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Some Operations On Bipolar Intuitionistic M- Fuzzy group and anti M- Fuzzy group

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ABSTRACT: In this paper the concept of a bipolar intuitionistic M fuzzy group and anti M fuzzy group is a new algebraic structure of a bipolar intuitionistic M fuzzy subgroup of a M fuzzy group and anti M fuzzy group are defined, related possibility and necessity operators are investigated. The purpose of the study is to implement the fuzzy set theory and group theory of bipolar intuitionistic M fuzzy subgroup of a M fuzzy group and anti M fuzzy group. The relation between operation on operators of bipolar intuitionistic M fuzzy group and bipolar intuitionistic anti M fuzzy group are established.

I. INTRODUCTION

The concept of fuzzy sets was initiated by L.A. Zadeh [15] then it has becomes a vigorous area of research in engineering, medical science, graph theory. Rosenfeld [13] gave the idea of fuzzy subgroups. The author W.R. Zhang [16] commenced the concept of bipolar fuzzy sets as a generalization of fuzzy sets in 1994. The membership degree means the satisfaction degree of elements to some property or constraint corresponding to a fuzzy set. P. S. Das [7] analyzed fuzzy group and level subgroup. K.M. Lee [8] introduced bipolar valued fuzzy sets and their operations. Mourad oqla [9] investigated structure properties of an intuitionistic anti fuzzy M subgroups. In case of bipolar valued fuzzy sets membership degree is enlarged from the interval [0,1] to [-1,1]. In a bipolar valued fuzzy sets, the membership degree ‘0’ means that the elements are irrelevant to the corresponding property, the membership degree (0,1] indicates that elements satisfy the property and the membership degree [-1,0) indicates that elements satisfy the implicit counter property. K.T. Atanassov [1-6] introduced new operations defined over intuitionistic fuzzy sets and operators over interval valued intuitionistic fuzzy sets. He was investigated possibility and necessity operators, level operator, modal type of operators and universal operators over intuitionistic fuzzy sets. N. Palaniappan and R. Muthuraj [10,11] introduced the concept of bipolar M fuzzy group and bipolar anti M fuzzy group. M. Palanivelrajan and S. Nandakumar [12] introduced some operations of intuitionistic fuzzy primary and semi primary ideal. We discuss some of its properties and some operations on bipolar intuitionistic M fuzzy group and anti M fuzzy group are established.

II. PRELIMINARIES

In this paper, $G=(G,*)$ is a finite groups, e is the identity element of G, and xy mean x*y, the fundamental definitions that will be used in the sequel.

Definition. 2.1.[4] Let A and B be two bipolar intuitionistic fuzzy sets of universal set E, then the operation is defined by

$$\text{i)}(A\cap B)^{+} = \{< x, \min(\mu_A^{+}(x), \mu_B^{+}(x)), \max(\upsilon_A^{+}(x), \upsilon_B^{+}(x)) > / x \in E\}$$

$$\text{ii)}(A\cap B)^{-} = \{< x, \max(\mu_A^{-}(x), \mu_B^{-}(x)), \min(\upsilon_A^{-}(x), \upsilon_B^{-}(x)) > / x \in E\}$$

$$\text{iii)}(A\cup B)^{+} = \{< x, \max(\mu_A^{+}(x), \mu_B^{+}(x)), \min(\upsilon_A^{+}(x), \upsilon_B^{+}(x)) > / x \in E\}$$

$$\text{iv)}(A\cup B)^{-} = \{< x, \min(\mu_A^{-}(x), \mu_B^{-}(x)), \max(\upsilon_A^{-}(x), \upsilon_B^{-}(x)) > / x \in E\}$$

ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 4, Issue 3 , March 2017

$$\text{v)}\ \left(\bar{A}\right)^{+} = \left\{ < x, \upsilon_A^{+}(x), \mu_A^{+}(x) > / x \in E \right\} \text{ and vi) } \left(\bar{A}\right)^{-} = \left\{ < x, \upsilon_A^{-}(x), \mu_A^{-}(x) > / x \in E \right\}.$$

