A STUDY ON CORDIAL LABELING OF GRAPHS

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ABSTRACT
In this topic assortment projects in graph theory, the most part for rocket controlling code, design exact radar compose codes and convolution codes with most appropriate auto correlation residences. Labeling performs crucial stage within observe of correspondence organize and we decide ideal circuit formats.

Key words: Labeling, double star graph, difference cordial labeling.

1. INTRODUCTION

Graph fills in as numerical models of numerous solid genuine issues. Graph gives pictorial representation to the relations between a physical circumstance including discrete articles.

Graph function mathematical fashions of many concrete actual world troubles. As an occurrence there exist issues in material science, science, correspondences, innovation, workstation innovation, hereditary qualities, brain research, humanism, financial matters and etymology which might be figured as inconveniences in diagram hypothesis. Likewise, numerous branches of arithmetic alongside bunch hypothesis, grid hypothesis, numerical examination, likelihood, topology and combinatorial have their connections with graph theory.

Some scientific riddles and certain issues of viable nature have been instrumental for the improvement of different themes in chart hypothesis and have been explained by diagram theoretic strategies. Issues of direct programming and activities research, for example, oceanic movement issue can be handled by the hypothesis of streams in systems. Office administration issues, for example, the faculty task an issue
can be managed by coordinating in diagrams. The kirkman school young lady issue and the booking issue are Illustrations of issues which can be fathomed by diagram colorings [1]–[4].

The investigation of simplified complex can be related with the investigation of diagram hypothesis. Numerous all the more such issues can be added to the above rundown.

Theorem 1.1

Path P_n admits sum cordial labeling.

Proof:

Let $G = P_n = v_1v_2v_3 \ldots\ldots\ldots\ldots. v_n$ be a path of length n with n vertices and n -1 edges.

Specify $g: V(G) \rightarrow \{0, 1\}$,

Examine the subsequent subdivision

Subdivision -1: once n = 4k

P_n: $v_1v_2v_3 \ldots\ldots\ldots\ldots. v_{4k}$ is a path of length 4k with 4k vertices and 4k – 1 edges.

$g(v_{4i-3}) = 1$, i lies between 1 to k

$g(v_{4i-2}) = 1, \quad 1 \le i \le k$

$g(v_{4i-1}) = 0$

$g(v_{4i}) = 0$

Subdivision -2: Once n = 4k - 1

P_n: $v_1v_2v_3 \ldots\ldots\ldots\ldots. v_{4k-1}$ is a path of length 4k - 1 with 4k - 1 vertices and 4k – 2 edges.

$g(v_{4i-3}) = 1$

$g(v_{4i-2}) = 1$

$g(v_{4i-1}) = 0$ i lies between 1 to k

$g(v_{4i}) = 0 \quad 1 \le i \le k - 1$

Subdivision -3: Once n = 4k + 1

P_n: $v_1v_2v_3 \ldots\ldots\ldots\ldots. v_{4k+1}$ is a path of length 4k + 1 with 4k + 1 vertices and 4k edges.[5], [6]

$g(v_{4i-3}) = 1 \quad 1 \le i \le k + 1$

$g(v_{4i-2}) = 1$,

$g(v_{4i-1}) = 0$

$g(v_{4i}) = 0$ i lies between 1 to k

Subdivision -4: Once n = 4k + 2

P_n: $v_1v_2v_3 \ldots\ldots\ldots\ldots. v_{4k+2}$ is a path of length 4k + 2 with 4k + 2 vertices and 4k - 1 edges

$g(v_1) = 1$

$g(v_2) = 1$

$g(v_3) = 0$

$g(v_4) = 0$

$g(v_5) = 1$

$g(v_6) = 0$

$g(v_{4i-1}) = 1$

$g(v_{4i}) = 1$

$g(v_{4i+1}) = 0 \quad 2 \le i \le k$

$g(v_{4i+2}) = 0 \quad 2 \le i \le k$

$|v_g(0) - v_g(1)| \le 1$ and $|e_g(0) - e_g(1)| \le 1$

PathP_n sum cordial labeling (see Figures 1 and 2).

Example 1.1

Paths P_9 and P_{14}

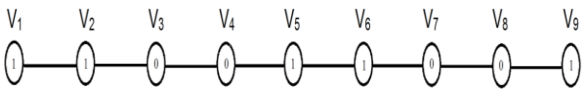

Figure 1: Paths P_9

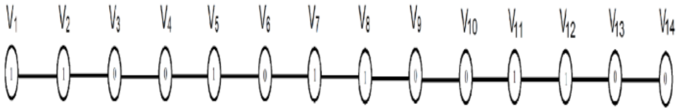

Figure 2: Paths P_{14}

Theorem 1.2

Double star graph $K_{1,n,n}$is a sum cordial labeling.

