Corona Graphs for Astronomical Calcualtions using L-Cordial Labeling

J. Arthy

Abstract: In this work we examine L-Cordial Labeling for .T_n ϴK_1 ,DT_n ϴK_1 〖,Q〗_n ϴ K_(1), ,B_(n,n) ϴK_1, C_m ϴP_n Graphs

***Keywords:* Corona, Triangular Snake, Quadrilateral Snake, L-Cordial (LC).**

AMS: Classification: 05C78.

I. INTRODUCTION

For our study we use the graph $G= (p,q)$ which are finite, simple and undirected. Initially L- Cordial Labeling (LCL) was introduced in [7] and proved some graphs for the same labeling in [8,9] LCL.In [2,3] et al proved cube Q_3, octahedron and special graph admits LCL. H- Related graph for square difference, Prime cordial and Cube difference labeling were studied in [1,6,14].In [15] Veena Shinde-Deorde, studied H-Cordial and prime labeling .In [10,11,12,13] Ponraj et.al proved snake graph and there corona admits difference cordial labeling. Detailed survey descriptions are given in [4]. Condition and results follow from [5] In this work we prove corona for some special graphs admits *L*-Cordial labeling.

II. PRELIMINARIES

1. If there is a bijection function $f: E(G) \rightarrow \{1,2,...|E|\}$, thus the vertex label is induced as 0 if the biggest label on the incident edges is even and is induced as 1, if it is odd and follows the condition that $|V_f(1) - V_f(1)| \leq 1$. Isolated vertices are not included for labeling here. A *L*-cordial graph is a graph which admits the above labeling.
2. The corona $A\Theta B$ graph G is formed by taking one copies of A(which has p points) p copies of B and then attaching the i^{th} point of A to every point in the i^{th} copy of B.

Theorem 1:
$T_n \Theta K_1$ admits L-Cordial Labeling.
Proof:
Consider $G = T_n \Theta K_1$ with
$V = \{u_i, x_i, y_i, w_i \,/\, i = 1,2,...,n\}$ and

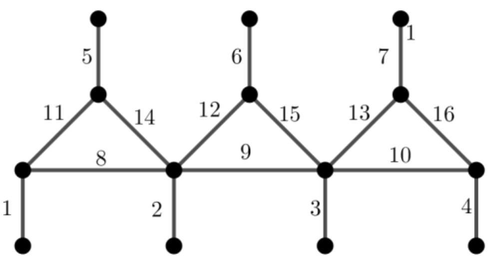
$$E = \{u_i x_i / 1 \leq i \leq n\} \cup \{u_i u_{i+1}, w_i u_{i+1}, w_i y_i, u_i w_i / 1 \leq i \leq n-1\} \text{ respectively.}$$

The edge labeling is given as

For i=1, 2…n-1

$$g(w_i u_{i+1}) = 4n + i - 3$$
$$g(u_i u_{i+1}) = 2n + i - 1$$
$$g(w_i y_i) = n + i$$
$$g(u_i w_i) = 3n + i - 2$$
$$For\ i = 1,2...n$$
$$g(u_i x_i) = i$$

Thus we have the vertex distribution as
$V_g(0) = V_g(1)$ for all n. Hence it's clear that $T_n \Theta K_1$ admits L-Cordial Labeling. Illustration of $T_4 \Theta K_1$ is given in Figure below.



Theorem 2:
$DT_n \Theta K_1$ is L-Cordial graph.
Proof:
Consider the graph G = $DT_n \Theta K_1$
With
$V(DT_n \Theta K_1) = \{x_j, x_j^{'}\ 1 \leq j \leq n\} \cup \{w_j, w_j^{'}, y_j, y_j^{'} \,/\, 1 \leq j \leq n-1\}$
and

$$E(DT_n \Theta K_1) = \{y_j y_j^{'}, w_j w_j^{'}, y_j x_{j+1}, w_j x_{j+1}, x_j w_j, x_j y_j, x_j x_{j+1} / 1 \leq j \leq n-1\} \cup \{x_j x_j^{'} / 1 \leq j \leq n\}$$

We state the Labeling $f: E(G) \rightarrow \{1,2,....,8n-7\}$ as

When *n odd*

$For\ j = 1,2 ..., n-1$
$f(w_j w_j^{'}) = 2j$
$f(x_j x_{j+1}) = 2n - 2 + j$ $\quad f(yy_j^{'}) = 2j - 1$
$f(y_j x_{j+1}) = 6n - 5 + j$
$f(x_j y_j) = 4n + j - 3$
$f(w_j x_{j+1}) = 7n - 6 + j$
$f(x_j w_j) = 5n + j - 4$

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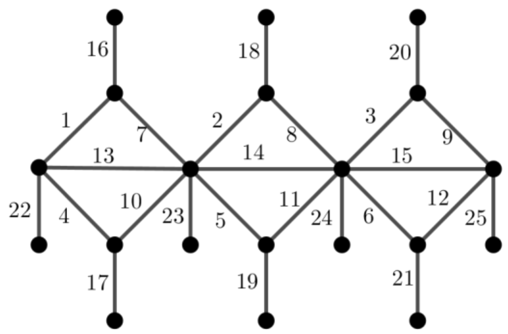
J. Arthy, Assistant Professor, Department of Science and Humanities, Bharath Institute of Higher Education and Research, India