Definition.2.2.[4] Let A be an bipolar intuitionistic fuzzy set of universal set E, then the "possibility" operator is defined by

$$\Box A^{+} = \left\{ < x, \mu_A^{+}(x), 1 - \mu_A^{+}(x) > / x \in E \right\} \text{ and}$$

$$\Box A^{-} = \left\{ < x, \mu_A^{-}(x), -1 - \mu_A^{-}(x) > / x \in E \right\}.$$

Definition.2.3.[4] Let A be an bipolar intuitionistic fuzzy set of universal set E, then the "necessity" operator is defined by

$$\Diamond A^{+} = \left\{ < x, 1 - \upsilon_A^{+}(x), \upsilon_A^{+}(x) > / x \in E \right\} \text{ and}$$

$$\Diamond A^{-} = \left\{ < x, -1 - \upsilon_A^{-}(x), \upsilon_A^{-}(x) > / x \in E \right\}.$$

Definition.2.4.[10] Let G be an M group and let A be a bipolar intuitionistic fuzzy subgroup of G, then A is called a bipolar intuitionistic M fuzzy group of G, if for all $x \in G$ and $m \in M$ then

i) $\mu_A^{+}(mx) \geq \mu_A^{+}(x)$ and $\upsilon_A^{+}(mx) \leq \upsilon_A^{+}(x)$.

ii) $\mu_A^{-}(mx) \leq \mu_A^{-}(x)$ and $\upsilon_A^{-}(mx) \geq \upsilon_A^{-}(x)$.

Definition.2.5.[10] Let G be an M group and let A be a bipolar intuitionistic anti fuzzy subgroup of G, then A is called a bipolar intuitionistic anti M fuzzy group of G if for all $x \in G$ and $m \in M$ then

i) $\mu_A^{+}(mx) \leq \mu_A^{+}(x)$ and $\upsilon_A^{+}(mx) \geq \upsilon_A^{+}(x)$.

ii) $\mu_A^{-}(mx) \geq \mu_A^{-}(x)$ and $\upsilon_A^{-}(mx) \leq \upsilon_A^{-}(x)$.

Theorem. 2.6. If A is an bipolar intuitionistic M fuzzy group of G, then $\Box A$ is an bipolar intuitionistic M fuzzy group of G.

Proof.

Consider $x \in A \text{and} m \in M.$.

Consider $\mu_{\Box A}^{+}(mx) = \mu_A^{+}(mx) \geq \mu_A^{+}(x) = \mu_{\Box A}^{+}(x)$.

Therefore $\mu_{\Box A}^{+}(mx) \geq \mu_{\Box A}^{+}(x)$.

Consider $\upsilon_{\Box A}^{+}(mx) = 1 - \mu_{\Box A}^{+}(mx) \leq 1 - \mu_A^{+}(x) = \upsilon_{\Box A}^{+}(x)$.

Therefore $\upsilon_{\Box A}^{+}(mx) \leq \upsilon_{\Box A}^{+}(x)$.

ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 4, Issue 3 , March 2017

Consider $\mu^{-}_{\Box A}(mx) = \mu^{-}_{A}(mx) \le \mu^{-}_{A}(x) = \mu^{-}_{\Box A}(x)$.

Therefore $\mu^{-}_{\Box A}(mx) \le \mu^{-}_{\Box A}(x)$.

Consider $\upsilon^{-}_{\Box A}(mx) = -1 - \mu^{-}_{\Box A}(mx) \ge -1 - \mu^{-}_{A}(x) = \upsilon^{-}_{\Box A}(x)$.

Therefore $\upsilon^{-}_{\Box A}(mx) \ge \upsilon^{-}_{\Box A}(x)$.

Therefore $\Box A$ is an bipolar intuitionistic M fuzzy group of G.

