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Path Related Cup Cordial Graphs

KEYWORDS: V cordial labeling, V cordial graph.

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ABSTRACT *Let G = (V,E) be a graph with p vertices and q edges. A Cup (V) cordial labeling of a Graph G with vertex set V is a bijection from V to {0,1} such that if each edge uv is assigned the label*

$$f(uv)=\begin{cases}0 & if\ f(u)=f(v)=0\\ 1 & otherwise\end{cases}$$

with the condition the number of vertices labeled with 0 and the number of vertices labeled with 1 differ by at most 1 and the number of edges labeled with 0 and the number of edges labeled with 1 differ by at most 1.
The graph that admits a V cordial labeling is called a V cordial graph (CCG). In this paper, we proved that Path Pn, Fan Fn(n : even), and Pn K1 are V cordial graphs.

1. Introduction :

A graph G is a finite non-empty set of objects called vertices together with a set of unordered pairs of distinct vertices of G which is called edges. Each pair e = {uv} of vertices in E is called an edge or a line of G. In this paper , we proved that Path P_n, Fan F_n(n : even) and $P_n \odot K_1$ are V cordial graphs.

2. Preliminaries :

Let G = (V,E) be a graph with p vertices and q edges. A V cordial labeling of a Graph G with vertex set V is a bijection from V to {0,1} such that if each edge uv is assigned the label

$$f(uv)=\begin{cases}0 & if\ f(u)=f(v)=0\\ 1 & otherwise\end{cases}$$

The graph that admits a V cordial labeling is called a V cordial graph (CCG). We proved that Path P_n, Fan F_n(n : even) and $P_n \odot K_1$ are V cordial graphs.

Definition 2.1 - Path

A graph with sequence of vertices u_1, u_2 …. u_n such that successive vertices are joined with an edge. P_n is a path of length n-1.

Definition 2.2 - Comb

It is a graph obtained from a path P_n by joining a pendent vertex to each vertices of P_n, it is denoted by $P_n \odot K_1$

Definition 2.3 - Fan

It is a graph obtained from a path P_n by joining each vertices of P_n to a pendent

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with the condition the number of vertices labeled with 0 and the number of vertices labeled with 1 differ by at most 1 and the number of edges labeled with 0 and the number of edges labeled with 1 differ by at most 1.

Proof

Let $V(P_n)=\{u_i:1\le i\le n\}$ and

$$E(P_n)=\{(u_iu_{i+1}):1\le i\le n-1\}$$

Define $f:V(P_n)\to\{0,1\}$

The vertex labeling are

Case 1: When n is even

$$f(u_i)=\begin{cases}1 & 1\le i\le \frac{n}{2}\\ 0 & \frac{n}{2}+1\le i\le n\end{cases}$$

The induced edge labeling are

$$f^*(u_iu_{i+1})=\begin{cases}1 & 1\le i\le \frac{n}{2}\\ 0 & \frac{n}{2}+1\le i\le n-1\end{cases}$$

Here $V_0(f)=V_1(f)$ and

$$e_0(f)+1=e_1(f)$$

It satisfies the condition

$|V_0(f)-V_1(f)|\le 1$ and

$$|e_0(f)-e_1(f)|\le 1$$

Case 2: When n is odd

$$f(u_i)=\begin{cases}1 & 1\le i\le \frac{n}{2}-1\\ 0 & \frac{n}{2}\le i\le n\end{cases}$$

The induced edge labeling are

vertex, it is denoted by

$F_n = P_m + k_1$

3. Main results :

Theorem 3.1

Path P_n is a V cordial graph.

$$f^*(u_iu_{i+1})=\begin{cases}1 & 1\le i\le \frac{n}{2}-1\\ 0 & \frac{n}{2}\le i\le n-1\end{cases}$$

Here $V_0(f)+1=V_1(f)$ and

$$e_0(f)=e_1(f)$$

It satisfies the condition

$|V_0(f)-V_1(f)|\le 1$ and

$$|e_0(f)-e_1(f)|\le 1$$

Hence, P_n is V cordial graph.

For example, P_8 and P_9 are V cordial graphs as shown in the figure 3.2 and figure 3.3.

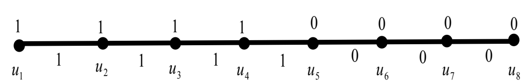

Figure 3.2

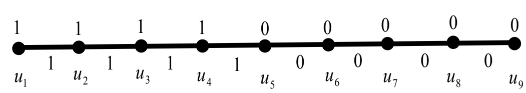

Figure 3.3

Theorem 3.4

Fan F_n (n : even) is a V cordial graph.

