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Research Paper

A Study on Some Cordial Labeling

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Abstract:

In this paper we investigate a now labeling called 3-total super product cordial labeling. Suppose $G = (V(G), E(G)$ be graph with vertex set $V(G)$ and edge set $E(G)$. A vertex labeling $f.V(G) \to \{0,1,2\}$. For each edge wv assign the label $(f(u)^* f(v))m$ 3. The map f is called a 3-total super product cordial labeling if $|f(i) - f(0)| \leq 1$ for $i, j\varepsilon\{0,1,2\}$ where $f(x)$ denotes the total number vertices and edges labeled with $x = \{0,1,2\}$ and for each edge $uv, [f(u) - f(v) \leq 1$. Any graph which satisfies 3-total super product cord labeling is called 3-total super product cordial graphs. Here we prove some graphs like path; cycle and complete bipartite graph k_b, n a 3-total super product cordial graphs.

Keywords: 3-total super product cordial labeling, 3-total super product cordial graphs

Introduction

All graphs in this paper are finite, undirected and simple. For all other terminology and notations, we follow Harrary [2]Let $G(V, E)$ be a graph where the

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symbols $V(G)$ and $E(G)$ denotes the vertex set and edge set. If the vertices oredges or both of the graph are assigned values subject to certain conditions it is known as graph labeling. A dynamic survey of graph labeling is regularly updated by Gallian [3]and it is published in Electronic Joumal of Combinatorics.. Cordial graphs were first introduced by Cahit[1] as a weakerversion of both graceful graphs and harmonious graphs. Theconcept of product cordial labeling of a graphs was: introduced by Sundaram et. al[4].

Definition 1.1.: Let G be a graph. Let f be a map from $V(G)$ to [0,1,2}. For each edge uv assign the label $[f(u) * f(v)](\text{mod}3)$. Then the map f is called 3-total product cordial labeling of G, if $|f(i) - f(j)| \leq 1$i, $j = \{0,1,2\}$ where $f(x)$ denotes the total number of vertices and edges labeled with $x = \{0,1,2\}$.

Definition 1.2.: A 3 -total product cordial labeling of a graph G is called 3-total super product cordial labeling if for eachedge $uv|f(u) - f(v)| \leq 1$. A graph G is 3 -total super product cordial if it admits 3 -total super product cordial labeling.

Theorem 2.1.: Path graph P_m is 3-total super product Otherwise: cordial.

Proof: Let P_m be the path $u_1, u_2, \dots, u_m$

Otherwise: $f(u_1) = f(u_2) = 1$

$$f(u_2) = 0$$

$$f(u_{2+1}) = 2; \quad 1 \leq i \leq 2p - 1 f(u_{2p+2}) = 1$$

$$f(u_{2p+8+i}) = 0; 1 \leq i \leq p - 1$$

Assign

$f(u_1) = 0$

$f(u_a) = 1$

$f(u_a) = 2$

Otherwise:

Define

$f(u_t) = 0; 1 \leq i \leq p$

$f(u_{p+1}) = f(u_{p+2}) = 1$

$f(u_{y+2+i}) = 2; 1 \leq i \leq 2p - 2$

Hence f is 3 -total super product cordial labeling

Case II: $m \equiv 1(\text{mod}3)$

Case **II:**$m \equiv 1(r$ Let $m = 3p + 1$

Define

$$f(u_t) = 0; 1 \leq i \leq p$$

$$f(u_{z+1}) = 1$$

$$f\left(u_{p+1+i}\right) = 2; 1 \leq i \leq 2p$$

Hence f is 3 -total super product cordial labeling

Case III: $m \equiv 2(\text{mod}3)$

Latm $= 3n + 2$

If $p = 0$ result is not true

If $p = 1$

$$f(u_1) = f(u_2) = 1$$
$$f(u_2) = 0$$
$$f(u_4) = f(u_5) = 2$$

Example 2.2.: The path P_6 and P_{10} are 3 -total super product cordial graphs and P_{10}F

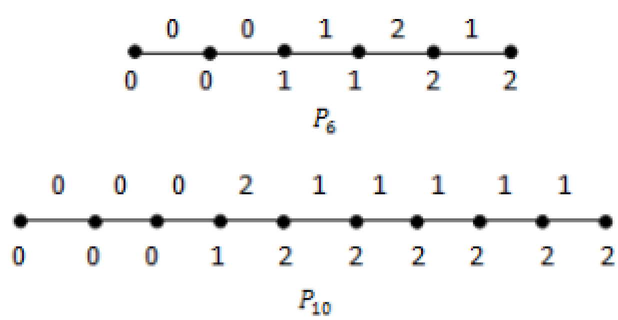

Figure 1:3 total super product cordial labeling of path P_6 and P_{10}

Theorem 2.3.: k_1, m is 3 -total super product cordial. If $m \equiv 0(\text{mod}3)$ and $m \equiv 2(\text{mod}3)$.