$For\ j = 1,2 \ldots, n$
$f(x_j x_j') = 3n - 3 + j$

When n is *even*
$For\ 1 \le j \le n-1$
$f(w_j x_{j+1}) = 3n - 3 + j$
$f(x_j y_j) = j$
$f(x_j w_j) = n + j - 1$
$f(x_j x_{j+1}) = 4n - 4 + j$
$f(y_j x_{j+1}) = 2n - 2 + j$
$f(w_j w_j') = 5n + 2j - 5$
$f(y_j y_j') = 5n + 2j - 6$
$For\ i = 1,2 \ldots n$
$f(x_j x_j') = 7n - 7 + j$

Therefore from the above labeling it is clear that $V_f(0) = V_f(1) = 3n - 2$ for all n. Thus $DT_n OK_1$ is L-Cordial Graph. Illustration of $DT_4 OK_1$ is given in Figure below.

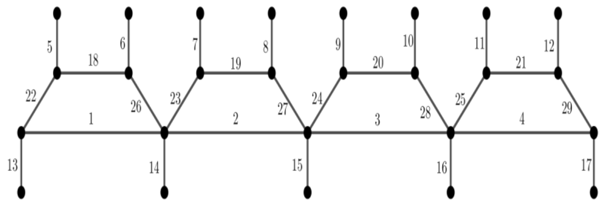


Theorem 3:
The Graph $Q_n O K_1$ is LC.
Proof:
Let G = $Q_n O K_1$ a graph with
$$V = \{a_j, b_j, c_j, e_j \,/\, j = 1,2 \ldots n-1\} \cup \{a_j, d_j \,/\, j = 1,2 \ldots n\} \text{ and}$$
$$E = \begin{cases} a_j d_j,\ j = 1,2 \ldots n \\ b_j e_j,\ a_j a_{j+1}, c_j e_{2j}, a_j b_j, c_j a_{j+1} \quad For\ j = 1,2 \ldots n-1 \end{cases}$$

Then we represent a one to one and onto
$f : E \to \{1,2,\ldots q\}\ as$
$For\ j = 1,2 \ldots n$
$f(a_j d_j) = 3n - 3 + j$
$For\ j = 1,2 \ldots n-1$
$f(b_j e_j) = n + 2j - 2$
$f(c_j e_{2j}) = n + 2j - 1$
$f(a_j a_{j+1}) = j$
$f(a_j b_j) = 5n - 4 + j$
$f(c_j a_{j+1}) = 6n - 5 + j$

Then it is easily observed that the above function satisfies the condition of L-Cordial Labeling.

Therefore $Q_n O K_1$ admits L-Cordial Labeling. Illustration of $Q_5 O K_1$ is given in Figure below.



Theorem 4:
$B_{n,n} OK_1$ admits LCL.
Proof:
Let $G = B_{n,n} OK_1$ be a graph with
$V(G) = \{x, y, u_i, v_i, u_i', v_i', x', y' / 1 \le i \le n\}$ and
$E(G) = \{xy, xx', yy', xu_i, yv_i, u_i u_i', v_i v_i' / 1 \le i \le n\}$
Then the edge labeling is given by
$For\ 1 \le i \le n$
$f(xy) = 1, f(xx') = 2, f(yy') = 3$
$f(xu_i) = 2 + 2i$
$f(yv_i) = 3 + 2i$
$f(u_i u_i^1) = 2n + 2i + 2$
$f(v_i v_i^1) = 2n + 2i + 3$
It is clear from the above defined labeling that $V_f(0) = V_f(1)$ for all n. Hence $B_{n,n} OK_1$ admits LCL.

Theorem 5:
Graph $C_m OP_n$ is L-Cordial graph.
Proof:
Let $G = C_m OP_n$ with
$$V(G) = \{x_i, y_j^i \,/\, 1 \le i \le m, 1 \le j \le n\}$$
$$E(G) = \{x_i y_{i+1} \,/\, 1 \le i \le m-1\} \cup \{x_1 x_n\} \cup \{y_j^i y_{j+1}^i \,/\, 1 \le i \le m,$$

We define f from $1,2,\ldots,q$ as
$f(x_i x_{i+1}) = mn - m + i, 1 \le i \le m-1$
$f(x_1 x_n) = mn$
$f(y_j^i y_{j+1}^i) = i + m(j-1), 1 \le i \le m, 1 \le j \le n-1$
Hence $C_m OP_n$ has $|V_f(0) - V_f(1)| \le 1$ vertex. Thus $C_m OP_n$ is LCG.

III. CONCLUSION

In this paper we examined the determination of L-cordial behavior of $T_n OK_1$, $DT_n OK_1$, $Q_n O K_1$, $B_{n,n} OK_1$, $C_m OP_n$.

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AUTHORS PROFILE

J. Arthy is an Assistant Professor, Department of Science and Humanities BIHER, Chennai. She is currently working on Graph labeling. She published 7 papers in international journal.