Theorem. 2.7. If A is an bipolar intuitionistic M fuzzy group of G, then $\Diamond A$ is an bipolar intuitionistic M fuzzy group of G.

Proof.

Let $x \in A$ and $m \in M$.

Consider $\mu^{+}_{\Diamond A}(mx) = 1 - \upsilon^{+}_{\Diamond A}(mx) \ge 1 - \upsilon^{+}_{A}(x) = \mu^{+}_{\Diamond A}(x)$.

Therefore $\mu^{+}_{\Diamond A}(mx) \ge \mu^{+}_{\Diamond A}(x)$.

Consider $\upsilon^{+}_{\Diamond A}(mx) = \upsilon^{+}_{A}(mx) \le \upsilon^{+}_{A}(x) = \upsilon^{+}_{\Diamond A}(x)$.

Therefore $\upsilon^{+}_{\Diamond A}(mx) \le \upsilon^{+}_{\Diamond A}(x)$.

Consider $\mu^{-}_{\Diamond A}(mx) = -1 - \upsilon^{-}_{\Diamond A}(mx) \le -1 - \upsilon^{-}_{A}(x) = \mu^{-}_{\Diamond A}(x)$.

Therefore $\mu^{-}_{\Diamond A}(mx) \le \mu^{-}_{\Diamond A}(x)$.

Consider $\upsilon^{-}_{\Diamond A}(mx) = \upsilon^{-}_{A}(mx) \ge \upsilon^{-}_{A}(x) = \upsilon^{-}_{\Diamond A}(x)$.

Therefore $\upsilon^{-}_{\Diamond A}(mx) \ge \upsilon^{-}_{\Diamond A}(x)$.

Therefore $\Diamond A$ is an bipolar intuitionistic M fuzzy group of G.

Theorem.2.8. If A and B are bipolar intuitionistic M fuzzy group of G, then $\Box(A \cap B) = \Box A \cap \Box B$ is also an bipolar intuitionistic M fuzzy group of G.

Proof.

Let $x \in A \cap B$ implies $x \in A, x \in B$ and $m \in M$.

Consider $\mu^{+}_{\Box(A \cap B)}(mx) = \mu^{+}_{(A \cap B)}(mx) \ge \min(\mu^{+}_{\Box A}(x), \mu^{+}_{\Box B}(x)) = \mu^{+}_{\Box A \cap \Box B}(x)$.

Therefore $\mu^{+}_{\Box(A \cap B)}(mx) \ge \mu^{+}_{\Box A \cap \Box B}(x)$.

Consider $\upsilon^{+}_{\Box(A \cap B)}(mx) = 1 - \mu^{+}_{\Box(A \cap B)}(mx) \le 1 - \mu^{+}_{\Box A \cap \Box B}(x) = \upsilon^{+}_{\Box A \cap \Box B}(x)$.

Therefore $\upsilon^{+}_{\Box(A \cap B)}(mx) \le \upsilon^{+}_{\Box A \cap \Box B}(x)$.

ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 4, Issue 3 , March 2017

Consider $\mu^-_{\Box(A\cap B)}(mx) = \mu^-_{(A\cap B)}(mx) \le \max(\mu^-_{\Box A}(x), \mu^-_{\Box B}(x)) = \mu^-_{\Box A\cap \Box B}(x).$

Therefore $\mu^-_{\Box(A\cap B)}(mx) \le \mu^-_{\Box A\cap \Box B}(x).$

Consider $\upsilon^-_{\Box(A\cap B)}(mx) = -1 - \mu^-_{\Box(A\cap B)}(mx) \ge -1 - \mu^-_{\Box A\cap \Box B}(x) = \upsilon^-_{\Box A\cap \Box B}(x).$

Therefore $\upsilon^-_{\Box(A\cap B)}(mx) \ge \upsilon^-_{\Box A\cap \Box B}(x).$

Therefore $\Box(A\cap B) = \Box A\cap \Box B$ is an bipolar intuitionistic M fuzzy group of G.

