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4-TOTAL PRIME CORDIAL LABELING OF SOME SPECIAL GRAPHS

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ABSTRACT. Let G be a (p, q) graph. Let $f : V(G) \to \{1, 2, \dots, k\}$ be a map where $k \in \mathbb{N}$ is a variable and $k > 1$. For each edge uv, assign the label $\gcd(f(u), f(v))$. f is called k-total prime cordial labeling of G if $|t_f(i) - t_f(j)| \leq 1$, $i, j \in \{1, 2, \cdots, k\}$ where $t_f(x)$ denotes the total number of vertices and the edges labeled with x. A graph with a k-total prime cordial labeling is called k-total prime cordial graph. In this paper we investigate the 4-total prime cordial labeling of some special graphs.

1. INTRODUCTION

All graphs in this paper are finite, simple and undirected. The notion of prime cordial labeling was introduced in [8]. Ponraj et al. [4], have been introduced the concept of k-total prime cordial labeling and investigate the k-total cordial labeling of certain graphs. Also in [4, 5, 6, 7], we investigate the 4-total prime cordial labeling for path, cycle, star, bistar, ladder, triangular snake, friendship graph, comb, double comb, double triangular snake, some complete graphs, subdivision of some graphs, gear graph and flower graph. In this paper we investigate the 4-total prime cordiality of some special graphs like jelly fish, book, irregular triangular snake.

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2. k-TOTAL PRIME CORDIAL LABELING

Definition 2.1. Let G be a (p, q) graph. Let $f : V(G) \to \{1, 2, \dots, k\}$ be a function where $k \in \mathbb{N}$ is a variable and $k > 1$. For each edge uv, assign the label gcd($f(u)$, $f(v)$). f is called k-total prime cordial labeling of G if $|t_f(i) - t_f(j)| \leq 1$, $i, j \in \{1, 2, \cdots, k\}$ where $t_f(x)$ denotes the total number of vertices and the edges labeled with x. A graph with a k-total prime cordial labeling is called k-total prime cordial graph.

3. PRELIMINARIES

Definition 3.1. Let G_1, G_2 respectively be (p_1, q_1), (p_2, q_2) graphs. The *corona* of G_1 with G_2 is the graph $G_1 \odot G_2$ obtained by taking one copy of G_1 , p_1 copies of G_2 and joining the i^{th} vertex of G_1 by an edge to every vertex in the i^{th} copy of G_2 where $1 \leq i \leq p_1$.

Definition 3.2. The *cartesian product* of two graphs G_1 and G_2 is the graph $G_1 \times G_2$ with vertex set $V_1 \times V_2$ and two vertices $u = (u_1, u_2)$ and $v = (v_1, v_2)$ are adjacent whenever $[u_1 = v_1$ and u_2 adj $v_2]$ or $[u_2 = v_2$ and u_1 adj $v_1]$.

Definition 3.3. The *book* B_n is the graph $S_n \times P_2$ where S_n is the star with $n + 1$ vertices.

Definition 3.4. *Jelly fish* graph $J(m, n)$ is obtained from a cycle $C_4 : uxvwu$ by joining x and w with an edge and appending m pendent edges to u and n pendent edges to v.

Definition 3.5. The *triangular snake* T_n is obtained from the path $P_n : u_1u_2 \dots u_n$ with $V(T_n) = V(P_n) \cup \{v_i : 1 \leq i \leq n - 1\}$ and edge set $E(IT_n) = E(P_n) \cup \{u_iv_i, u_{i+1}v_i : 1 \leq i \leq n - 1\}$.

Definition 3.6. The graph *irregular triangular snake* IT_n $n \geq 4$ is obtained by the path $P_n : u_1u_2 \dots u_n$ with vertex set $V(IT_n) = V(P_n) \cup \{v_i : 1 \leq i \leq n-2\}$ and edge set $E(IT_n) = E(P_n) \cup \{u_iv_i, u_{i+2}v_i : 1 \leq i \leq n-2\}$.

4. Main Results

Theorem 4.1. The Jelly fish $J(n, n)$ is 4-total prime cordial for all values of n.

Proof. Let u, w, v, x be the vertices such that u, v are adjacent to x and w, w is adjacent to x. Let $u_1, u_2, \dots, u_n$ be the pendent vertices adjacent to u and $v_1, v_2, \dots, v_n$ be the pendent vertices adjacent to v. Clearly $|V(J(n, n))| + |E(J(n, n))| = 4n + 9$. We consider the following cases according as the nature of n.

