Conclusion

Since the publication of the classic paper on fuzzy sets by L.A. Zadeh in 1965, the theory of fuzzy mathematics has gained more and more recognition from many researchers in a wide range of scientific fields. Among various branches of pure and applied mathematics, algebra was one of the first few subjects where the notion of fuzzy set was applied. Ever since A. Rosenfeld introduced fuzzy sets in the realm of group theory in 1971, many researchers have been involved in extending the notions of abstract algebra to the broader framework of fuzzy setting. As a result, a number of concepts have been formulated and explored. However many concepts are yet to be ‘fuzzified’. The main objective of this thesis was to extend some basic concepts and results in module theory in algebra to the fuzzy setting.

The concepts like simple module, semisimple module and exact sequences of $R$-modules form an important area of study in crisp module theory. In this thesis generalising these concepts to the fuzzy setting we have introduced concepts of ‘simple and semisimple $L$-modules’ and proved some results which include results analogous to those in crisp case. Also we have defined and studied the concept of ‘exact sequences of $L$-modules’.
Further extending the concepts in crisp theory, we have introduced the fuzzy analogues ‘projective and injective $L$-modules’. We have proved many results in this context. Further we have defined and explored notion of ‘essential $L$-submodules of an $L$-module’. Still there are results in crisp theory related to the topics covered in this thesis which are to be investigated in the fuzzy setting.

There are a lot of ideas still left in algebra, related to the theory of modules, such as the ‘injective hull of a module’, ‘tensor product of modules’ etc. for which the fuzzy analogues are not defined and explored.