Theorem.2.9. If A and B are bipolar intuitionistic M fuzzy group of G, then $\Diamond(A\cap B) = \Diamond A\cap \Diamond B$ is also an bipolar intuitionistic M fuzzy group of G.

Proof.

Let $x \in A\cap B$ implies $x \in A, x \in B$ and $m \in M$.

Consider $\mu^+_{\Diamond(A\cap B)}(mx) = 1 - \upsilon^+_{A\cap B}(mx) \ge 1 - \max(\upsilon^+_A(x), \upsilon^+_B(x)) = \mu^+_{\Diamond A\cap \Diamond B}(x).$

Therefore $\mu^+_{\Diamond(A\cap B)}(mx) \ge \mu^+_{\Diamond A\cap \Diamond B}(x).$

Consider $\upsilon^+_{\Diamond(A\cap B)}(mx) = \upsilon^+_{A\cap B}(mx) \le \max(\upsilon^+_A(x), \upsilon^+_B(x)) = \upsilon^+_{\Diamond A\cap \Diamond B}(x).$

Therefore $\upsilon^+_{\Diamond(A\cap B)}(mx) \le \upsilon^+_{\Diamond A\cap \Diamond B}(x).$

Consider $\mu^-_{\Diamond(A\cap B)}(mx) = -1 - \upsilon^-_{A\cap B}(mx) \le -1 - \min(\upsilon^-_A(x), \upsilon^-_B(x)) = \mu^-_{\Diamond A\cap \Diamond B}(x).$

Therefore $\mu^-_{\Diamond(A\cap B)}(mx) \le \mu^-_{\Diamond A\cap \Diamond B}(x).$

Consider $\upsilon^-_{\Diamond(A\cap B)}(mx) = \upsilon^-_{A\cap B}(mx) \ge \min(\upsilon^-_A(x), \upsilon^-_B(x)) = \upsilon^-_{\Diamond A\cap \Diamond B}(x).$

Therefore $\upsilon^-_{\Diamond(A\cap B)}(mx) \ge \upsilon^-_{\Diamond A\cap \Diamond B}(x).$

Therefore $\Diamond(A\cap B) = \Diamond A\cap \Diamond B$ is an bipolar intuitionistic M fuzzy group of G.

Theorem.2.10. If A is an bipolar intuitionistic M fuzzy group of G, then $\Box\overline{\overline{A}} = \Diamond A$ is an bipolar intuitionistic M fuzzy group of G.

Proof.

Let $x \in A$ and $m \in M$.

Consider $\mu^+_{\Box\overline{\overline{A}}}(mx) = \upsilon^+_{\Box\overline{A}}(mx) = 1 - \mu^+_{\overline{A}}(mx) = 1 - \upsilon^+_A(mx) \ge \mu^+_{\Diamond A}(x).$

Therefore $\mu^+_{\Box\overline{\overline{A}}}(mx) \ge \mu^+_{\Diamond A}(x).$

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 4, Issue 3 , March 2017

Consider $\upsilon^{+}_{\Box\overline{\overline{A}}}(mx) = \mu^{+}_{\Box\overline{A}}(mx) = \mu^{+}_{\overline{A}}(mx) = \upsilon^{+}_{A}(mx) \le \upsilon^{+}_{\Diamond A}(x).$

Therefore $\upsilon^{+}_{\Box\overline{\overline{A}}}(mx) \le \upsilon^{+}_{\Diamond A}(x).$

Consider $\mu^{-}_{\Box\overline{\overline{A}}}(mx) = \upsilon^{-}_{\Box\overline{A}}(mx) = -1-\mu^{-}_{\overline{A}}(mx) = -1-\upsilon^{-}_{A}(mx) \le \mu^{-}_{\Diamond A}(x).$

Therefore $\mu^{-}_{\Box\overline{\overline{A}}}(mx) \le \mu^{-}_{\Diamond A}(x).$

