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Path Relatively Prime Cordial Graph

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***Abstract*— Let $G = (V,G)$ be a graph with p vertices and q edges. A Analytic Mean Cordial Labeling of a Graph G with vertex set is a bijection from $v = \{1,2 \ldots..p\}$.The induced edge labelling are defined by $f(u,v) = 0$ if either $f(u)$ divides $f(v)$ (or) $f(v)$ divides $f(u)$ one otherwise and if any one of the vertex label is 1, the induced edge label is 0.**

The graph that admits a Relatively Prime Cordial Graph is called Relatively Prime Cordial Graph. In this paper, we proved that path related graphs P_n , $P_n \odot K_1$, $Pn^2, P_2: S_n, P_n + K_1$ are Relatively Prime Cordial Graph.

***Index Terms*— Relatively Prime Cordial Graph, Relatively Prime Cordial Labeling.**

I. 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 $e = \{u,v\}$ of vertices in E is called an edge or a line of G in which e is said to join u and v. We write $e = uv$ and say that u and v are adjacent vertices (sometimes denoted as $u\ adj\ v$); vertex u and the edge e are incident with each other, as are v and e. If two distinct edges $e_1$and e_2 are incident with a common vertex, then they are called $adjacent\ edges$. A graph with p vertices and q edges is called $(p,q) -$ graph. In this paper,we proved that path related graphs P_n,$P_n \odot K_1$, $Pn^2, P_2: S_n, P_n + K_1$ are Relatively Prime Cordial Graph. For graph theory terminology, we follow [2].

II.PRELIMINARIES

Let $G = (V,G)$ be a graph with p vertices and q edges. A Analytic Mean Cordial Labeling of a Graph G with vertex set is a bijection from $v = \{1,2 \ldots..p\}$.The induced edge labelling are defined by $f(u,v) = 0$ if either $f(u)$ divides $f(v)$ (or) $f(v)$ divides $f(u)$ one otherwise and if any one of the vertex label is 1, the induced edge label is 0.

The graph that admits a Relatively Prime Cordial Graph is called Relatively Prime Cordial Graph. In this paper, we proved that path related graphs P_n , $P_n \odot K_1$, Pn^2, $P_2: S_n, P_n + K_1$ are Relatively Prime Cordial Graph.

Definition: 2.1 P_n is a path of length $n - 1$.

Definition: 2.2 The Corona $= G_1 \odot G_2$ of two graph G_1 and G_2 is defined as the graph G obtained by taking one copy of G_1 (which has P_1 points) and P_1 copies of G_2 and joining the i^{th} point of G_1 to every point in the i^{th}copy of G_2 ,The graph $P_n \odot K_1$is called a $comb$.

Definition: 2.3

(Pn^2) is a path of length n-1 of twice.

Definition: 2.4

Star of length one is joined with every vertex of a path Pn through an edge. It is denoted by $P_2 : S_n$

Definition: 2.5

The join of G_1 and G_2 is the graph G = $G_1 + G_2$ with vertex set V = V_1 U V_2 and edge set E = E_1 U E_2 U{UV :u ϵ V_1,v ϵ V_2}.The graphP_n+K_1 is called a Fan.

II. MAIN RESULTS

THEOREM: 3.1

Path P_n is Relatively Prime Cordial Graph.

Proof:

Let G be P_n

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

Let $E(G) = \{(u_i u_{i+1}) : 1 \le i \le n-1\}$

$Define\ f : V(G) \to \{1,2, \ldots. p\}$

The vertex labeling are

When $n = even$

$$f(u_i) = 2i \qquad 1 \le i \le \frac{n}{2}$$

$$f(u_{n+1-i}) = 2i - 1 \qquad 1 \le i \le \frac{n}{2}$$

When $n = odd$

$$f(u_i) = 2i \qquad 1 \le i \le \frac{n-1}{2}$$

$$f(u_{n+1-i}) = 2i - 1 \quad 1 \le i \le \frac{n+1}{2}$$

The induced edge labeling are,

When $n = even$

$$f^*(u_{n-1}u_n) = 0$$

$$f^*(u_i u_{i+1}) = 0 \qquad 1 \le i \le \frac{n-2}{2}$$

$$f^*(u_i u_{i+1}) = 1 \qquad \frac{n}{2} \le i \le n-2$$

When $n = odd$

$$f^*(u_{n-1}u_n) = 0$$

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

$f^*(u_iu_{i+1}) = 1 \qquad \frac{n-1}{2} \le i \le n-2$

Here, When $n = 2m, m > 1$

$e_f(0) = m$

$e_f(1) = m - 1$

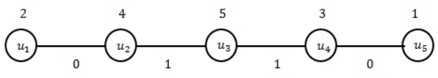
$n = 2m + 1$, m>1

$e_f(0) = m = e_f(1)$

$| e_f(1) - e_f(0) | \lesssim 1$

Hence , Path P_n is Relatively Prime Cordial Graph.

