhemiring of R$'$. Let x and y in R & $q$ *in* $Q$. where [V] is an interval valued Q-L fuzzy subhemiring of R$'$.We have to prove that [A] is an interval valued $Q - L$ fuzzy subhemiring of R. Let x and y in R and q in Q. Then $[A] (x + y , q) = [V] \big( f(x + y ,q)\big) = [V] ( f(y + x ,q) \geq \{[V](f(y), q) \wedge [V](f(x), q))\}$ $= \{[A](x, q) \wedge [A](y, q)\}$, which implies that $[A] (x + y ,q) = \{[A] (x ,q) \wedge [A] (y ,q)\}$ .Again, $[A] ( xy ,q) = [V]\big((f(xy) ,q)\big) \geq [V]\big(f(x), q)(f(y), q)\big) \geq \{[V](f(y), q) \wedge [V]\big(f(x), q)\big)\} \geq \{[V](f(x), q) \wedge [V]\big(f(y), q)\big)\} = \{[A](x, q) \wedge [A](y, q)\}$.which implies that $[A](xy, q) = \{[A](x ,q) \wedge [A]( y ,q)\}$. Hence [A] is an interval valued Q-L fuzzy subhemiring of R.

**2.5 Theorem**: Let [A] be an interval valued Q-L fuzzy subhemiring of hemiring H and f is an isomorphism from a hemiring R onto H. Then [A]∘ f is an interval valued Q-L fuzzy subhemiring of R.

**Proof**: Let x and y in R and [A] be an interval valued Q-fuzzy subhemiring of a hemiring H. Then we have, $([A] \circ f)( x + y, q ) = [A] ( f(x + y), q)) = [A](f(x), q) + (f(y), q)) \geq \{([A]( f(x) , q ) \wedge [A](f(y), q)\} = \{([A] \circ f)(x, q) \wedge ([A] \circ f)(y, q)\}$. which implies that $([A] \circ f)( x + y ,q) \geq \{([A] \circ f)(x, q) \wedge ([A] \circ f)(y, q)\}$. And, $([A] \circ f)( xy, q ) = [A] ( f(xy), q)) = [A]((f(x), q)(f(y), q)) \geq \{([A]( f(x) ,q ) \wedge [A](f(y), q)\} = \{([A] \circ f)(x, q) \wedge ([A] \circ f)(y, q)\}$. which implies that $([A] \circ f)( xy ,q) \geq \{([A] \circ f)(x, q) \wedge ([A] \circ f)(y, q)\}$.Therefore $([A] \circ f)$ is an interval valued Q-fuzzy subhemiring of R.

**2.6 Theorem**: Let [A] be an interval valued Q-L fuzzy subhemiring of hemiring H and f is an anti-isomorphism from a hemiring R onto H. Then [A]$\circ$ f is an interval valued Q-L fuzzy subhemiring of R.

**Proof**: Let x and y in R and [A] be an interval valued Q-L fuzzy subhemiring of a hemiring H.Then we have, $([A] \circ \mathrm{f})(x+\mathrm{y},\mathrm{q}) = [\mathrm{A}](\mathrm{f}(\mathrm{x}+\mathrm{y}),\mathrm{q})) = [\mathrm{A}](\mathrm{f}(\mathrm{y},\mathrm{q})+\mathrm{f}(\mathrm{x},\mathrm{q}))$ $\geq \min\{([\mathrm{A}](\mathrm{f}(\mathrm{x}),\mathrm{q}) \wedge [A](\mathrm{f}(\mathrm{y}),\mathrm{q})\} = \{([\mathrm{A}] \circ \mathrm{f})(\mathrm{x},\mathrm{q}) \wedge ([A] \circ \mathrm{f})(\mathrm{y},\mathrm{q})\}$. which implies that $([A] \circ \mathrm{f})(\mathrm{x}+y,q) \geq \{([\mathrm{A}] \circ \mathrm{f})(\mathrm{x},\mathrm{q}) \wedge ([A] \circ \mathrm{f})(\mathrm{y},\mathrm{q})\}$. And, $([A] \circ \mathrm{f})(x\mathrm{y},\mathrm{q}) =$ $[\mathrm{A}](\mathrm{f}(\mathrm{yx}),\mathrm{q})) = [\mathrm{A}](\mathrm{f}(\mathrm{y}),\mathrm{q})\mathrm{f}(\mathrm{x}),\mathrm{q})) \geq \{([\mathrm{A}](\mathrm{f}(\mathrm{x}),\mathrm{q}) \wedge [A](\mathrm{f}(\mathrm{y}),\mathrm{q})\} = \{([\mathrm{A}] \circ \mathrm{f})(\mathrm{x},\mathrm{q}) \wedge ([A] \circ \mathrm{f})(\mathrm{y},\mathrm{q})\}$.which implies that $([A] \circ \mathrm{f})(\mathrm{x}y,q) \geq \{([\mathrm{A}] \circ \mathrm{f})(\mathrm{x},\mathrm{q}) \wedge ([A] \circ \mathrm{f})(\mathrm{y},\mathrm{q})\}$. Therefore $([A] \circ \mathrm{f})$ is an interval valued Q-L fuzzy subhemiring of the hemiring R.

