IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Truth Table- Smarandachley product cordial labeling of Rooted Product Graph

Dibya Gulab Minj, Phulmanti Nagesia

Department of Mathematics,KalingaUniversity,Naya Raipur,Chhattisgarh-492101,India

Assistant Professor, Department of Computer Science, Holy Cross Women's College Ambikapur

Abstract- In this paper the researcher study and work on the labeling of Corona Product Graph by admitting the certain condition of Smarandachely product cordial labeling.

Smarandachely product cordial labeling on G is such a labeling $f : V(G) \to \{0,1\}$ with induced labeling $f(u)f(v)$ on edge $uv \in E(G)$ *that* $|v_f(0) - v_f(1)| \geq 2$ *and* $|e_f(0) - e_f(1)| \geq 2.$

Key words- Cordial labeling, Smarandachely product cordial labeling, and Corona product graph.

Introduction- A graph labeling is an assignment of integers to the vertices or edges or both, subject to certain conditions. Labeling helps to distinguish between any two adjacent vertices or edges. Graph labelling was first introduced in the year 1967 by Rosa [1]. Rosa defined a function as $f : V(G) \to \{0,1,2,3..........q\}$, f is an injection such that, when each edge xy is assigned the label $|f(x) - f(y)|$, the resulting edge labels are distinct.
Elvi Khairunnisa and Kiki Ariyanti Sugeng [2] worked on the graceful labelling of Corona Product of Aster flower Graph. Chiranlal [3] introduced the Proper d-Lucky Labeling of Corona Products of Certain Graph. And He [4] alsoproved and worked on Proper d-Lucky Labeling of Rooted Products and Corona Products of Certain Graphs.
Now the researcher continues his work as lebeling on the graph which is known as Corona Product graph. Graphs can be used to model interconnection networks in which vertices correspond to processors of the network and the edges correspond to communication links. A new interconnection network topology which is called the bloom graph has been introduced by truth table, which satisfies the condition of SmaranDachley Product Cordial labelling.

Def. Corona Product graph- The corona product of two graphs G and H is defined as the graph obtained by taking one copy of G and |V(G)| copies of H and joining the i-th vertex of G to every vertex in the i-th copy of H.

Theorem 1 – The $m \times n$ *dimensional Corona product graph* $C_m o C_n$ *admits Smarandachely Product Cordial labeling* $3 \le m, n \ge 10$.

Proof- It admits the condition of Smarandachely Product Cordial Labeling when

Case1. When m and n both are even-

Truth Table-

$C_m O C_n$	V(0)	V(1)	$\left\|\sum v(0) - \sum v(1)\right\| \ge 2$	e(0)	e(1)	$\left\|\sum e(0) - \sum e(1)\right\| \ge 2$
C_4OC_4	4	12	8	8	12	4
C_4OC_6	8	16	8	16	12	4
C_4OC_8	12	20	8	24	12	12
C_4OC_{10}	16	24	8	32	12	20

$C_m O C_n$	V(0)	V(1)	$\left\|\sum v(0) - \sum v(1)\right\| \ge 2$	e(0)	e(1)	$\left\|\sum e(0) - \sum e(1)\right\| \ge 2$
$C_6 OC_4$	6	18	12	12	18	6
C_6OC_6	12	24	12	24	18	6
C_6OC_8	18	30	12	36	18	18
C_6OC_{10}	24	36	12	48	18	30

