On Integer Additive Set-Valuations of Finite Jaco Graphs

Research Article

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Abstract. Let X denote a set of non-negative integers and $\mathcal{P}(X)$ be its power set. An integer additive set-labeling (IASL) of a graph G is an injective set-valued function $f : V(G) \to \mathcal{P}(X) - \{\emptyset\}$ where induced function $f^+ : E(G) \to \mathcal{P}(X) - \{\emptyset\}$ is defined by $f^+(uv) = f(u) + f(v)$, where $f(u) + f(v)$ is the sumset of $f(u)$ and $f(v)$. Let $f(x) = mx + c$, $m \in \mathbb{N}$, $c \in N_0$. A finite linear Jaco graph, denoted by $J_n(f(x))$, is a directed graph with vertex set $\{v_i : i \in \mathbb{N}\}$ such that (v_i, v_j) is an arc of $J_n(f(x))$ if and only if $f(i) + i - d^-(v_j) \geq j$. In this paper, we discuss the admissibility of different types of integer additive set-labeling by finite linear Jaco graphs.

Keywords. Integer additive set-labeled graphs; Weak integer additive set-labeled graphs; Arithmetic integer additive set-labeled graphs; Dispensing number of a graph; Finite linear Jaco graph

MSC. 05C78; 05C75; 05C62

Received: February 29, 2016   **Accepted:** April 18, 2016

1. Introduction

For all terms and definitions, not defined specifically in this paper, we refer to [2, 3, 5, 25]. Unless mentioned otherwise, all graphs considered here are simple, finite, non-trivial and connected.

Motivated by several problems in social interactions, the notion of the *set-valuation* or *set-labeling* of graphs was introduced in [1] as an injective set assignment of G in which the vertices of G are labeled by the subsets of a ground set X according certain rules. A graph with