Case 1. $n \equiv 0 \pmod 4$.

Let $n = 4t$, $t \in \mathbb{N}$ and $t > 1$. Assign the labels 4, 2, 3, 3 respectively to the vertices u, w, x and v. Assign the label 4 to the vertices $u_1, u_2, \dots, u_{2t}$ and assign the label 2 to the vertices $u_{2t+1}, u_{2t+2}, \dots, u_{4t}$. Next we consider the vertices v_i $(1 \leq i \leq n)$. Assign the label 3 to the vertices $v_1, v_2, \dots, v_{2t}$. Next we assign the label 4 to the vertex v_{2t+1}. Finally we assign the label 1 to the vertices $v_{2t+2}, v_{2t+3}, \dots, v_{4t}$. Clearly $t_f(1) = t_f(2) = t_f(4) = 4t + 2$ and $t_f(3) = 4t + 3$.

Case 2. $n \equiv 1 \pmod 4$.

Let $n = 4t + 1$, $t \in \mathbb{N}$ and $t > 1$. In this case, assign the same label as in case 1 to the vertices u, w, x, v, u_i $(1 \leq i \leq n-1)$ and v_i $(1 \leq i \leq n-1)$. Next assign the labels 2, 4 to the vertices u_n and v_n respectively. Here $t_f(1) = t_f(3) = t_f(4) = 4t + 3$ and $t_f(2) = 4t + 4$.

Case 3. $n \equiv 2 \pmod 4$.

Let $n = 4t + 2$, $t \in \mathbb{N}$ and $t > 1$. Assign the same label as in case 2 to the vertices u, w, x, v, u_i $(1 \leq i \leq n-1)$ and v_i $(1 \leq i \leq n-1)$. Finally we assign the labels 3, 4 to the vertices u_n and v_n respectively. It is easy to verify that $t_f(1) = 4t + 5$ and $t_f(2) = t_f(3) = t_f(4) = 4t + 4$.

Case 4. $n \equiv 3 \pmod 4$.

Let $n = 4t + 3$, $t \in \mathbb{N}$ and $t > 1$. Assign the same label as in case 3 to the vertices u, w, x, v, u_i $(1 \le i \le n-1)$ and v_i $(1 \le i \le n-1)$. Now we relabel the vertices v_{2t+2} and v_{2t+3} by 4, 2 respectively. Finally we assign the labels 3, 2 respectively to the vertices u_n and v_n . Here $t_f(1) = t_f(3) = t_f(4) = 4t + 5$ and $t_f(2) = 4t + 6$.

Case 5. $n \in \{1, 2, 3, 4, 5, 6, 7\}$.

A 4-total prime cordial labeling follows from Table 1.

□

Example 4.1. A 4-total prime cordial labeling of $J(5, 5)$ is given in Figure 1.

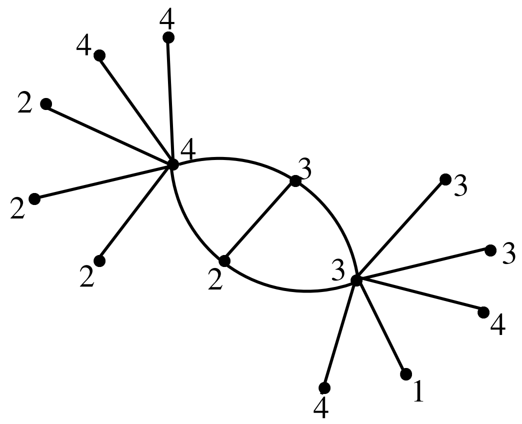

FIGURE 1

Corollary 4.1. The Jelly fish $J(m, n)$ is 4-total prime cordial if $m, n \ge 8$.

Proof. Let u, w, v, x be the vertices such that u, v are adjacent to x and w, w is adjacent to x. Let $u_1, u_2, \ldots, u_m$ be the pendent vertices adjacent to u and $v_1, v_2, \ldots, v_n$ be the pendent vertices adjacent to v. Clearly $|V(J(m, n))| + |E(J(m, n))| = 2m + 2n + 9$. We consider the following cases according as the nature of m and n.

Case 1. $m = n$.