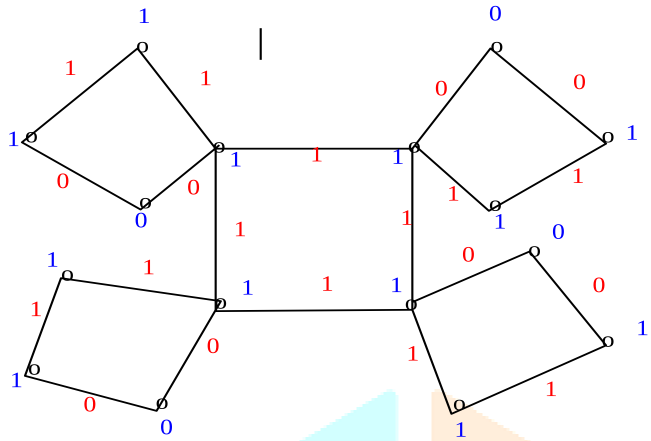
$C_m O C_n$	V(0)	V(1)	$\left\|\sum v(0) - \sum v(1)\right\| \ge 2$	e(0)	e(1)	$\left\|\sum e(0) - \sum e(1)\right\| \ge 2$
C_8OC_4	8	24	16	16	24	8
C_8OC_6	16	32	16	32	24	8
C_8OC_8	24	40	16	48	24	24
C_8OC_{10}	32	48	16	64	24	40

$C_m O C_n$	V(0)	V(1)	$\left\|\sum v(0) - \sum v(1)\right\| \ge 2$	e(0)	e(1)	$\left\|\sum e(0) - \sum e(1)\right\| \ge 2$
$C_{10}OC_4$	10	30	20	20	30	10
$C_{10}OC_6$	20	40	20	40	30	10
$C_{10}OC_8$	30	50	20	60	30	30
$C_{10}OC_{10}$	40	60	20	80	30	50

All the vertices of m are labelled with (1,1,1........) and 3 vertices of n are labelled with (0,1,1) respectively and rest will be labelled with (0,1,0,1.......) alternatively.

Figure 1.1

$C_4 O C_4$

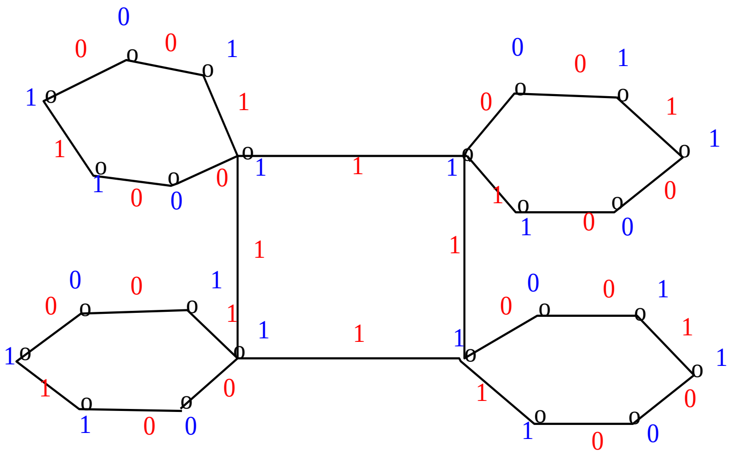


$$v(0)=4, v(1)=12$$
$$\left|\sum v(0)-\sum v(1)\right| \geq 2$$
$$|4-12| \geq 2$$
$$8 \geq 2$$

$$e(0)=8, e(1)=12$$
$$\left|\sum e(0)-\sum e(1)\right| \geq 2$$
$$|8-12| \geq 2$$
$$4 \geq 2$$

Figure 1.2

$$C_4{}^OC_6$$



$$v(0)=8, v(1)=16$$
$$\left|\sum v(0)-\sum v(1)\right|\geq 2$$
$$|8-16|\geq 2$$
$$8\geq 2$$

$$e(0)=16, e(1)=12$$
$$\left|\sum e(0)-\sum e(1)\right|\geq 2$$
$$|16-12|\geq 2$$
$$4\geq 2$$

Case 2- when m is odd, n is even-

Truth Table-

$C_m{}^OC_n$	V(0)	V(1)	$\left\|\sum v(0)-\sum v(1)\right\|\geq 2$	e(0)	e(1)	$\left\|\sum e(0)-\sum e(1)\right\|\geq 2$
C_3OC_4	3	9	6	6	9	3
C_3OC_6	6	12	6	12	9	3
C_3OC_8	9	15	6	18	9	9
C_3OC_{10}	12	18	6	24	9	15