**2.7 Theorem**: Let (R, +,.) and (R$'$, +, .) be any two hemirings. The homomorphic image of an interval valued Q-L fuzzy normal subhemiring of R is an interval valued Q-L fuzzy subhemiring of R$'$.

**Proof:** Let (R, +,.) and (R$'$, +, .) be any two hemirings.Let $\mathrm{f}: \mathrm{R} \rightarrow \mathrm{R}'$ be a homomorphism.Let [A] is an interval valued Q-L fuzzy normal subhemiring of R. We have to prove that [V] is an interval valued Q-L fuzzy normal subhemiring of $\mathrm{f}(\mathrm{R}) = \mathrm{R}'$.Now, for f(x), f(y) in R$'$ & q in Q . Clearly, $[V]$ is an interval valued $\mathrm{Q}-\mathrm{L}$ fuzzy subhemiring of $\mathrm{f}(\mathrm{R}) = \mathrm{R}'$. since [A] is an interval valued $\mathrm{Q}-\mathrm{L}$ fuzzy subhemiring of R. Now, $[\mathrm{V}]\big((\mathrm{f}(\mathrm{x}),\mathrm{q})(\mathrm{f}(\mathrm{y}),\mathrm{q})\big) = [V](f(\mathrm{xy}),\mathrm{q})$ $\geq [\mathrm{A}](\mathrm{xy},\mathrm{q}) = [\mathrm{A}](\mathrm{yx},\mathrm{q}) \leq [\mathrm{V}]\{\mathrm{f}(\mathrm{yx}),\mathrm{q})\} = [\mathrm{V}]\big((\mathrm{f}(y),\mathrm{q})(\mathrm{f}(x),\mathrm{q})\big)$ which implies that Then we have, $([\mathrm{A}] \circ \mathrm{f})(\mathrm{x}+\mathrm{y},\mathrm{q}) = [\mathrm{A}](\mathrm{f}(\mathrm{x}+\mathrm{y}),\mathrm{q})) = [\mathrm{A}](\mathrm{f}(\mathrm{x}),\mathrm{q}) + (\mathrm{f}(\mathrm{y}),\mathrm{q})) \geq$ $\{([\mathrm{A}](\mathrm{f}(\mathrm{x}),\mathrm{q}) \wedge [\mathrm{A}](\mathrm{f}(\mathrm{y}),\mathrm{q})\} = \{([\mathrm{A}] \circ \mathrm{f})(\mathrm{x},\mathrm{q}) \wedge ([\mathrm{A}] \circ \mathrm{f})(\mathrm{y},\mathrm{q})\}$. which implies that $([\mathrm{A}] \circ \mathrm{f})(\mathrm{x}+\mathrm{y},\mathrm{q}) \geq \{([\mathrm{A}] \circ \mathrm{f})(\mathrm{x},\mathrm{q}) \wedge ([\mathrm{A}] \circ \mathrm{f})(\mathrm{y},\mathrm{q})\}$. And, $([\mathrm{A}] \circ \mathrm{f})(\mathrm{xy},\mathrm{q}) =$ $[\mathrm{A}](\mathrm{f}(\mathrm{xy}),\mathrm{q})) = [\mathrm{A}]((\mathrm{f}(\mathrm{x}),\mathrm{q})(\mathrm{f}(\mathrm{y}),\mathrm{q})) \geq \{([\mathrm{A}](\mathrm{f}(\mathrm{x}),\mathrm{q}) \wedge [\mathrm{A}](\mathrm{f}(\mathrm{y}),\mathrm{q})\} = \{([\mathrm{A}] \circ \mathrm{f})(\mathrm{x},\mathrm{q}) \wedge ([\mathrm{A}] \circ \mathrm{f})(\mathrm{y},\mathrm{q})\}$. which implies that $([\mathrm{A}] \circ \mathrm{f})(\mathrm{xy},\mathrm{q}) \geq \{([\mathrm{A}] \circ \mathrm{f})(\mathrm{x},\mathrm{q}) \wedge ([\mathrm{A}] \circ \mathrm{f})(\mathrm{y},\mathrm{q})\}$.Therefore $([\mathrm{A}] \circ \mathrm{f})$ is an interval valued Q-fuzzy subhemiring of R.

**2.6 Theorem**: Let [A] be an interval valued Q-L fuzzy subhemiring of hemiring H and f is an anti-isomorphism from a hemiring R onto H. Then [A]$\circ$ f is an interval valued Q-L fuzzy subhemiring of R.

