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On Recent Advances in Divisor Cordial Labeling of Graphs

Vishally Sharma, A. Parthiban*

Department of Mathematics, Lovely Professional University, Punjab, India

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Abstract An assignment of intergers to the vertices of a graph $\bar{G}$ subject to certain constraints is called a vertex labeling of $\bar{G}$. Different types of graph labeling techniques are used in the field of coding theory, cryptography, radar, missile guidance, x-ray crystallography etc. A DCL of $\bar{G}$ is a bijective function $\bar{f}$ from node set $\bar{V}$ of $\bar{G}$ to $\{1, 2, 3, ..., |\bar{V}|\}$ such that for each edge rs, we allot 1 if $\bar{f}(r)$ divides $\bar{f}(s)$ or $\bar{f}(s)$ divides $\bar{f}(r)$ & 0 otherwise, then the absolute difference between the number of edges having 1 & the number of edges having 0 do not exceed 1, i.e., $|e_{\bar{f}}(0) - e_{\bar{f}}(1)| \leq 1$. If $\bar{G}$ permits a DCL, then it is called a DCG. A complete graph K_n, is a graph on n nodes in which any 2 nodes are adjacent and lilly graph I_n is formed by $2K_{1,n}$ joining $2P_n, n \geq 2$ sharing a common node. i.e., $I_n = 2K_{1,n} + 2P_n$, where $K_{1,n}$ is a complete bipartite graph & P_n is a path on n nodes. In this paper, we propose an interesting conjecture concerning DCL for a given $\bar{G}$, besides, discussing certain general results concerning DCL of complete graph K_n-related graphs. We also prove that I_n admits a DCL for all $n \geq 2$. Further, we establish the DCL of some I_n-related graphs in the context of some graph operations such as duplication of a node by an edge, node by a node, extension of a node by a node, switching of a node, degree splitting graph, & barycentric subdivision of the given $\bar{G}$.

Keywords Graph Labeling, DCL, Lilly Graph

1 Introduction

By $\bar{G}$, we denote a simple, finite, & undirected graph with node set $\bar{V}$ & edge set $\bar{E}$. An allocation of labels to nodes or edges or sometimes both, under some constraints is called as graph labeling. Graph labeling is a close association of graph theory & number theory. Being interdisciplinary, graph labeling is attracting the attention of numerous researchers and software developers. For number theory and graph theory related terms, we refer to [1] and [4], respectively. For further study on various graph labeling problems, see [3]. We use DCL and DCG to denote divisor cordial labeling and divisor cordial graph, respectively.

Cahit [2] introduced the idea of cordial labeling. Sundaram et al. [9] coined the notion of prime cordial labeling. The concept of DCL was given by Vartharajan et al. [10]. Vartharajan et al. [11] proved some general results especially the DCL of full binary tree.

Definition 1. [10] A DCL of $\bar{G}$ having $\bar{V}$ is a bijection $\bar{f}$ from $\bar{V}$ to $\{1, 2, 3, ..., |\bar{V}|\}$ such that each edge rs is alloted 1 if $\bar{f}(r)/\bar{f}(s)$ or $\bar{f}(s)/\bar{f}(r)$ & 0 otherwise, then $|e_{\bar{f}}(0) - e_{\bar{f}}(1)| \leq 1$. If $\bar{G}$ admits a DCL, then it is said to be a DCG.

For further results on DCL, refer to [3, 6, 10, 11].

2 Main Results

This section is devoted to derive some general results on DCG. Also, DCL of lilly graph in the context of different graph operations has been explored.

2.1 DCL of K_n Related Graphs

Let $N(u)$ and $N[u]$ represent the open and closed neighbourhood of u, respectively. In this section, we deal with K_n