Consider $\upsilon^{-}_{\Box\overline{\overline{A}}}(mx) = \mu^{-}_{\Box\overline{A}}(mx) = \mu^{-}_{\overline{A}}(mx) = \upsilon^{-}_{A}(mx) \ge \upsilon^{-}_{\Diamond A}(x).$

Therefore $\upsilon^{-}_{\Box\overline{\overline{A}}}(mx) \ge \upsilon^{-}_{\Diamond A}(x).$

Therefore $\Box\overline{\overline{A}} = \Diamond A$ is an bipolar intuitionistic M fuzzy group of G.

III. BIPOLAR INTUITIONISTIC ANTI M- FUZZY GROUP OF G.

Theorem.3.1. If A and B are bipolar intuitionistic anti M fuzzy group of G, then $\Box(A\cap B) = \Box A \cap \Box B$ is also an bipolar intuitionistic anti M fuzzy group of G.

Proof.

Let $x \in A\cap B$ implies $x \in A, x \in B$ and $m \in M$.

Consider $\mu^{+}_{\Box(A\cap B)}(mx) = \mu^{+}_{(A\cap B)}(mx) \le \min(\mu^{+}_{\Box A}(x), \mu^{+}_{\Box B}(x)) = \mu^{+}_{\Box A\cap\Box B}(x).$

Therefore $\mu^{+}_{\Box(A\cap B)}(mx) \le \mu^{+}_{\Box A\cap\Box B}(x).$

Consider $\upsilon^{+}_{\Box(A\cap B)}(mx) = 1-\mu^{+}_{\Box(A\cap B)}(mx) \ge 1-\mu^{+}_{\Box A\cap\Box B}(x) = \upsilon^{+}_{\Box A\cap\Box B}(x).$

Therefore $\upsilon^{+}_{\Box(A\cap B)}(mx) \ge \upsilon^{+}_{\Box A\cap\Box B}(x).$

Consider $\mu^{-}_{\Box(A\cap B)}(mx) = \mu^{-}_{(A\cap B)}(mx) \ge \max(\mu^{-}_{\Box A}(x), \mu^{-}_{\Box B}(x)) = \mu^{-}_{\Box A\cap\Box B}(x).$

Therefore $\mu^{-}_{\Box(A\cap B)}(mx) \ge \mu^{-}_{\Box A\cap\Box B}(x).$

Consider $\upsilon^{-}_{\Box(A\cap B)}(mx) = -1-\mu^{-}_{\Box(A\cap B)}(mx) \le -1-\mu^{-}_{\Box A\cap\Box B}(x) = \upsilon^{-}_{\Box A\cap\Box B}(x).$

Therefore $\upsilon^{-}_{\Box(A\cap B)}(mx) \le \upsilon^{-}_{\Box A\cap\Box B}(x).$

Therefore $\Box(A\cap B) = \Box A\cap\Box B$ is an bipolar intuitionistic anti M fuzzy group of G.

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 4, Issue 3 , March 2017

Theorem.3.2. If A is an bipolar intuitionistic anti M fuzzy group of G, then $\Box(\Diamond A) = \Diamond A$ is an bipolar intuitionistic anti M fuzzy group of G.

Proof.

Let $x \in A$ and $m \in M$.

Consider $\mu^{+}_{\Box(\Diamond A)}(mx) = 1 - \upsilon^{+}_{\Diamond A}(mx) \leq \mu^{+}_{\Diamond A}(x)$.

Therefore $\mu^{+}_{\Box(\Diamond A)}(mx) \leq \mu^{+}_{\Diamond A}(x)$.

Consider $\upsilon^{+}_{\Box(\Diamond A)}(mx) = 1 - \mu^{+}_{\Diamond A}(mx) = 1 - (1 - \upsilon^{+}_{A}(mx)) \geq \upsilon^{+}_{\Diamond A}(x)$.

