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RESEARCH ARTICLE

NEAR PRODUCT CORDIAL GRAPH-PATH AND ITS RELATED GRAPH

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ABSTRACT

In this paper we discuss about Near product cordial labeling graphs on path graph and its corollary then < Cn : Cn-1 > , S(Cn). If the labeling in the graph satisfies the condition of Near product cordial then it is called Near product cordial graphs.In this paper we have proved that the above mentioned graphs are Near product cordial graphs and except (S(Cn)) which is Weak Near product cordial labeling of the graph.

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INTRODUCTION

The concept of cordial labeling was introduced by Cahit. The concept of product cordial labeling is introduced by M. Sundaram, R. Ponraj and S. Somasundaram. Motivated by the above definitions, Near Product cordial is defined.

Theorem 1: All Trees are Near product cordial graphs.

Proof: Let T be a tree on n vertices

Define f(V(T)) = { 1, 2, . . . , n-1, n+1}

To get more edges with label 1, the sub graph formed by odd labeled vertices should be adjacent among themselves and it is connected and hence it is a tree.

Suppose n is even, Then n = 2k (say): Then there are k+1 odd labeled vertices and k-1 even labeled vertices. Let T_1 be a sub graph of T on K+1 vertices from a tree. Then there are exactly k edges of T_1 with label 1 and clearly, remaining k-1 edges of $T\text{-}T_1$ with label 0.

In other words, $e_f(1) = k$ and $e_f(0) = k-1$

Then, $|e_f(0) - e_f(1)| = 1$

Hence, T is Near product cordial graph when n is even

Suppose n is odd, n = 2k+1 (say): There are k+1 even labeled vertices and k odd vertices. In this case also, as above we can construct a subgraph with k odd labeled vertices. There are k+1 even labeled vertices and k odd labeled vertices and it contain atmost k-1 edges with label 1 for any choice of Near product cordial labeling f.

That is, for any choice of labeling $f : V(T) \rightarrow \{ 1, 2, \ldots, 2k, 2k+2\}$, $e_f(0) = k+1$ and $e_f(1) = k-1$

If the subgraph is a tree (such a subgraph exists), then

$e_f(0) = k+1$ and $e_f(1) = k-1$

We have, $|e_f(0) - e_f(1)| = 2$

Hence, any Tree on odd vertices is Weak near product cordial graph.

Corollary 2: The Path P_n is Near product cordial graph.
Corollary 3: The graph $P_n(m)$ is Near product cordial graph.
Corollary 4: The graph $P_n \cup P_m$ is Near product cordial graph.
Corollary 5: The graph $nP_m \cup mP_n$ is Near product cordial graph.
Corollary 6: The graph Comb (P^+) is Near product cordial graph.
Corollary 7: The graph $(P_n^+: S_1)$ is Near product cordial graph.
Corollary 8: The graph $P_{2n}\Theta S_m$ is Near product cordial graph.
Corollary 9: The graph H_n is Near product cordial graph.
Corollary 10: The graph $H_n\Theta S_m$ is Near product cordial graph.
Corollary 11: The graph Twig Tg_{2n} is Near product cordial graph.
Corollary 12: Full Binary tree is Near product cordial graph.

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Corollary 13: The Bistar graph, $K_{1,n}, K_{2,n,}$ is Near product cordial graph.

Theorem 14: $< C_n : C_{n-1} >$ is Near product cordial when n > 3.

Proof:

Let $V(< C_n : C_{n-1} >) = \{u_1 = v_1, u_2, \ldots, u_n, v_2, \ldots, v_{n-1}\}$
$E(< Cn : Cn\text{-}1 >) = \{(uiui+1) : 1 \leq i \leq n\text{-}1\} \cup \{(vivi+1) : 1 \leq i \leq n\text{-}2\} \cup \{unu1\} \cup \{vn\text{-}1v1\}$

Define f: $V(< C_n : C_{n-1} >) \rightarrow \{1, 3, \ldots, 2n\text{-}3, 2n\text{-}1\}$ as follows

$f(u_1) = 1$
$f(v_1) = 1$
$f(u_i) = 2i\text{-}1, 1 \leq i \leq n$
$f(v_i) = 2i\text{-}2, 2 \leq i \leq n\text{-}1$

Edge Condition

$e_f(0) = n\text{-}1$ and $e_f(1) = n$ and

Then, $|e_f(0) - e_f(1)| = 1$

Hence, $(< C_n : C_{n-1} >)$ is a Near product cordial graph.

Example 15: Near product cordial labeling of the graph $(C_n \otimes S_m)$ is shown in the Fig 1 and Fig 2.

Theorem 16: $S(C_n)$ is a Near product cordial for $n < 6$.