C_mOC_n	V(0)	V(1)	$\left\|\sum v(0)-\sum v(1)\right\| \geq 2$	e(0)	e(1)	$\left\|\sum e(0)-\sum e(1)\right\| \geq 2$
C_5OC_4	5	15	10	10	15	5
C_5OC_6	10	20	10	20	15	5
C_5OC_8	15	25	10	30	15	15
C_5OC_{10}	20	30	10	40	15	25

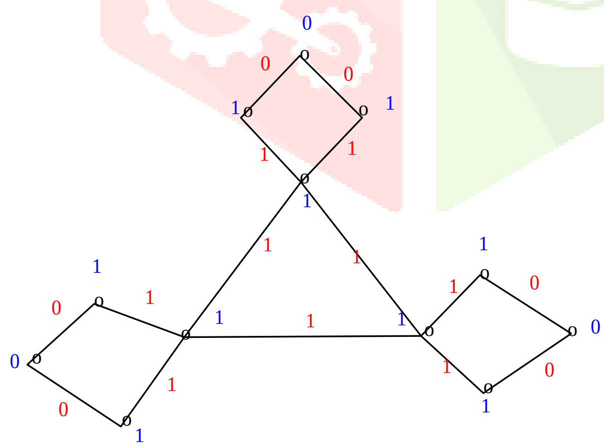
C_mOC_n	V(0)	V(1)	$\left\|\sum v(0)-\sum v(1)\right\| \geq 2$	e(0)	e(1)	$\left\|\sum e(0)-\sum e(1)\right\| \geq 2$
C_7OC_4	7	21	14	14	21	7
C_7OC_6	14	28	14	28	21	7
C_7OC_8	21	35	14	42	21	21
C_7OC_{10}	28	42	14	56	21	35

C_mOC_n	V(0)	V(1)	$\left\|\sum v(0)-\sum v(1)\right\| \geq 2$	e(0)	e(1)	$\left\|\sum e(0)-\sum e(1)\right\| \geq 2$
C_9OC_4	9	27	18	18	27	9
C_9OC_6	18	36	18	36	27	9
C_9OC_8	27	45	18	54	27	27
C_9OC_{10}	36	54	18	72	27	45

All the vertices of m are labelled with (1, 1, 1........) and all vertices of n are labelled with (1,0,1,0,1........) alternatively.

Figure 2.1

C_3OC_4



$$v(0)=3, v(1)=9$$

$$\left|\sum v(0)-\sum v(1)\right| \geq 2$$

$$|3-9| \geq 2$$

$$6 \geq 2$$

$$e(0) = 6, e(1) = 9$$

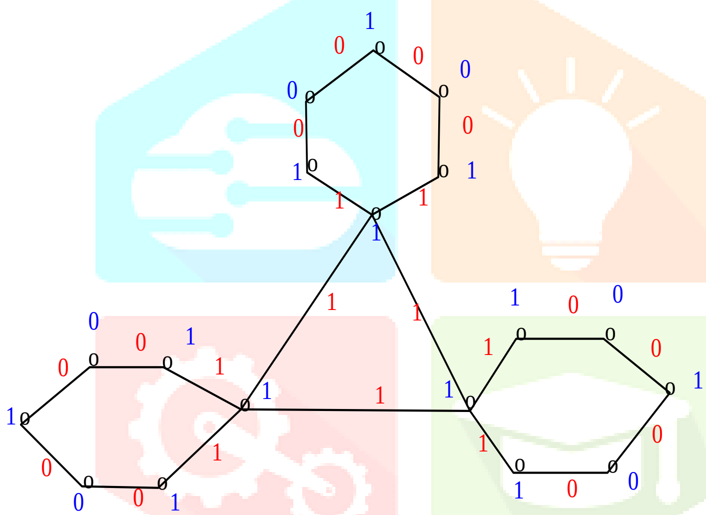
$$\left|\sum e(0) - \sum e(1)\right| \geq 2$$