For example, The Relatively Prime Cordial Graph of P_5 are shown in the figure



$figure$ 3.1

THEOREM: 3.2

$P_n \odot K_1$ is a Relatively Prime Cordial Graph.

Proof:

Let G be $P_n \odot K_1$

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

Let

$E(G) = \{ [(u_iu_{i+1}) : 1 \le i \le n - 1] \, U \, [(u_iv_i) : 1 \le i \le n] \}$

$Define \ f : V(G) \rightarrow \{1,2, \ldots . . p\}$

The vertex labeling are ,

$f(u_i) = 2i \qquad 1 \le i \le n$

$f(v_i) = 2i - 1 \qquad 1 \le i \le n$

The induced edge labeling are,

$f^*(u_iu_{i+1}) = 0 \qquad 1 \le i \le n-1$

$f^*(u_1v_1) = 0$

$f^*(u_iv_i) = 1 \qquad 2 \le i \le n$

Here, When $n = m, m > 1$

$e_f(0) = m$

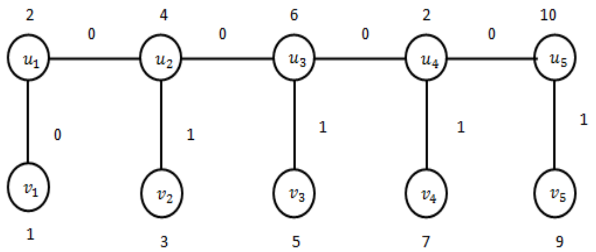
$e_f(1) = m - 1$

$| e_f(1) - e_f(0) | \lesssim 1$

Hence, $P_n \odot K_1$ is Relatively Prime Cordial Graph.

For example, Relatively Prime Cordial Graph,

$P_5 \odot K_1$ are shown in the fig



$figure$ 3.2

THEOREM: 3.3

Graph Pn^2 is a Relatively Prime Cordial Graph.

Proof:

Let G be Pn^2 Graph

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

Let

$E(G) = \{ [(u_iu_{i+1}) : 1 \le i \le n-1] \, U \, [(u_iu_{i+2}) :$

$Define \ f : V(G) \rightarrow \{1,2, \ldots . . p\}$

Vertex Labeling:

When $n = even$

$f(u_i) = 2i \qquad 1 \le i \le \frac{n}{2}$

$f(u_i) = 2i - 1 \qquad \frac{n+2}{2} \le i \le n$

When $n = odd$

$f(u_i) = 2i \qquad 1 \le i \le \frac{n-1}{2}$

$f(u_{n+1-i}) = 2i - 1 \qquad 1 \le i \le \frac{n+1}{2}$

Edge Labeling:

When $n = even$

$f^*(u_nu_{n-1}) = 0$

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

$f^*(u_iu_{i+1}) = 1 \qquad \frac{n}{2} \le i \le n-2$

$f^*(u_{n-2}u_n) = 0$

$f^*(u_iu_{i+2}) = 0 \qquad 1 \le i \le \frac{n-4}{2}$

$f^*(u_iu_{i+2}) = 1 \qquad \frac{n-2}{2} \le i \le n-2$

When $n = odd$

$f^*(u_iu_{i+1}) = 0 \qquad 1 \le i \le \frac{n-3}{2}$

$f^*(u_iu_{i+1}) = 1 \qquad \frac{n-1}{2} \le i \le n-2$

$f^*(u_{n-1}u_n) = 0$

$f^*(u_{n-2}u_n) = 0$

$f^*(u_iu_{i+2}) = 0 \qquad 1 \le i \le \frac{n-3}{2}$

$f^*(u_iu_{i+2}) = 1 \qquad \frac{n-1}{2} \le i \le n-3$

When $n = 2m + 1, m > 1$

$e_f(0) = 2m - 1$

$e_f(1) = 2m$

Hence, Path $P5^2$ is a Relatively Prime Cordial Graph.