Therefore $\upsilon^{+}_{\Box(\Diamond A)}(mx) \geq \upsilon^{+}_{\Diamond A}(x)$.

Consider $\mu^{-}_{\Box(\Diamond A)}(mx) = -1 - \upsilon^{-}_{\Diamond A}(mx) \geq \mu^{-}_{\Diamond A}(x)$.

Therefore $\mu^{-}_{\Box(\Diamond A)}(mx) \geq \mu^{-}_{\Diamond A}(x)$.

Consider $\upsilon^{-}_{\Box(\Diamond A)}(mx) = -1 - \mu^{-}_{\Diamond A}(mx) = -1 - (-1 - \upsilon^{-}_{A}(mx)) \leq \upsilon^{-}_{\Diamond A}(x)$.

Therefore $\upsilon^{-}_{\Box(\Diamond A)}(mx) \leq \upsilon^{-}_{\Diamond A}(x)$.

Therefore $\Box(\Diamond A) = \Diamond A$ is an bipolar intuitionistic anti M fuzzy group of G.

Theorem.3.3. If A is an bipolar intuitionistic anti M fuzzy group of G, then $\Diamond(\Box A) = \Box A$ is an bipolar intuitionistic anti M fuzzy group of G.

Proof.

Let $x \in A$ and $m \in M$.

Consider $\mu^{+}_{\Diamond(\Box A)}(mx) = 1 - \upsilon^{+}_{\Box A}(mx) = 1 - (1 - \mu^{+}_{A}(mx)) \leq \mu^{+}_{\Box A}(x)$.

Therefore $\mu^{+}_{\Diamond(\Box A)}(mx) \leq \mu^{+}_{\Box A}(x)$.

Consider $\upsilon^{+}_{\Diamond(\Box A)}(mx) = \upsilon^{+}_{\Box A}(mx) = 1 - \mu^{+}_{A}(mx) \geq \upsilon^{+}_{\Box A}(x)$.

Therefore $\upsilon^{+}_{\Diamond(\Box A)}(mx) \geq \upsilon^{+}_{\Box A}(x)$.

Consider $\mu^{-}_{\Diamond(\Box A)}(mx) = -1 - \upsilon^{-}_{\Box A}(mx) = -1 - (-1 - \mu^{-}_{A}(mx)) \geq \mu^{-}_{\Box A}(x)$.

Therefore $\mu^{-}_{\Diamond(\Box A)}(mx) \geq \mu^{-}_{\Box A}(x)$.

Consider $\upsilon^{-}_{\Diamond(\Box A)}(mx) = \upsilon^{-}_{\Box A}(mx) \leq -1 - \mu^{-}_{A}(x) = \upsilon^{-}_{\Box A}(x)$.

Therefore $\upsilon^{-}_{\Diamond(\Box A)}(mx) \leq \upsilon^{-}_{\Box A}(x)$.

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 4, Issue 3 , March 2017

Therefore $\Diamond(\Box A) = \Box A$ is an bipolar intuitionistic anti M fuzzy group of G.

Theorem.3.4. If A is an bipolar intuitionistic anti M fuzzy group of G, then $\Box\,\overline{\overline{A}} = \Diamond A$ is an bipolar intuitionistic anti M fuzzy group of G.

Proof.

Let $x \in A$ and $m \in M$.

Consider $\mu^{+}_{\Box\overline{A}}(mx) = \upsilon^{+}_{\Box\overline{A}}(mx) = 1-\mu^{+}_{A}(mx) = 1-\upsilon^{+}_{A}(mx) \le \mu^{+}_{\Diamond A}(x)$.

Therefore $\mu^{+}_{\Box\overline{A}}(mx) \le \mu^{+}_{\Diamond A}(x)$.

Consider $\upsilon^{+}_{\Box\overline{A}}(mx) = \mu^{+}_{\Box\overline{A}}(mx) = \mu^{+}_{A}(mx) = \upsilon^{+}_{A}(mx) \ge \upsilon^{+}_{\Diamond A}(x)$.

