



*Summary
and Conclusion*

SUMMARY AND CONCLUSION

Matrix theory over semirings is an object of much study in the last decades. It has numerous applications in combinatorics, graph theory, information theory, automata theory and optimization theory.

This thesis is devoted to the study of some interesting results on matrices over semirings. The discussion is under the following topics:

1. Regular matrices over semirings,
2. Prime and semiprime matrices over semirings,
3. Invertible matrices over semirings,
4. Idempotent matrices over semirings,
5. Regularity preservers for matrices over semirings,
6. Determinant, singularity and non-singularity preservers for matrices over semirings,
7. Rank and perimeter preservers for matrices over semirings.

Chapter I deals with preliminary definitions and examples. Chapter II deals with regular matrices over semirings. Some interesting examples of regular matrices over semirings are given and some interesting properties of these matrices are investigated.

Prime and semiprime matrices over semirings are studied in chapter III. In this chapter, the relationship between (semi) prime matrices and their row spaces are studied.

Chapter IV deals with invertible matrices over semirings. In this chapter, the complete description of the invertible matrices over a commutative antiring is given. Some necessary and sufficient conditions for a

matrix over a commutative antiring to be invertible are obtained. Cramer's rule for a matrix equation over a commutative antiring is presented.

Chapter V is devoted to the study of idempotent matrices over semirings. Interesting properties and characterizations are established.

Chapter VI deals with regularity preservers for matrices over semirings. In this chapter, the linear operators that strongly preserve regular matrices over semirings including the binary Boolean algebra, the nonnegative reals, the nonnegative integers and fuzzy scalars are studied. Interesting characterizations of linear operators that strongly preserve regular matrices over semirings are established.

Chapter VII deals with determinant, singularity and non-singularity preservers for matrices over semirings. Interesting characterizations of linear operators preserving \mathcal{S} -singularity and \mathcal{R} -singularity are obtained. Using the definition of bideterminant, an interesting characterization of determinant preservers of matrices over semirings is established.

Chapter VIII deals with Rank and perimeter preservers for matrices over semirings. The set of linear operators preserving the rank and the perimeter of every rank-1 matrix over any chain semiring is characterized.