$$|6 - 9| \geq 2$$

$$3 \geq 2$$

Figure 2.1

$$C_3 {}^{O} C_6$$



$$v(0) = 6, v(1) = 12$$

$$\left|\sum v(0) - \sum v(1)\right| \geq 2$$

$$|6 - 12| \geq 2$$

$$6 \geq 2$$

$$e(0) = 12, e(1) = 9$$

$$\left|\sum e(0) - \sum e(1)\right| \geq 2$$

$$|12 - 9| \geq 2$$

$$3 \geq 2$$

Case -3- When m is even, n in odd-

Truth Table-

$C_m O C_n$	V(0)	V(1)	$\left\|\sum v(0) - \sum v(1)\right\| \geq 2$	e(0)	e(1)	$\left\|\sum e(0) - \sum e(1)\right\| \geq 2$
C_4OC_3	4	8	4	12	4	8
C_4OC_5	8	12	4	20	4	16
C_4OC_7	12	16	4	28	4	24
C_4OC_9	16	20	4	36	4	32

$C_m O C_n$	V(0)	V(1)	$\left\|\sum v(0) - \sum v(1)\right\| \geq 2$	e(0)	e(1)	$\left\|\sum e(0) - \sum e(1)\right\| \geq 2$
C_6OC_3	6	12	6	18	6	12
C_6OC_5	12	18	6	30	6	24
C_6OC_7	18	24	6	42	6	36
C_6OC_9	24	30	6	54	6	48

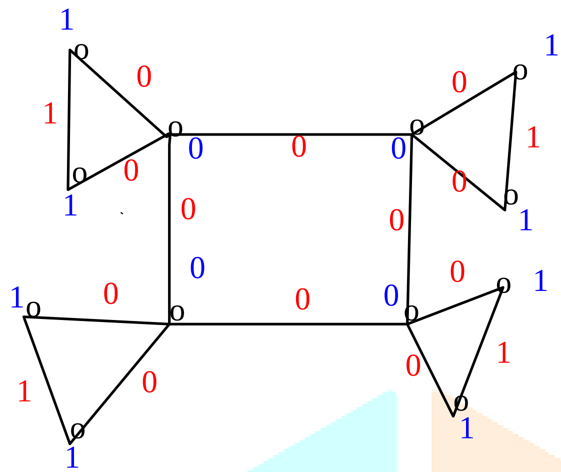
$C_m O C_n$	V(0)	V(1)	$\left\|\sum v(0) - \sum v(1)\right\| \geq 2$	e(0)	e(1)	$\left\|\sum e(0) - \sum e(1)\right\| \geq 2$
C_8OC_3	8	16	8	24	8	16
C_8OC_5	16	24	8	40	8	32
C_8OC_7	24	32	8	56	8	48
C_8OC_9	32	40	8	72	8	64

$C_m O C_n$	V(0)	V(1)	$\left\|\sum v(0) - \sum v(1)\right\| \geq 2$	e(0)	e(1)	$\left\|\sum e(0) - \sum e(1)\right\| \geq 2$
$C_{10}OC_3$	10	20	10	30	10	20
$C_{10}OC_5$	20	30	10	50	10	40
$C_{10}OC_7$	30	40	10	70	10	60
$C_{10}OC_9$	40	50	10	90	10	80

All the vertices of m are labelled with (0,0,0........) and 2 vertices of n are labelled with (1,1) and rest will be labelled with (0,1,0,1........) alternatively.

Figure 3.1

$C_4 O C_3$



$v(0) = 4, v(1) = 8$

$\left|\sum v(0) - \sum v(1)\right| \geq 2$

$|4 - 8| \geq 2$

$4 \geq 2$

$e(0) = 12, e(1) = 4$

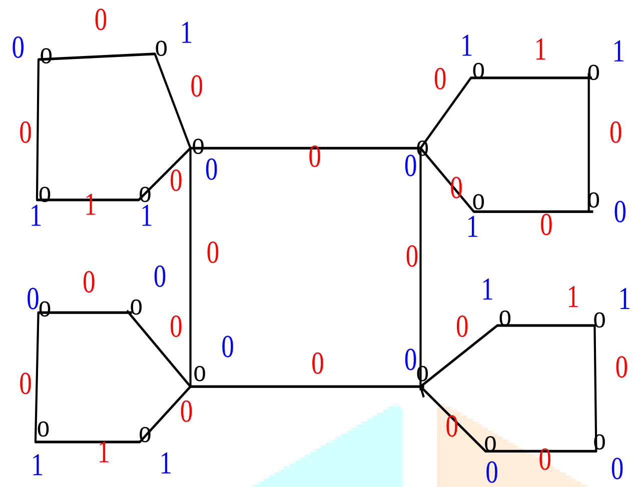
$\left|\sum e(0) - \sum e(1)\right| \geq 2$

