CHAPTER I

INTRODUCTION

A graph G is an ordered pair $(V, \mathcal{E})$, where V is a finite non-empty set, and $\mathcal{E}$ is a set of 2-subsets of V. Elements of V and $\mathcal{E}$ will be referred to as vertices and edges respectively. A graph $G = (V, \mathcal{E})$ is called a bipartite graph if V can be partitioned into two sets V_1 and V_2 such that for every edge E, the cardinalities of the sets $E \cap V_1$ and $E \cap V_2$ are 1. Such an ordered partition (V_1, V_2) is called a bipartition of V.

The degree of a vertex v in a graph G, denoted by $d_G(v)$, is the number of edges that contain v. Given a bipartite graph $G = (V, \mathcal{E})$, where the bipartition of V consists of $V_1 = \{v_1, \ldots, v_{n_1}\}$ and $V_2 = \{v_{n_1+1}, \ldots, v_{n_1+n_2}\}$. Then the degree sequence of G is the partitioned finite sequence

$$\delta_G = (d_G(v_1), \ldots, d_G(v_{n_1}); d_G(v_{n_1+1}), \ldots, d_G(v_{n_1+n_2})).$$

A characterization of degree sequences of bipartite graphs is known. It can be found in [1] (see Theorem1, page 102).

In the definition of a graph, if we take $\mathcal{E}$ to be a set of 3-subsets of V, we obtain what is called a 3-uniform hypergraph. By a 3-partite 3-uniform hypergraph, we mean a 3-uniform hypergraph $H = (V, \mathcal{E})$ in which V can be partitioned into three sets V_1, V_2 and V_3 such that for every edge E, the cardinalities of the sets $E \cap V_1$, $E \cap V_2$ and $E \cap V_3$ are 1.

In Chapter III, we provide a characterization of degree sequences of 3-partite 3-uniform hypergraphs. Chapter II deals with relevant concepts and results.