Proof: Let k_1, m be the complete bipartite graph we note that $|V(k_1, m)| = m + 1$ and$E(k_1, m)| = m$

Let$|V(k_1, m)| = m + 1$

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$E(k_1, m) = \{uu_i : 1 \leq i \leq m\}$

Case I: $m \equiv 0(\text{mod}3)$

| $F(k)$Let Let $m = 3p$

Assign

$f(u) = 1$

Define:

: $f(u_{3i+1}) = 0; 0 \leq i \leq p-1$

$f(u_{3i+2}) = 1; 0 \leq i \leq p-1$

$f(u_{3i+3}) = 2; 0 \leq i \leq p-1$

Hence f is 3 total super product cordial.

Case II: $m \equiv 2(\text{mod}3)$

Let $m = 3p + 2$

Assign

$f(u) = 1$

Define:

:$f(u_{3i+1}) = 0; 0 \leq i \leq p$

$f(u_{3i+2}) = 2; 0 \leq i \leq p$

$f(u_{3i+3}) = 1; 0 \leq i \leq p-1$

Hence f is 3 total super product cordial.

Example 2.4; The stars k1, 5 and k1, 9 are 3-total super product cordial graph

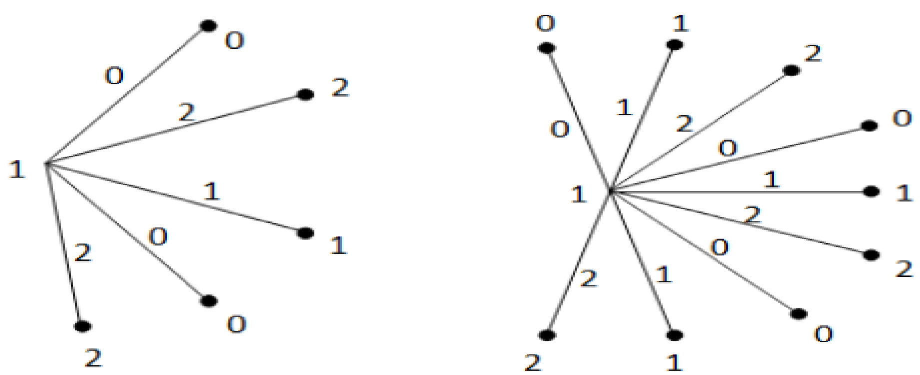

Figure 2: 3-total super product cordial labeling of the stars k_1, 5 andk $_{1,9}$

Theorem 2.5.: Cycle graph c_m is 3 -total super product cordial labeling. If : $m \equiv$

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1(mod3) and $m \equiv 2(\text{mod}3)$

Proof: Let c_m be the cycle graph. We note that $|V(G)| = m$ and $|E(G)| = m$.

Case I: $m \equiv 1(\text{mod}3)$

Let$m = 3p + 1$

$f(u_i) = 0; 1 \leq i \leq p$

$f(u_{p+1}) = 1$

$f(u_{p+1+i}) = 2; 1 \leq i \leq 2p - 1$

$f(u_{3p+1}) = 1$

Hence f is 3-total super product cordial.

Case II: $m \equiv 2(\text{mod}3)$

Let $m = 3p + 2$

Define:

$f(u_i) = 0; 1 \leq i \leq p$

$f(u_{p+1}) = 1$

$f(u_{p+1+i}) = 2; 1 \leq i \leq 2p$

$f(u_{3p+1}) = 1$

Hence f is 3 total super product cordial.

Example 2.6: The cycle c7 and c8 are 3-toal super product cordial graphs.

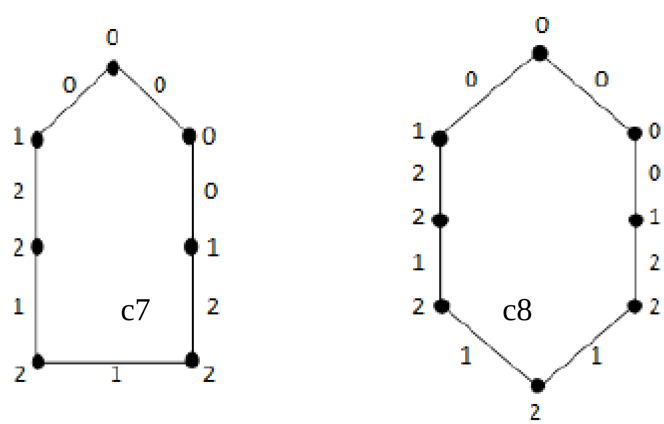

Figure 3: 3 total super product cordial labelling of c7 and c8

Conclusion:

Every 2 total product cordial graph is 2 total super product of cordial graphs.

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