It follows from the Theorem 4.1

n	1	2	3	4	5	6	7
u	4	4	4	4	4	4	4
w	3	2	2	2	2	2	2
x	4	2	2	3	3	3	3
v	3	3	3	3	3	3	3
u_1	2	4	4	4	4	4	4
u_2		3	3	4	4	4	4
u_3			3	2	2	2	2
u_4				2	2	2	2
u_5					2	2	3
u_6						3	3
u_7							4
v_1	2	4	4	3	3	3	3
v_2		3	3	3	3	3	3
v_3			4	4	4	4	4
v_4				1	1	1	2
v_5					4	4	4
v_6						4	2
v_7							2

TABLE 1

Case 2. $m > n$.

Subcase 1. $m \equiv 1 \pmod 4$ and $n \equiv 0 \pmod 4$.

Assign the same label as in case 1 of Theorem 4.1 to the vertices u, w, x, v, u_i $(1 \leq i \leq m-1)$ and v_i $(1 \leq i \leq n)$. Next we relabel the vertex v_{2t+2} by 4. Finally we assign the label 1 to the vertex u_m. Here $t_f(1) = t_f(3) = t_f(4) = 4t+3$ and $t_f(2) = 4t+2$.

Subcase 2. $m \equiv 2 \pmod 4$ and $n \equiv 0 \pmod 4$.

Assign the same label as in subcase 1 to the vertices u, w, x, v, u_i $(1 \leq i \leq m-1)$ and v_i $(1 \leq i \leq n)$. Finally we assign the label 2 to the vertex u_m. Clearly $t_f(1) = t_f(3) = t_f(4) = 4t+3$ and $t_f(2) = 4t+4$.

Subcase 3. $m \equiv 3 \pmod 4$ and $n \equiv 0 \pmod 4$.

Assign the same label as in subcase 2 to the vertices u, w, x, v, u_i $(1 \leq i \leq m-1)$ and v_i $(1 \leq i \leq n)$. Finally we assign the label 3 to the vertex u_m. Here $t_f(1) = t_f(2) = t_f(3) = 4t+4$ and $t_f(4) = 4t+3$.

Case 3. $m < n$.

The proof is symmetry to case 2. □

Example 4.2. A 4-total prime cordial labeling of $J(4,3)$ is given in Figure 2.

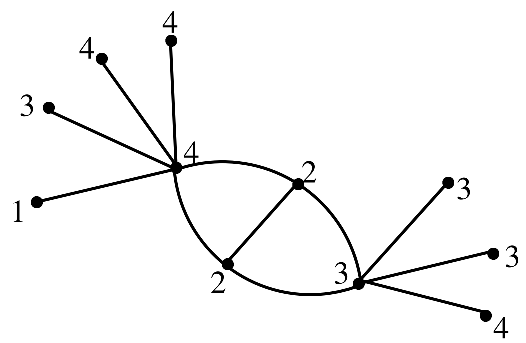

FIGURE 2

Theorem 4.2. The irregular triangular snake IT_n is 4-total prime cordial for $n \geq 4$.

Proof. Let P_n be the path $u_1u_2 \dots u_n$. Let v_i be the vertex which is adjacent to both u_i and u_{i+2} $(1 \leq i \leq n-2)$. It is easy to verify that $|V(IT_n)| + |E(IT_n)| = 5n-7$. We consider the following cases according as the nature of n.

Case 1. $n \equiv 0 \pmod 4$.

Let $n = 4t$, $t > 1$ $t \in \mathbb{N}$. Assign the label 4 to the vertices $u_1, u_2, \dots, u_t$ and assign the label 2 to the vertices $u_{t+1}, u_{t+2}, \dots, u_{2t}$. Next we assign the label 3 to the vertices

$u_{2t+1}, u_{2t+2}, \ldots, u_{3t}$ then we assign 1 to the vertices $u_{3t+1}, u_{3t+2}, \ldots, u_{4t-2}$. Finally we assign the labels 4, 3 to the vertices u_{4t-1} and u_{4t} respectively. Next we consider the vertices v_i $(1 \leq i \leq n-2)$. Assign the label 4 to the vertices $v_1, v_2, \ldots, v_t$ and assign the label 2 to the vertices $v_{t+1}, v_{t+2}, \ldots, v_{2t-1}$ and we assign the label 3 to the vertices $v_{2t}, v_{2t+1}, \ldots, v_{3t-1}$. Finally we assign the label 1 to the vertices $v_{3t}, v_{3t+1}, \ldots, v_{4t-2}$. Here $t_f(1) = 5t-1$ and $t_f(2) = t_f(3) = t_f(4) = 5t-2$.

