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Some Recent Advances in Prime Cordial Labeling of Graphs

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Abstract

This paper deals with the prime cordial labeling of graphs obtained by performing graph operations namely, corona product and extension of vertex, on some well-known graphs. Further, certain interesting conjectures and open problems concerning prime cordial labeling are also formulated.

Keywords: Prime cordial labeling, Corona product, Extension of vertex.

1. Introduction

In this article, all of the graphs are simple, finite, connected, and undirected. Burton [2] and Hararay [5] are the names of the books we refer for number theory and graph theory respectively. Gallian [4] is complex survey on the various graph labeling problems with considerable bibliography. For definitions and other related literature we refer to [1, 6-10]. Cahit [3] pioneered the idea of cordial labeling. We refer to prime cordial labeling and prime cordial graph as “pcl” and “pcg” respectively, throughout this article.

Definition 1.1. [7] A pcl of a graph H^* having node set V_H^* is a one-one, onto map $g^*: V_H^* \rightarrow \{1, 2, 3, \dots, |V_H^*|\}$ so that each edge u_1v_1 is assigned the label 1 when $GCD(g^*(u_1), g^*(v_1)) = 1$ and 0 if $GCD(g^*(u_1), g^*(v_1)) > 1$, then the modulus of difference between the count of edges having labels 0 and 1 is at the most 1 i.e; $|e_{g^*}(0) - e_{g^*}(1)| \leq 1$. A graph is considered a pcg if it allows a pcl.

Note. One can easily recall that in graph theory the terms node and vertex, node set and vertex set are interchangeable.

2. Main Results

In this section, we discuss certain advanced results on the pcl of graphs.

2.1 PCL in the Context of Corona Product of Graphs

In this section, we accomplish some results on prime cordial labeling in the context of corona product of graphs.

Definition 2.1.1. [1] If H^* is a graph of order r , then the corona product of H^* with another graph K^* , represented by $H^* \circ K^*$ is a graph acquired by considering one copy of H^* and r copies of K^* thereby connecting the r^{th} node of H^* by an edge to each node in the r^{th} copy of K^* .

Theorem 2.1.2. Corona product of path P_m with K_1 denoted by $P_m \circ K_1$ permits a pcl.

Proof. Let P_m be the given path having node set $V^s(P_m) = \{p_1, p_2, \dots, p_m\}$ and edge set $E^s(P_m) = \{p_i p_{i+1} : 1 \leq i \leq m-1\}$. Let G^s represent the graph acquired by considering corona product of P_m with K_1 having node set $V^s(G^s) = V^s(P_m) \cup \{p'_1, p'_2, \dots, p'_m\}$ and edge set $E^s(G^s) = E(P_m) \cup \{p_i p'_i : 1 \leq i \leq m\}$.