REVIEW OF LITERATURE

Soft set Theory is one of the recent topics gaining significance in finding rational and logical solutions to various real life problems which involve uncertainty, impreciseness and vagueness.

Uncertainty is present in almost every sphere of our daily life. Traditional Mathematical tools are not sufficient to handle all the practical problems in fields such as Medical Science, Social Science, Engineering, Economics, etc., which involve various types of uncertainty. Zadeh [69], in 1965 was the first to come up with his remarkable theory of Fuzzy sets for dealing these types of uncertainties where conventional tools fail. His theory brought a grand paradigmatic change in mathematics. Later, there are theories namely the Intuitionistic Fuzzy sets, Vague Sets, Rough sets etc., for handling uncertainty.

In 1999, Molodtsov [38] initiated the theory of Soft sets as a new mathematical tool for dealing uncertainty. Maji et al. [33] initiated the concept of Fuzzy Soft sets. Maji et al. (2002) gave first practical application of Soft sets in decision making problems. Pei and Miao (2005) investigated the relationships between Soft sets and information systems. Maji, Biswas and Roy (2003) presented the operations of Soft sets and constructed a uni-int decision making method by using these new operations and developed Soft set theory. Then to make easy compaction with the operations of Soft sets, they presented the Soft matrix theory and setup the Soft maximin decision making method (2010). These decision making methods can be successfully applied to many problems that contain uncertainties.

The algebraic structure of Soft set theories has been explored in recent years. In 2007, Aktas and Cagman gave a definition of Soft groups and compared Soft sets to the related concepts of Fuzzy sets and Rough sets. Sezgin and Atagun (2011) defined the notion of normalistic Soft groups. Aygunoglu and Augun (2009) introduced the notion of Fuzzy Soft groups based

on Rosenfeld's approach (1971) and studied its properties. Feng et al. (2008) worked on Soft semirings, Soft ideals and Idealistic Soft semirings.

Many researchers have contributed towards the algebraic structures of Soft set theory. The following are some of the articles published on Soft semigroups and Fuzzy Soft semigroups.

"Soft semigroups", Muhammad Irfan Ali. (2009)

"Soft Regular semigroups", Muhammad Irfan Ali. (2009)

"Soft Ordered semigroups", Jun, Y.B., Lee, K.J. and Khan, A. (2010)

"Soft LA-semigroups", Muhammad Aslam, Muhammad Shabir and Asif Mehmood. (2010)

"Soft ternary semigroups", Muhammad Shabir. and Ali Ahmad. (2011)

"Soft M-semigroups", Vijayabalaji,S. and Shakila, V. (2013)

"Uni Soft semigroups", Chang Su Kim, Jeong Gi Kang. and Joo Sup Kim. (2013)

"Soft Neutrosophic semigroups", Mumtaz Ali et al.,(2014)

"Soft Neutrosophic LA-semigroups", Florentin Smarandache et al., (2014)

"Int-Soft semigroups", Song, S.Z., Kim, H.S. and Jun, Y.B. (2014)

"Uni-Soft ternary semigroups", Abid Khan. and Muhammad Sarwar. (2015)

"Intuitionistic Fuzzy Soft semigroups", Jiehnuazhou, Yuewu Li. and Yunqiang Yin. (2011)

"Fuzzy Soft semigroups", Munazza Naz et al. (2013)

"Intuitionistic Fuzzy Soft ordered ternary semigroups", Muhammad Akram. and Naveed Yaqoob. (2013)

"Fuzzy Soft Γ-semigroups", Muhammad Akram, Kavikumar, J. and Azme Bin Khamis. (2014)

"Bipolar Fuzzy Soft Γ-semigroups", Muhammad Akram, Jacob Kavikumar. and Azme Bin Khamis. (2014)

"Fuzzy Soft LA-semigroups", Saranya,S. and Kalaichelvi, A. (2015).

Soft sets, Soft semigroups, Fuzzy Soft sets and Fuzzy Soft semigroups has become an important area of research in different disciplines such as Engineering, Medical Science, Social Science, Physics, Statistics, Graph Theory, Signal Processing, Pattern Recognition, Complete Networks, Expert Systems, Decision Making and so on.

In this Review of Literature a brief survey of some of the articles published on Soft sets, Soft semigroups, Fuzzy Soft sets and Fuzzy Soft semigroups are given.