Case 2. $n \equiv 1 \pmod 4$.

Let $n = 4t+1$, $t > 1$ $t \in \mathbb{N}$. Assign the same label as in case 1 to the vertices u_i $(1 \leq i \leq 4t-3)$ and v_i $(1 \leq i \leq 4t-4)$. Next we assign the labels 4, 4, 3, 3, 2 to the vertices u_{4t-2}, u_{4t-1}, u_{4t}, v_{4t-3} and v_{4t-2} respectively. Clearly $t_f(1) = t_f(3) = 5t-1$ and $t_f(2) = t_f(4) = 5t$.

Case 3. $n \equiv 2 \pmod 4$.

Let $n = 4t+2$, $t > 1$ $t \in \mathbb{N}$. Assign the same label as in case 1 to the vertices u_i $(1 \leq i \leq 4t-2)$ and v_i $(1 \leq i \leq 4t-5)$. Finally we assign 2, 3, 3, 4, 4 to the vertices u_{4t-1}, u_{4t}, v_{4t-4}, v_{4t-3} and v_{4t-2} respectively. It is easy to verify that $t_f(1) = t_f(3) = t_f(4) = 5t+1$ and $t_f(2) = 5t$.

Case 4. $n \equiv 3 \pmod 4$.

Let $n = 4t+3$, $t > 1$ $t \in \mathbb{N}$. Assign the same label as in case 3 to the vertices u_i $(1 \leq i \leq 4t-2)$ and v_i $(1 \leq i \leq 4t-4)$. Finally we assign the labels 4, 1, 3, 4 respectively to the vertices u_{4t-1}, u_{4t}, v_{4t-3} and v_{4t-2}. Clearly $t_f(1) = t_f(2) = t_f(3) = t_f(4) = 5t+2$.

Case 5. $n = 4, 5, 6, 7$.

A 4-total prime cordial labeling follows from Table 2.

$\square$

n	4	5	6	7
u_1	4	4	4	4
u_2	2	2	2	4
u_3	3	3	3	2
u_4	3	3	3	4
u_5		4	4	3
u_6			4	3
u_7				1
v_1	4	4	4	4
v_2	2	2	2	2
v_3		3	3	3
v_4			2	3
v_5				4

TABLE 2

Example 4.3. A 4-total prime cordial labeling of IT_7 is given in Figure 3.

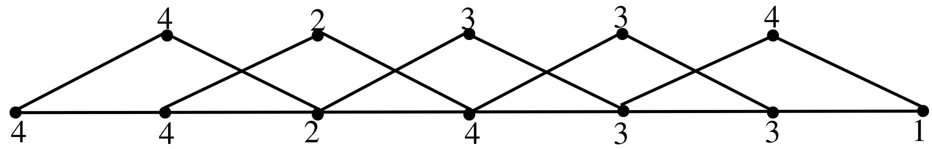

FIGURE 3

Theorem 4.3. The corona of triangular snake T_n with K_1, $T_n \odot K_1$ is 4-total prime cordial for all n.

Proof. Let P_n be the path $u_1u_2 \dots u_n$. Let $v_1, v_2, \dots, v_{n-1}$ be the vertices such that v_i is adjacent to both u_i and u_{i+1} $(1 \le i \le n-1)$. Let x_i be the pendent vertices adjacent to v_i $(1 \le i \le n-1)$. Let y_i be the pendent vertices adjacent to u_i $(1 \le i \le n)$. It is easy to verify that $|V(T_n \odot K_1)| + |E(T_n \odot K_1)| = 9n - 6$. We consider the following cases according as the nature of n.

Case 1. $n \equiv 0 \pmod 4$.