Proof:

Let $V(C(S_n)) = \{ ui : 1 \leq i \leq n \} \cup \{ vi : 1 \leq i \leq n \}$ and
$E(S(Cn)) = \{ uiui+1 : 1 \leq i \leq n-1 \} \cup \{unu1\} \cup \{uivi+1 : 1 \leq i \leq n-1\} \cup \{unv1\} \cup \{uivi\text{-}1 : 3 \leq i \leq n\} \cup \{u1vn\} \cup \{u2v1\}$

Define $f: V(S(C_n)) \rightarrow \{ 1, 2, 3, \ldots, 2n - 1, 2n + 1 \}$ as follows:

In Fig 3.45, 3.46 and 3.47, it is established that $S(C_n)$ is Near product cordial when $n \leq 5$.

When n ≥ 6

In order to get more edge label 1, vertices of a sub graph of G labeled by odd numbers should be a maximal connected graphs. As there are n + 1 odd numbers in V(G), maximal connected subgraph should be on n+ 1 vertices. There are 2n vertices out of which $v_1, v_2, v_3, \ldots v_n$ are independent vertices. It can be verified that any maximal connected Subgraph on n + 1 vertices contains at most n + 2 edges.

Then, $e_f(0) \geq 2n - 2$ and $e_f(1) \leq n + 2$

For $n \geq 6$, $|e_f(0) - e_f(1)| \geq n - 4$
≥ 2

In this case, $S(C_n)$ is not Near product cordial when $n \geq 6$. Further it is observed that $S(C_6)$ is weak near product cordial graph.

Example 17(a)

Near product cordial labeling of the graph $(S(C_n))$ is shown in the Fig 3 , Fig 4 and Fig 5.

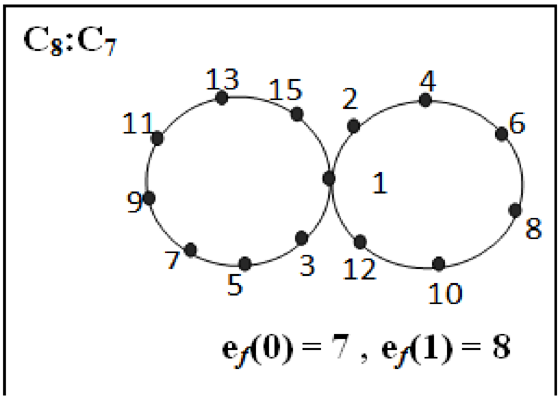

Fig. 1.

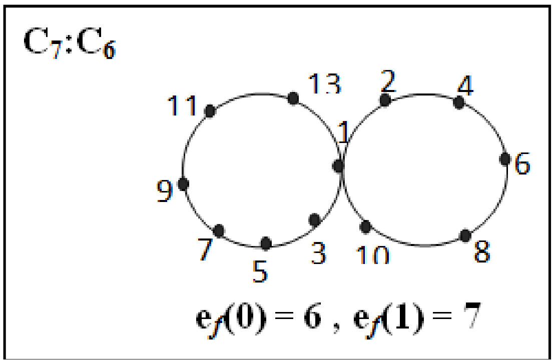

Fig. 2.

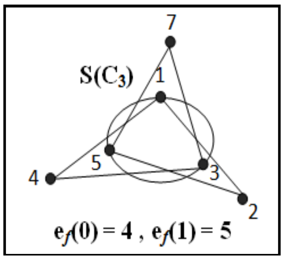

Fig. 3.

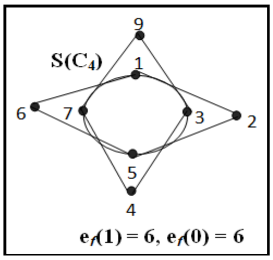

Fig. 4.

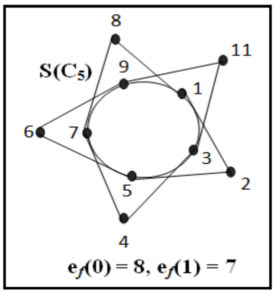

Fig. 5.

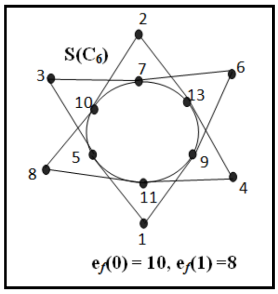

Fig. 6.

Example 17(b): Weak Near product cordial labeling of the graph $(S(C_n))$ is the Fig. 6.

REFERENCES

1. Cahit, I. 1987. Cordial graphs: A weaker version of graceful and harmonious graphs, Ars Combinatorial, 23, 201-207.
2. Sridevi, R., S. Navaneethakrishnan, Some New Graph Labeling Problems and Related Topics (Thesis). Manonmaniam Sundaranar University, January 2013.
3. Sundaram, M., R. Ponraj and S. Somasundaram, Product cordial labeling of graphs, Bulletin of Pure and Applied Sciences, 25E(1) (2005), 199-203.
4. Sundaram, M., R. Ponraj and S. Somasundaram, Some results on Product cordial labeling, *Pure and Applied Mathematica Sciences,* Vol, N01-2, (March 2006), 1-11.