Proof

Let $V(F_n)=\{u,u_i:1\le i\le n\}$ and

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$E(F_n) = \{(uu_i) : 1 \le i \le n\}$

Define $f : V(F_n) \to \{0,1\}$

The vertex labeling are

$f(u) = 0$

$$f(u_i) = \begin{cases} 0 & 1 \le i \le \frac{n}{2} \\ 1 & \frac{n}{2}+1 \le i \le n \end{cases}$$

The induced edge labeling are

$$f^*(uu_i) = \begin{cases} 0 & 1 \le i \le \frac{n}{2} \\ 1 & \frac{n}{2}+1 \le i \le n \end{cases}$$

Here $V_0(f)+1 = V_1(f)$ and

$e_0(f) = e_1(f)+1$

It satisfies the condition

$|V_0(f) - V_1(f)| \le 1$ and

$|e_0(f) - e_1(f)| \le 1$

Hence, F_n (n : even) is a V cordial graph

For example, F_4, and F_6 are V cordial graphs as shown in the figure 3.5 and figure 3.6

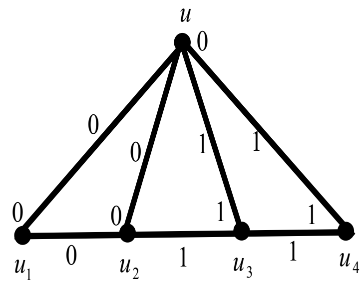

Figure 3.5

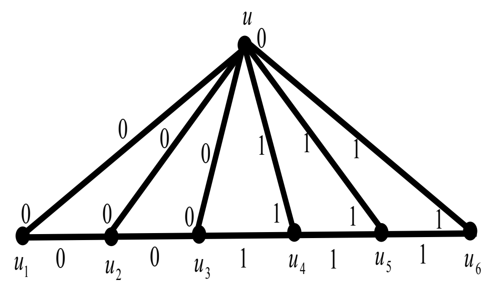

Figure 3.6

Theorem 3.7

Comb $P_n \odot K_1$ is V cordial.

Proof

Let G be $[P_n \odot K_1]$

Let $V(G) = \{u_i, v_i : 1 \le i \le n\}$ and

$E(G) = \{[(u_i u_{i+1}) : 1 \le i \le n-1] \cup [(u_i v_i) : 1 \le i \le n]\}$

Define $f : V(G) \to \{0,1\}$

The vertex labeling are

$f(u_i) = 0 \quad 1 \le i \le n$

$f(v_i) = 1 \quad 1 \le i \le n$

The induced edge labeling are

$f^*(u_i u_{i+1}) = 0 \quad 1 \le i \le n-1$

$f^*(u_i v_i) = 1 \quad 1 \le i \le n$

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Here $V_0(f)=V_1(f)$ and

$$e_0(f)+1=e_1(f)$$

It satisfies the condition

$$|V_0(f)-V_1(f)|\le 1 \text{ and}$$

$$|e_0(f)-e_1(f)|\le 1$$

Hence, the graph $P_n \odot K_1$ is V cordial.

For example, $P_4 \odot K_1$ and $P_5 \odot K_1$ are V cordial graphs as shown in the figure 3.8 and figure 3.9.

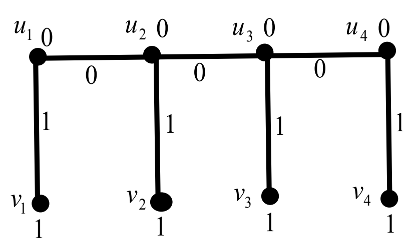

Figure 3.8

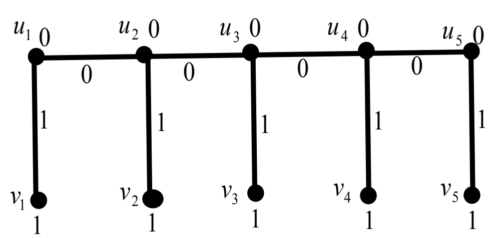

Figure 3.9

REFERENCE 1. J. A. Gallian, A Dynamic Survey of graph labeling, The Electronic journal of Coim-binotorics, 6(2001), #DS6. | 2. F. Harary, Graph Theory, Addition - Wesley publishing company Inc, USA, 1969. | 3. A.Nellai Murugan and V.Baby Suganya, Cordial labeling of path related splitted graphs, Indian Journal of Applied Research ISSN 2249 –555X,Vol.4, Issue 3, Mar. 2014, ISSN 2249 – 555X , PP 1-8. | 4. A.Nellai Murugan and M. Taj Nisha, A study on divisor cordial labelling of star attached paths and cycles, Indian Journal of Research ISSN 2250 –1991,Vol.3, Issue 3, Mar. 2014, PP 12-17. | 5. A.Nellai Murugan and V.Brinda Devi, A study on path related divisor cordial graphs, International Journal of Scientific Research, ISSN 2277–8179,Vol.3, Issue 4, April. 2014, PP 286 - 291. | 6. A.Nellai Murugan and A Meenakshi Sundari, On Cordial Graphs, International Journal of Scientific Research, ISSN 2277–8179,Vol.3, Issue 7 ,July. 2014, PP 54-55. |