INTRODUCTION

It is very well-known that a square matrix over a field is invertible if and only if its determinant is different from zero. Invertible matrices over a commutative ring with identity are characterized in [1] by the following theorem : "A square matrix over a commutative ring R with identity is invertible if and only if its determinant is a multiplicatively invertible element of R". This theorem gives a generalization of the above standard result. Also, invertible matrices over some special semirings have been studied. Characterizations of invertible matrices over the following semirings were given :

(1) The Boolean algebra of 2 elements [2],

(2) Boolean algebras of sets [3],

(3) commutative idempotent semirings with 0,1 [4].

Semirings in (2) and (3) are generalizations of semirings in (1) and (2), respectively.

The aim of this research is to study invertible matrices over the following semirings : Boolean semirings, additively inverse semirings and semifields. (All semirings that we mentioned are assumed to be commutative and have 0,1.) Semirings of the first type are a generalization of semirings in (3), those of the second are a generalization of commutative rings with identity and those of the third are a generalization of fields.

The preliminaries and notation used for this work are given in Chapter I. Necessary and sufficient conditions for any square matrix over a Boolean semiring, over an additively inverse semiring

and over a semifield to be invertible are given in Chapter II, Chapter III and Chapter IV, respectively.