$|12 - 4| \geq 2$

$8 \geq 2$

Figure 3.2

$C_4 O C_5$



$$v(0) = 8, v(1) = 12$$

$$\left|\sum v(0) - \sum v(1)\right| \geq 2$$

$$|8 - 12| \geq 2$$

$$4 \geq 2$$

$$e(0) = 20, e(1) = 4$$

$$\left|\sum e(0) - \sum e(1)\right| \geq 2$$

$$|20 - 4| \geq 2$$

$$16 \geq 2$$

Case 4 – When m, n both are odd –

Truth Table-

$C_m O C_n$	V(0)	V(1)	$\left\|\sum v(0) - \sum v(1)\right\| \geq 2$	e(0)	e(1)	$\left\|\sum e(0) - \sum e(1)\right\| \geq 2$
C_3OC_3	3	6	3	9	3	6
C_3OC_5	6	9	3	15	3	12
C_3OC_7	9	11	3	21	3	18
C_3OC_9	12	15	3	27	3	24

$C_m O C_n$	V(0)	V(1)	$\lvert\sum v(0)-\sum v(1)\rvert \geq 2$	e(0)	e(1)	$\lvert\sum e(0)-\sum e(1)\rvert \geq 2$
C_5OC_3	5	10	5	14	5	9
C_5OC_5	10	15	5	24	5	19
C_5OC_7	15	20	5	34	5	29
C_5OC_9	20	25	5	44	5	39

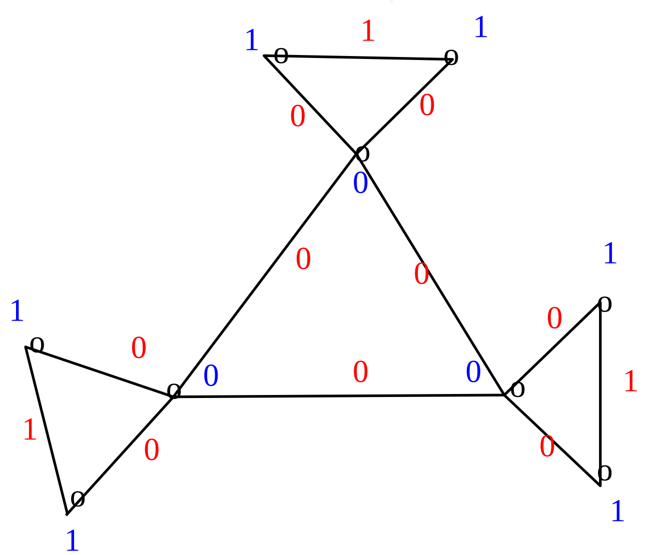
$C_m O C_n$	V(0)	V(1)	$\lvert\sum v(0)-\sum v(1)\rvert \geq 2$	e(0)	e(1)	$\lvert\sum e(0)-\sum e(1)\rvert \geq 2$
C_7OC_3	7	14	7	21	7	14
C_7OC_5	14	21	7	35	7	28
C_7OC_7	21	28	7	49	7	42
C_7OC_9	28	35	7	63	7	56

$C_m O C_n$	V(0)	V(1)	$\lvert\sum v(0)-\sum v(1)\rvert \geq 2$	e(0)	e(1)	$\lvert\sum e(0)-\sum e(1)\rvert \geq 2$
C_9OC_3	9	18	9	27	9	18
C_9OC_5	18	27	9	45	9	36
C_9OC_7	27	36	9	63	9	54
C_9OC_9	36	45	9	81	9	72