Therefore $\upsilon^{+}_{\Box\overline{A}}(mx) \ge \upsilon^{+}_{\Diamond A}(x)$.

Consider $\mu^{-}_{\Box\overline{A}}(mx) = \upsilon^{-}_{\Box\overline{A}}(mx) = -1-\mu^{-}_{A}(mx) = -1-\upsilon^{-}_{A}(mx) \ge \mu^{-}_{\Diamond A}(x)$.

Therefore $\mu^{-}_{\Box\overline{A}}(mx) \ge \mu^{-}_{\Diamond A}(x)$.

Consider $\upsilon^{-}_{\Box\overline{A}}(mx) = \mu^{-}_{\Box\overline{A}}(mx) = \mu^{-}_{A}(mx) = \upsilon^{-}_{A}(mx) \le \upsilon^{-}_{\Diamond A}(x)$.

Therefore $\upsilon^{-}_{\Box\overline{A}}(mx) \le \upsilon^{-}_{\Diamond A}(x)$.

Therefore $\Box\,\overline{\overline{A}} = \Diamond A$ is an bipolar intuitionistic anti M fuzzy group of G.

Theorem.3.5. If A is an bipolar intuitionistic anti M fuzzy group of G, then $\Diamond\,\overline{\overline{A}} = \Box A$ is an bipolar intuitionistic anti M fuzzy group of G.

Proof.

Let $x \in A$ and $m \in M$.

Consider $\mu^{+}_{\Diamond\overline{A}}(mx) = \upsilon^{+}_{\Diamond\overline{A}}(mx) \le \mu^{+}_{\Box A}(x)$.

Therefore $\mu^{+}_{\Diamond\overline{A}}(mx) \le \mu^{+}_{\Box A}(x)$.

Consider $\upsilon^{+}_{\Diamond\overline{A}}(mx) = \mu^{+}_{\Diamond\overline{A}}(mx) = 1-\upsilon^{+}_{A}(mx) = 1-\mu^{+}_{A}(mx) \ge \upsilon^{+}_{A}(x) = \upsilon^{+}_{\Box A}(x)$.

Therefore $\upsilon^{+}_{\Diamond\overline{A}}(mx) \ge \upsilon^{+}_{\Box A}(x)$.

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 4, Issue 3 , March 2017

Consider $\mu^{-}_{\Diamond \overline{\overline{A}}}(mx) = \upsilon^{-}_{\Diamond \overline{A}}(mx) \geq \mu^{-}_{\Box A}(x).$

Therefore $\mu^{-}_{\Diamond \overline{\overline{A}}}(mx) \geq \mu^{-}_{\Box A}(x).$

Consider $\upsilon^{-}_{\Diamond \overline{\overline{A}}}(mx) = \mu^{-}_{\Diamond \overline{A}}(mx) = -1 - \upsilon^{-}_{\overline{A}}(mx) = -1 - \mu^{-}_{A}(mx) \leq \upsilon^{-}_{A}(x) = \upsilon^{-}_{\Box A}(x).$

Therefore $\upsilon^{-}_{\Diamond \overline{\overline{A}}}(mx) \leq \upsilon^{-}_{\Box A}(x).$

Therefore $\Diamond \overline{\overline{A}} = \Box A$ is an bipolar intuitionistic anti M fuzzy group of G.

IV. CONCLUSION

The concept of bipolar intuitionistic M fuzzy group and anti M fuzzy group is a new algebraic structure of a bipolar intuitionistic M fuzzy subgroup of a M fuzzy group and anti M fuzzy group are defined, some related properties and some operations on operators are investigated. The purpose of the study is to implement fuzzy set theory and group theory in bipolar intuitionistic M fuzzy subgroup of a M fuzzy group and anti M fuzzy group. We hope that our results can also be extended to other algebraic system.

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