

## ABSTRACT

Near-rings are algebraic structures that generalize rings, which satisfy all the conditions of rings except the commutative property of addition and one of the distributive properties.

Research on the uniserial and Bezout modules associated with distributive modules has been done by Mikhalev and Tuganbaev [1]. Choudhury and Saikia [2] investigated distributive near-ring groups.

Extending near-ring groups, the concepts of uniserial and Bezout near-ring groups have been investigated in this work. The uniserial and Bezout properties of near-ring groups play an important role in characterizing the distributive near-ring groups. The following correlations have been derived between -

- a. *DN*-groups and annihilators of near-ring groups.
- b. *DN*-groups and uniserial *N*-groups.
- c. Principal *N*-groups and uniserial *N*-groups.
- d. Bezout *N*-groups and uniserial *N*-groups.
- e. *DN*-groups and Bezout *N*-groups.

Khodadaapour and Roodbarylor [3] examined the ideas of multiplication *N*-groups and cyclic *N*-groups in near-rings. Their work discussed the connections between multiplication *N*-groups and cyclic *N*-groups. In this work, defining localized near-rings, localized *N*-groups, localized *N*-subgroups and localized ideals of *N*-groups, different properties of *DN*-groups, multiplication *N*-groups, uniserial *N*-groups and Bezout *N*-groups are examined. It is also proved that arithmetic near-rings, uniserial *N*-groups

and  $DN$ -groups lead to the multiplication  $N$ -groups. Associations between the following have been made-

- a.** Localized  $N$ -groups and  $N$ -groups.
- b.** Localized  $N$ -groups and localized multiplication  $N$ -groups.
- c.** Localized multiplication  $N$ -groups and cyclic  $N$ -groups.
- d.** Localized multiplication  $N$ -groups and multiplication  $N$ -groups.
- e.** Multiplication  $N$ -groups and  $DN$ -groups.

Zadeh introduced fuzzy sets as an extension of the classical notion of sets. Distributive lattice properties of L-fuzzy ideals of a ring are studied by Gao, Qingguo and Zhaowen [4]. Atanassov [5] proposed intuitionistic fuzzy sets as a generalization of fuzzy sets. Saikia and Barthakur [6], Saikia [7] and Sharma and Kaur [8] described the concepts of intuitionistic fuzzy near-rings, intuitionistic fuzzy  $N$ -groups, intuitionistic fuzzy  $N$ -subgroups and intuitionistic fuzzy ideals of  $N$ -groups. Hadi and Semeein [9] had done some research work on fuzzy distributive modules. Here, intuitionistic fuzzy distributive  $N$ -groups,  $(\gamma, \lambda)$ -cuts of  $N$ -groups and intuitionistic fuzzy weak  $DN$ -groups are defined. The following relationships have been established between-

- a.** Intuitionistic fuzzy  $DN$ -groups and  $DN$ -groups.
- b.** Intuitionistic fuzzy uniserial  $DN$ -groups and intuitionistic fuzzy  $DN$ -groups.
- c.** Intuitionistic fuzzy weak  $DN$ -groups and weak  $DN$ -groups.

The concept of intuitionistic fuzzy multiplication modules is extended to intuitionistic fuzzy multiplication  $N$ -groups. The work defines intuitionistic fuzzy multiplication  $N$ -group and other fundamental notions of intuitionistic fuzzy multiplication  $N$ -groups. The following linkages have been established between-

- a.** Intuitionistic fuzzy multiplication  $N$ -groups and multiplication  $N$ -groups.
- b.** Intuitionistic fuzzy multiplication  $N$ -groups and intuitionistic fuzzy  $DN$ -groups.