Proof

Let $u, u_1, u_2, \ldots\ldots\ldots, u_n, v, v_1, v_2, \ldots\ldots v_n$ be the vertices of the double star $K_{1,n,n}$.$M = K_{1,n,n}$

$|V(M)| = 2n + 1$ and $|E(M)| = 2n$

Specify $g: V(G) \to \{0, 1\}$

$g(u) = 1$

$g(u_i) = 1$, i lies between 1 and n

$g(v_i) = 0$, i lies between 1 and n

$|v_g(0) - v_g(1)| \le 1$ and $|e_g(0) - e_g(1)| \le 1$

Double star $K_{1,n,n}$ sum cordial labeling (see Figures 3 and 4).

Example 1.2

Double star graph $K_{1,5,5}$ and $K_{1,8,8}$

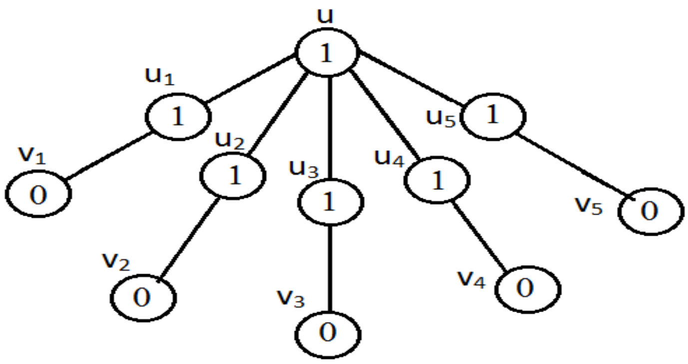

Figure 3: Double stars $K_{1,5,5}$

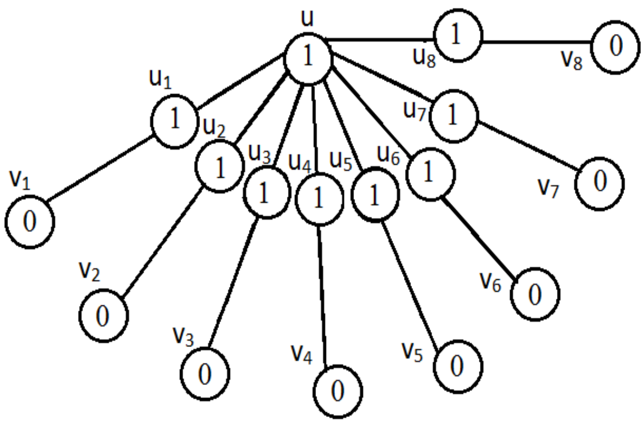

Figure 4: Double stars $K_{1,8,8}$

Theorem 1.3

Wheel W_n is difference cordial graph.

Proof:

Wn = Cn + K1 , where Cn is the cycle u1,u2,u3………un and V(K1) = {u}

Specify g: $V(W_n) \rightarrow \{1,2,3,\ldots\ldots.,n+1\}$

$g(u) = 0$,

$g(u_j) = j+1$, j lie between 1 to n

$e_g(0) = n = e_g(1)$

W_n is difference cordial graph (see Figure 5).

Example 1.3

WheelW_8

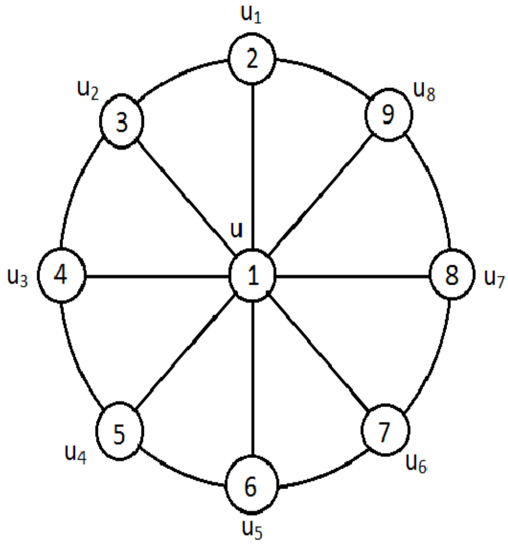

Figure 5: Wheel W_8

Theorem 1.4

Friendship graph F_n is product cordial.

Proof:

$F_n$be the friendship graph with n copies of cycle c_3.

v' be an apex vertex

$v_1, v_2, v_3, \ldots\ldots\ldots .v_{2n}$ be the other vertices

and $e_1, e_2, e_3, \ldots\ldots, e_{3n}$ be the edges of F_n

Satisfy m: $V(F_n) \rightarrow \{0,1\}$.

Examine the subsequent cases.