1. "Soft set theory-first results"

Molodsov, D. (1999) [38]

The soft set theory offers a general mathematical tool for dealing objects. The basic notions of the theory of Soft sets are introduced, the first results of the theory are presented and some problems of the future are discussed.

2. "From Soft sets to information systems"

Daowu Pei and Duoqian Miao (2005) [17]

This paper discusses the relationships between Soft sets and information systems. It is showed that Soft sets are a class of special information systems. After Soft sets are extended to several classes of general cases, the more general results also show that partition-type Soft sets and information systems

have the same formal structures and that Fuzzy Soft sets and Fuzzy information systems are equivalent.

3. "Distance and similarity measures for Soft sets"
Athar Kharal (2010) [9]

In this paper, new similarity measures for Soft sets using set theoretic operations are proposed. An application of the proposed measures of

similarity in the area of automated financial analysis is also presented.

4."Matrices in Soft set theory and their applications in decision making problems"
Tanushree Mitra Basu, Nirmal Kumar Mahapatra and Syamal Kumar Mondal (2012) [65]

The purpose of this paper is to define different types of matrices in Soft set theory. We have introduced here some new operations on these matrices and discussed here all these definitions and operations by appropriate examples. Moreover a new efficient solution procedure has been developed to solve Soft set based real life decision making problems which may contain more than one decision maker.

5. "An application of Soft sets in a decision making problem"
Maji, P.K., Biswas, R. and Roy, A.R (2002) [34]

In this paper, the theories of Soft sets are applied to solve a decision making problem.

6. "Algebraic Hyperstructures of Soft set Associated with Ternary semihyper- groups"
Kostaq Hila, Krisanthi Naka (2013) [28]

In this paper, Soft ternary semihypergroups are introduced by using Soft set theory. The notions of ternary semihypergroups, Soft ternary subsemihypergroups, Soft left (right, lateral) hyperideals, Soft hyperideals, Soft

quasi-hyperideals and Soft bi-hyperideals are introduced and several related properties are investigated.

7. "Generalished fuzzy soft sets"

Pinaki Majumdar, Samanta. S.K (2010) [37]

In this paper, the authors define generalized fuzzy soft sets and study some of their properties. Application of generalized fuzzy soft sets in decision making problem and medical diagnosis problem has been shown.

8. "Fuzzy soft set theory and its applications"

NaimCagman, SerdarEnginoglu, FilizCitak (2011) [13]

In this work, the authors define a fuzzy soft set theory and its related properties. We then define fuzzy soft aggregation operator that allows constructing more efficient decision method. Finally, the authors give an example which shows that the method can be successfully applied to many problems that contain uncertainties.

9. "Fuzzy soft semigroups and fuzzy soft ideals"

Cheng-Fu Yang (2011) [15]

In this paper, the notions of fuzzy soft semigroups and fuzzy soft (left, right) ideals are given, and the α-level set, union and intersection of them were studied for each $\alpha \in [0,1]$. Finally, fuzzy soft image and fuzzy soft inverse image of fuzzy soft semigroup (ideal) are discussed.

10. "Soft ordered semigroups"

Young Bae Jun, Kyoungja Lee and Asghar Khan (2010) [24]

In 1999, Molodsov introduced the concept of soft sets as a new mathematical tool for dealing with uncertainties that is free from the difficulties that have troubled the usual theoretical approaches. In this paper, the notion of

soft sets by Molodsov to ordered semigroups are applied. The notions of (trivial, whole) soft ordered semigroup, soft ordered subsemigroup, soft left (right) ideal, left (right) idealistic soft ordered semigroup are introduced and various related properties are investigated.

11. "Soft ideals and soft filters of soft ordered semigroups"
Muhammad Irfan Ali (2011) [45]

In this paper, the soft ordered semigroups over an ordered semigroup are actually soft ordered subsemigroups of (S, A) are showed. Soft idealistic semigroups over an ordered semigroup are soft ideals of soft ordered semigroup (S, A). The concept of soft filters of a soft ordered semigroup is introduced. It is shown that restricted complement of a soft filters is a soft prime ideal of (S, A).

12. "Soft ideals and generalized fuzzy ideals in semigroups"
Muhammad Shabir, Muhammad Irfan Ali (2009) [48]

A soft semigroup over a semigroup is a collection of subsemigroups. Similarly, a soft ideal over a semigroup is a collection of ideals of the semigroup. As a natural consequence, the idea of soft ideals of a soft semigroup originates. Soft ideals over a semigroup with a fixed set of parameters form a distributive lattice. Soft sets ate a very handy tool. Soft ideals over a semigroup characterize generalized fuzzy ideals and fuzzy ideals with thresholds of S.