**Proof**: Let x and y in R and [A] be an interval valued Q-L fuzzy subhemiring of a hemiring H.Then we have, $([A]\circ f)(x+y,q) = [A]\,(f(x+y),q)) = [A](f(y,q)+f(x,q))$ $\geq \min\{([A](f(x),\ q)\wedge[A](f(y),q)\} = \{([A]\circ f)(x,q)\wedge([A]\circ f)(y,q)\}$. which implies that $([A]\circ f)(x+y,q) \geq \{([A]\circ f)(x,q)\wedge([A]\circ f)(y,q)\}$. And, $([A]\circ f)(xy,q) =$ $[A]\,(f(yx),q)) = [A](f(y),q)f(x),q)) \geq \{([A](f(x),q)\wedge[A](f(y),q)\} = \{([A]\circ f)(x,q)\wedge([A]\circ f)(y,q)\}$.which implies that $([A]\circ f)(xy,q) \geq \{([A]\circ f)(x,q)\wedge([A]\circ f)(y,q)\}$. Therefore $([A]\circ f)$ is an interval valued Q-L fuzzy subhemiring of the hemiring R.

**2.7 Theorem**: Let (R, +,.) and ($R'$, +, .) be any two hemirings. The homomorphic image of an interval valued Q-L fuzzy normal subhemiring of R is an interval valued Q-L fuzzy subhemiring of $R'$.

**Proof:** Let (R, +,.) and ($R'$, +, .) be any two hemirings.Let $f: R \to R'$ be a homomorphism.Let [A] is an interval valued Q-L fuzzy normal subhemiring of R. We have to prove that [V] is an interval valued Q-L fuzzy normal subhemiring of $f(R) = R'$.Now, for $f(x)$, $f(y)$ in $R'$ & q in Q . Clearly, $[V]$ is an interval valued $Q-L$ fuzzy subhemiring of $f(R) = R'$. since [A] is an interval valued $Q-L$ fuzzy subhemiring of R. Now, $[V]\big((f(x),\ q)(f(y),\ q)\big) = [V](f(xy),\ q)$ $\geq [A](xy,q) = [A](yx,q) \leq [V]\{f(yx),q)\} = [V]\big((f(y),q)(f(x),q)\big)$ which implies that $[V]\big((f(x),q)(f(y),q)\big) = [V]\big((f(y),q)(f(x),q)\big)$.Hence [V] is an interval valued Q-L fuzzy normal subhemiring of the hemiring $R'$.

**2.8 Theorem**: Let (R, +,.) and ($R'$, +,.) be any two hemirings. The homomorphic preimage of an interval valued Q-L fuzzy normal subhemiring of $R'$is interval valued Q-L fuzzy normal subhemiring of R.

**Proof:** Let (R, +,.) and ($R'$, +,.) be any two hemirings.Let $f: R \to R'$ be a homomorphism.Let [V] is an interval valued Q-fuzzy normal subhemiring of $f(R)= R'$.We have to prove that [A] is an interval valued Q – fuzzy normal subhemiring of R. Let x and y in R and q in Q.Then clearly, [A] is an interval valued $Q-$fuzzy subhemiring of the hemiring R. Now, $[A](xy,q) = [V](f(xy),q) = [V]\{(f(x),q)(f(y),q)\} = [V]\big((f(y),q)(f(x),q)\big) =$ $[V](f(yx),q) = [A](yx,q)$ which implies that$[A](xy,q) = [A](yx,q)$, for all x and y in R and q in Q. Hence [A] is an interval valued Q-fuzzy normal subhemiring of the hemiring R.

**2.9 Theorem**: Let (R, +,.) and ($R^{'}$, +, .) be any two hemirings. The antihomomorphic image of an interval valued Q-L fuzzy normal subhemiring of R is an interval valued Q-L fuzzy subhemiring of $R^{'}$.

**Proof:** Let (R, +,.) and ($R^{'}$, +, .) be any two hemirings.Let $f: R \to R^{'}$ be a anti homomorphism.Let [A] is an interval valued Q-L fuzzy normal subhemiring of R. We have to prove that [V] is an interval valued Q-L fuzzy normal subhemiring of $f(R) = R^{'}$.Now, for $f(x)$, $f(y)$ in $R^{'}$ & q in Q . Clearly, $[V]$ is an interval valued $Q-L$ fuzzy subhemiring of $R^{'}$. since [A] is an interval valued $Q-L$ fuzzy subhemiring of R. Now, $[V]\big((f(x), q)(f(y), q)\big) = [V](f(yx), q) \geq [A](yx, q) = [A](xy, q) \leq [V]\{f(xy), q)\} = [V]\big((f(y), q)(f(x), q)\big)$ which implies that $[V]\big((f(x), q)(f(y), q)\big) = [V]\big((f(x), q)(f(y), q)\big)$.Hence [V] is an interval valued Q-L fuzzy normal subhemiring of the hemiring $R^{'}$.

R.Then we have $([A] \circ f)(xy, q) = [A](f(xy), q)) = [A]((f(y), q)(f(x), q)) = [A]((f(x), q)(f(y), q)) = [A](f(yx), q)) = ([A] \circ f)(yx, q)$ which implies that $([A] \circ f)(xy, q) = ([A] \circ f)(yx, q)$, for all x and y in R and q in Q. Hence $([A] \circ f)$ is an interval valued Q-L fuzzy normal subhemiring of hemiring R.


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