All the vertices of m are labelled with (0,0,0........) and 2 vertices of n are labelled with (1,1) and rest will be labelled with (0,1,0,1........) alternatively

Figure 4.1

$C_3 O C_3$



$$v(0)=3, v(1)=6$$

$$\left|\sum v(0)-\sum v(1)\right| \geq 2$$

$$|3-6| \geq 2$$

$$3 \geq 2$$

$$e(0)=9, e(1)=3$$

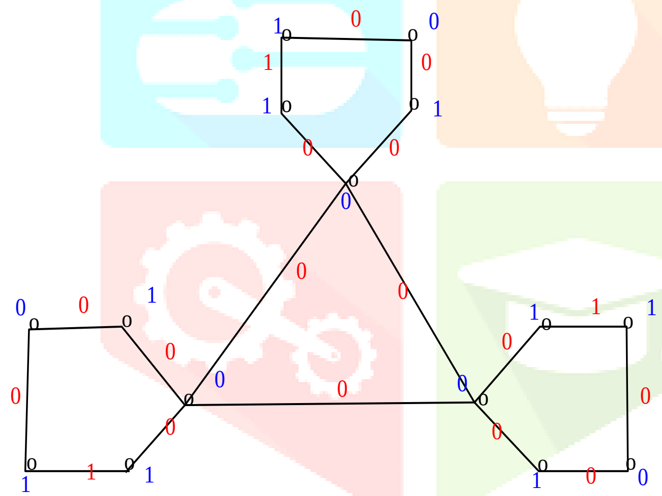
$$\left|\sum e(0)-\sum e(1)\right| \geq 2$$

$$|9-3| \geq 2$$

$$6 \geq 2$$

Figure 4.2

$C_3{}^{O}C_5$



$$v(0)=6, v(1)=9$$

$$\left|\sum v(0)-\sum v(1)\right| \geq 2$$

$$|6-9| \geq 2$$

$$3 \geq 2$$

$$e(0)=3, e(1)=15$$

$$\left|\sum e(0)-\sum e(1)\right| \geq 2$$

$$|3-15| \geq 2$$

$$12 \geq 2$$

5. Result Table-

Case -	$\left\|\sum v(0)-\sum v(1)\right\| \geq 2$	$\left\|\sum e(0)-\sum e(1)\right\| \geq 2$
1. When m, n both are even.	$even\ number \geq 2$	$even\ number \geq 2$
2. When m is odd, n is even.	$even\ number \geq 2$	$odd\ number \geq 2$
3. When m is even, n is odd.	$even\ number \geq 2$	$even\ number \geq 2$
4. When m, n both are odd.	$odd\ number \geq 2$	$even\ number \geq 2$

6. Conclusion – Here we computed the truth table and labelled the Corona product Graph, which satisfies the SmaranDachley Product Cordial Labeling that is a labeling $f: V(G) \longrightarrow \{0,1\}$ with induced labeling $f(u)\,f(v)$ *on edge* $uv \in E(G)$ *that* $\left|\sum v(0)-\sum v(1)\right| \geq 2$ *and* $\left|\sum e(0)-\sum e(1)\right| \geq 2$

A lot of work has been accomplished in this area by many researcher and still work is being carried out for this Graph.

7. References-

[1] A.Rosa,On Certain Valuations of the vertices of a Graph, Theory of Graphs (International Symposium, Rome, July 1966) ,Gordon and Breach,N. Y. and Dunod Paris,(1967), 349-355

[2] ElviKhairunnisa , Kiki AriyantiSugeng on graceful labelling of Corona Product of Aster Flower Graph, Mathematics,Informatics,science,anf education International Conference (MISEIC2018)

[3] Chiranlalkujur, Proper d-Lucky Labeling of Corona Products of Certain Graphs, Indian journal of science and Technology 2023, 668-673

[4] ChiranlalKujur, Proper d-LuckyLabeling of Rooted Products and Cororna Products of Certain Graphs, IndianJounal of Science and Technology2022, 2021-2026