13. "A study of fuzzy soft interior ideals of ordered semigroups"
Hhan, A., Sarmin, N.H. and Davvaz, B (2013) [22]

In this paper, the concepts of a fuzzy soft left (right) ideal and fuzzy soft interior ideal over an ordered semigroup S are presented. Some basic results of fuzzy soft left (right) ideals and fuzzy soft interior ideals are investigated and the supported examples are provided. Different classes, regular, intra-regular and simple ordered semigroups are characterized by means of fuzzy soft left (right)

ideals and fuzzy soft interior ideals. It is shown that an ordered semigroup is simple if and only if it is fuzzy soft simple. Furthermore, left (right) regular and intra-regular ordered semigroups are characterized by means of fuzzy soft left (right) ideals and fuzzy soft ideals.

14. "Intuitionistic fuzzy soft semigroups"

Jiehua Zhou, Yuewu Li and Yunqiang Yin (2011) [70]

Maji et al. introduced the concept of intuitionistic fuzzy soft sets, which is an extension to the soft set and intuitionistic fuzzy set. In this paper, the concept of intuitionistic fuzzy soft sets are applied to semigroup theory. The notion of intuitionistic fuzzy soft ideals over a semigroup is introduced and their basic properties are investigated. Some lattice structures of the set of all intuitionistic fuzzy soft ideals of a semigroup are derived.

15. "Intuitionistic Fuzzy Soft Ordered Ternary Semigroups"

Muhammad Akram and Naveed Yaqoob (2013) [40]

In this paper, the notion of intuitionistic fuzzy soft ideals over an ordered ternary semigroup are introduced and their basic properties are investigated.

16. "Soft neutrosophic semigroups and their generalization"

Mumtaz Ali et al. (2014) [51]

Soft set theory is a general mathematical tool for dealing with uncertain, fuzzy, not clearly defined objects. In this paper soft neutrosophic semigroup,soft neutosophic bisemigroup, soft neutrosophic N-semigroup are introduced with some of their characteristics.

17. "Soft neutrosophic left almost semigroup"

Florentin Smarandache et al. (2014) [21]

In this paper neutrosophic LA-semigroup, neutrosophic sub LA-semigroup, neutrosophic ideals, neutosophic prime ideals, neutrosophic semiprime ideals, neutrosophic strong irreducible ideals are extended to soft

neutrosophic LA-semigroup, soft neutosophic sub LA-semigroup, soft neutrosophic ideals, soft neutrosophic prime ideals, soft neutrosophic semiprime ideals and soft strong irreducible neutrosophic ideals respectively.

18. "Uni-Soft Ideals of Ternary Semigroups"

Abid Khan and Muhammad Sarwar (2015) [1]

In this paper the notions of uni-soft ternary semigroups, uni-soft left (right, lateral) ideals and unisoft quasi ideals of ternary semigroups are introduced and some related properties of these terms are investigated. Some characterizations of uni-soft ternary semigroups and uni-soft left (right, lateral) ideals of ternary semigroups are also discussed.

19. "Int-soft interior ideals of semigroups"

Wieslaw A. Dudek and Young Bae Jun (2014) [67]

The soft version of interior ideals in semigroups is considered. The notion of an int-soft interior ideal is introduced, and related properties are investigated. A relation between an int-soft ideal and an int-soft interior ideal is provided, and conditions for an int-soft interior ideal to be an int-soft two-sided ideal are given. Characterizations of int-soft interior ideals are discussed. Using the notion of int-soft left (right) ideals, characterizations of a left (right) simple semigroup are provided. The int-soft interior ideal generated by a soft set is established.

20. "Uni-soft (Quasi) Ideals of Semigroups"

Chang Su Kim, Jeong Gi Kang and Joo Sup Kim (2013) [27]

The notions of uni-soft semigroups, uni-soft left (right) ideals and uni-soft quasi ideals are introduced, and related properties are investigated. Characterizations of uni-soft semigroups, uni-soft left (right) ideals and uni-soft quasi ideals are discussed. A regular semigroup is characterized by the notion of a uni-soft quasi ideal.