Let $n = 4t$, $t > 1$ $t \in \mathbb{N}$. First we assign the labels to the vertices u_i $(1 \le i \le n)$. Assign the label 4 to the vertices $u_1, u_2, \dots, u_t$ and assign the label 2 to the vertices $u_{t+1}, u_{t+2}, \dots, u_{2t}$. Next we assign the label 3 to the vertices $u_{2t+1}, u_{2t+2}, \dots, u_{3t}$ then we assign 1 to the vertices $u_{3t+1}, u_{3t+2}, \dots, u_{4t-1}$. Finally we assign the label 3 to the vertex u_{4t}. Next we consider the vertices v_i $(1 \le i \le n-1)$. Assign the label 4 to the vertices $v_1, v_2, \dots, v_t$ and assign the label 2 to the vertices $v_{t+1}, v_{t+2}, \dots, v_{2t-1}$ and we assign the label 3 to the vertices $v_{2t}, v_{2t+1}, \dots, v_{3t-1}$. Now we assign the label 1 to the vertices $v_{3t}, v_{3t+1}, \dots, v_{4t-3}$. Finally we assign the labels 2, 4 respectively to the vertices v_{4t-2} and v_{4t-1}. Next we move to the pendent vertices x_i $(1 \le i \le n-1)$. Assign the label 4 to the vertices $x_1, x_2, \dots, x_t$ and assign the label 2 to the vertices $x_{t+1}, x_{t+2}, \dots, x_{2t-1}$ and we assign the label 3 to the vertices $x_{2t}, x_{2t+1}, \dots, x_{3t-1}$. Finally we assign the label 1 to the vertices $x_{3t}, x_{3t+1}, \dots, x_{4t}$. Now we consider the pendent vertices y_i $(1 \le i \le n-1)$. Assign the label 4 to the vertices $y_1, y_2, \dots, y_t$ and assign the label 2 to the vertices $y_{t+1}, y_{t+2}, \dots, y_{2t}$. Next we assign the label 3 to the vertices $y_{2t+1}, y_{2t+2}, \dots, y_{3t}$ then we assign 1 to the vertices $y_{3t+1}, y_{3t+2}, \dots, y_{4t-1}$. Finally we assign the label 2 to the vertex y_{4t}. Here $t_f(1) = t_f(2) = 9t - 2$ and $t_f(3) = t_f(4) = 9t - 1$. For $t = 1$, a 4-total prime cordial labeling of $T_4 \odot K_1$ is shown in Figure 4.

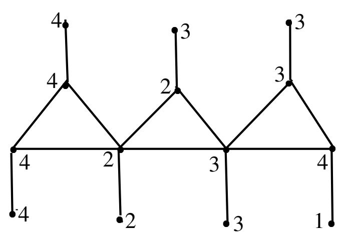

FIGURE 4

Case 2. $n \equiv 1 \pmod 4$.

Let $n = 4t + 1$, $t > 1$ $t \in \mathbb{N}$. Assign the same label as in case 1 to the vertices u_i $(1 \leq i \leq n-1)$, v_i $(1 \leq i \leq n-2)$, x_i $(1 \leq i \leq n-2)$ and y_i $(1 \leq i \leq n-1)$. Finally we assign the labels 3, 4, 2, 4 respectively to the vertices u_{4t}, v_{4t-1}, x_{4t-1} and y_{4t}. Clearly $t_f(1) = t_f(3) = t_f(4) = 9t + 1$ and $t_f(2) = 9t$. For $t = 1$, a 4-total prime cordial labeling of $T_5 \odot K_1$ is shown in Figure 5.

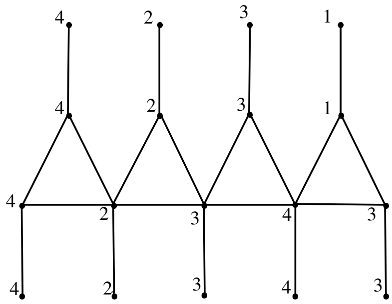

Figure 5

Case 3. $n \equiv 2 \pmod 4$.

Let $n = 4t + 2$, $t > 1$ $t \in \mathbb{N}$. Assign the same label as in case 2 to the vertices u_i $(1 \leq i \leq n-1)$, v_i $(1 \leq i \leq n-2)$, x_i $(1 \leq i \leq n-2)$ and y_i $(1 \leq i \leq n-4)$. Finally we assign the labels 4, 2, 4, 4, 3, 2, 1 respectively to the vertices u_{4t}, v_{4t-1}, x_{4t-1}, y_{4t-3}, y_{4t-2}, y_{4t-1} and y_{4t}. It is easy to verify that $t_f(1) = t_f(2) = t_f(3) = t_f(4) = 9t + 3$. For $t = 1$, a 4-total prime cordial labeling of $T_6 \odot K_1$ is shown in Figure 6.