For example, The Relatively Prime Cordial Graph of $P5^2$ are shown in the figure

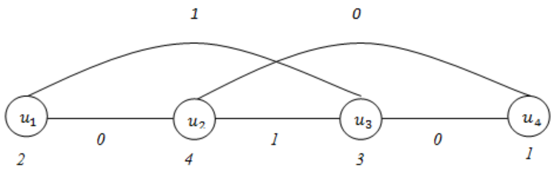


figure 3.3

THEOREM: 3.4

Graph $(P_2 : S_n)$ is a Relatively Prime Cordial Graph.

Proof:

Let

$V\ (p_2 : s_n)\ =\ \{\ u_{i,}\ :\ 1\ \leq\ i\ \leq\ 4; u_{1i,} u_{2i,} 1 \leq i \leq n\ \}$

Let

$E(p_2 : s_n) = \{\ [\ u_3 u_4\ ] U : [\ u_1 u_4\ ] U [\ u_2 u_3\ ] U [\ u_1 u_{1i}\ : 1 \leq i \leq n] U\ [\ u_2 u_{2i}\ : 1 \leq i \leq n] \}$

$Define\ \ f\ :\ V\ (G)\ \rightarrow\ \{1,2, \ldots . . p\}$

Vertex Labeling:

$f(u_i) = i \qquad 1 \leq i \leq 4$

$f(u_{1i}) \ = 2i + 4 \qquad 1 \leq i \leq n$

$f(u_{2i}) \ = 2i + 3 \qquad 1 \leq i \leq n$

Edge labeling:

$f^*(u_i u_{i+1}) = 1 \quad 2 \leq i \leq 3$

$f^*(u_1 u_4) = 0$

$f^*(u_1 u_{1i}) = 0 \qquad 1 \leq i \leq n$

$f^*(u_2 u_{2i}) = 1 \qquad 1 \leq i \leq n$

Here, When $n\ = m$

$e_f(0) =\ n + 1$

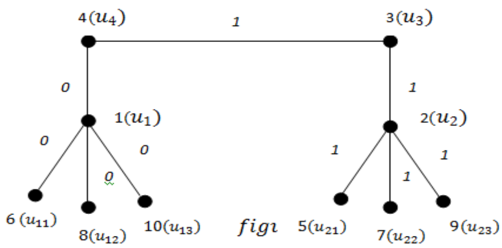
$e_f(1)\ =\ n + 2$

$e_f(0) + 1\ =\ e_f(1)$

$| e_f(1) - e_f(0) | \leq 1$

Hence, $P_2 : S_n$ is Relatively Prime Cordial Graph.

For example, The Relatively Prime Cordial Graph of $P_2 : S_n$ are shown in the figure



figı

THEOREM: 3.5

Graph $P_n + K_1$ is Relatively Prime Cordial graph.

Proof:

Let $p_n + k_1, n > 1$

Let $V\ (p_n + k_1) = \{u, u_i : 1\ \leq i \leq n\}$

Let

$E\ (p_n + k_1)\ =\ \{[uu_i]; 1 \leq i \leq n\ U\ [u_i u_{i+1}]; 1 \leq i \leq n - 1\}$

$Define\ \ f\ :\ V\ (G)\ \rightarrow\ \{1,2, \ldots . . p\}$

Vertex Labeling:

$f(u) = 1$

$f(u_i)\ \ = i + 1 \qquad 1 \leq i \leq n$

Edge Labeling:1

$f^*(uu_i) = 1$

$f^*(u_i u_{i+1})\ = 1 \qquad 1 \leq i \leq n - 1$

Here, When $n\ = m$, m>1

$e_f(0) =\ m$

$e_f(1) = m - 1$

$| e_f(1) - e_f(0) | \leq 1$

Hence, $P_n + K_1$ is Relatively Prime Cordial Graph.

For example, The Relatively Prime Cordial Graph of $P_n + K_1$ are shown in the figure

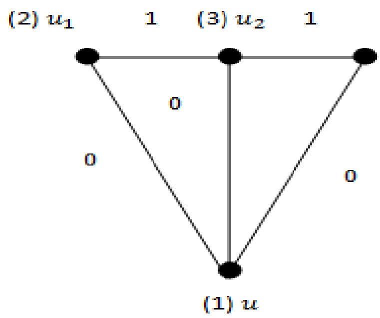


figure 3.5

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