Case 1:

For n = 2,4,6…

$m(v_i) = 0$, i lie between 1 to n

$m(v_i) = 1, i > n$

$m(v') = 1$

$v_m(0) = v_m(1) - 1 = n$,

$e_m(0) = e_m(1) = \left\lceil \frac{3n}{2} \right\rceil$

$|v_f(0) - v_m(1)| \leq 1$ and $|e_m(0) - e_m(1)| \leq 1$.

Case 2:

For n = 1,3,5…

$m(v_i) = 0$, i lie between 1 to n

$m(v_i) = 1$, $i > n$

$m(v') = 1$

$v_m(0) + 1 = v_m(1) = n + 1$,

$e_m(0) = e_m(1) + 1 = \left\lceil \frac{3n}{2} \right\rceil$.

$|v_m(0) - v_m(1)| \leq 1$ and $|e_m(0) - e_m(1)| \leq 1$.

F_n could be a product cordial graph (see Figure 6).

Example 1.4

Friendship F_7

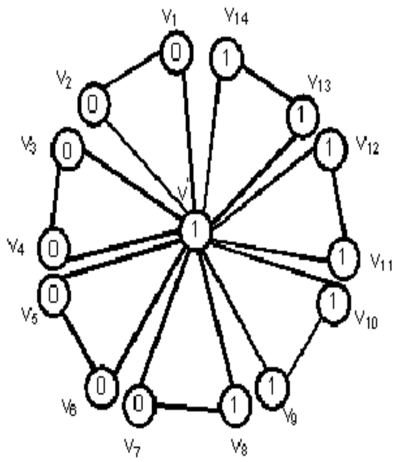

Figure 6: Friendship F_7

Theorem 1.5

Flower graph Fl_n is a divisor cordial graph.

Proof:

v be the apex,

$v_1,v_2,\ldots\ldots,v_n$ be the vertices of degree 4

and $u_1,u_2,\ldots\ldots,u_n$ be the vertices of degree 2 of Fl_n.

$|V(Fl_n)| = 2n + 1$ and $|E(Fl_n)| = 4n$.

Examine vertex labeling

$m : V(M) \to \{1,2,\ldots\ldots\ldots,2n+1\}$.

$m(v) = 1$,

$m(v_1) = 2$,

$m(u_1) = 3$,

$m(v_{1+i}) = 5 + 2(i-1)$; i lie between 1 to $n-1$

$m(u_{1+i}) = 4 + 2(i-1)$; i lie between 1 to $n-1$

$e_m(0) = 2n = e_m(1)$.

$|e_m(0) - e_m(1)| \leq 1$.

Flower graph Fl_n is a divisor cordial graph (see Figure 7).

Example 1.5

Flower Fl_8

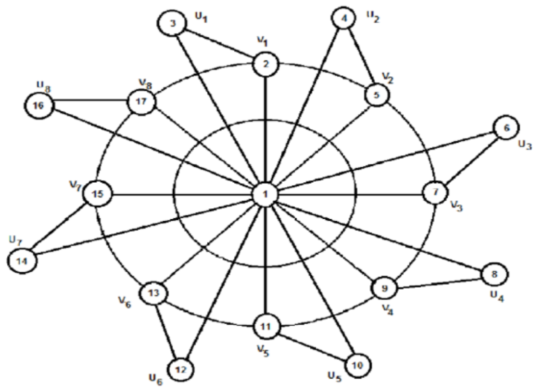

Figure 7: Flower Fl_8

Theorem 1.6

All pyramids are difference cordial

Proof:

Let $a_{ij}(1 \leq j \leq i)$ be the vertices in the i^{th} row.

Examine the vertices of the pyramid $Py_n$to the set $\{ 1,2,3,\ldots\ldots \frac{n(n+1)}{2} \}$ by

$g(a_{ij}) = \frac{1}{2}(j-1)(2n-j) + i$, i lies between j to n

$e_g(0) = e_g(1) = \frac{n(n-1)}{2}$

g is a difference labeling of the pyramid (see Figure 8).

Example 1.6.

pyramid Py_7

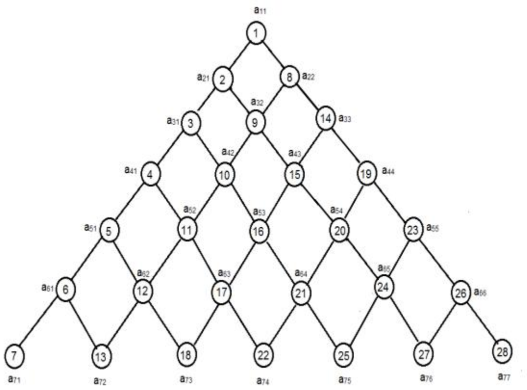

Figure 8: Pyramid Py_7

2. CONCLUSION

Exciting to investigate graph families admits specific sort of cordial labeling. Consequently researcher investigates the sum, difference, product and divisor cordial labeling of graphs [5]–[9].

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