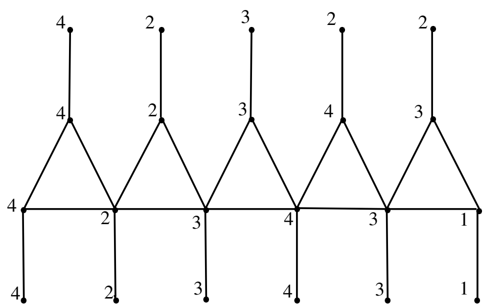

Figure 6

Case 4. $n \equiv 3 \pmod 4$.

Let $n = 4t + 3$, $t > 1$ $t \in \mathbb{N}$. For $t = 1$, a 4-total prime cordial labeling of $T_7 \odot K_1$ is shown in Figure 7.

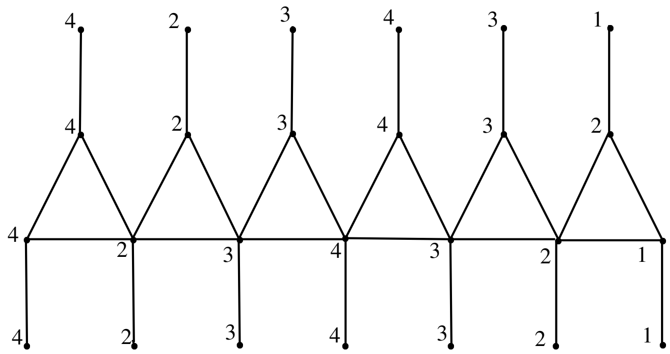

FIGURE 7

Assign the same label as in case 3 to the vertices u_i $(1 \leq i \leq n-1)$, v_i $(1 \leq i \leq n-2)$, x_i $(1 \leq i \leq n-1)$ and y_i $(1 \leq i \leq n-2)$. Finally we assign the labels 4, 3, 3, 1, 2 respectively to the vertices u_{4t}, v_{4t-1}, x_{4t-1}, y_{4t-2}, y_{4t-1} and y_{4t}. Here $t_f(1) = t_f(2) = t_f(3) = 9t + 5$ and $t_f(4) = 9t + 6$.

Case 5. $n = 2, 3$.

A 4-total prime cordial labeling follows from Table 3.

n	2	3
u_1	4	4
u_2	4	4
u_3		3
v_1	2	4
v_2		3
x_1	3	1
x_2		3
y_1	3	2

y_2	3	2
y_3		2

Table 3:

□

Example 4.4. A 4-total prime cordial labeling of $T_{12} \odot K_1$ is given in Figure 8.

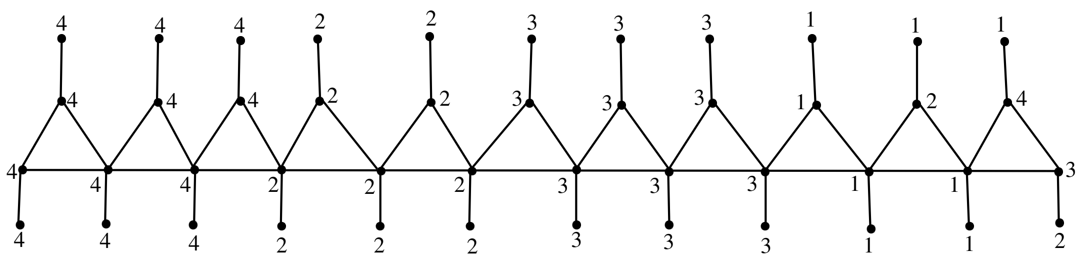

FIGURE 8

Theorem 4.4. The book B_n is 4-total prime cordial if $n \notin \{1, 4, 5\}$.

Proof. Let u, v, u_i, v_i $(1 \leq i \leq n)$ be the vertices of the book B_n and uv, uu_i, vv_i, u_iv_i $(1 \leq i \leq n)$ be the edge of the book. Clearly $|V(B_n)| + |E(B_n)| = 5n + 3$. We consider the following cases according as the nature of n.

Case 1. $n \equiv 0 \pmod 4$.

Let $n = 4t$, $t > 1$ $t \in \mathbb{N}$.

Subcase 1. t is even.

Assign the label 4 to the vertex u and 3 to the vertex v. Next we assign the label 4 to the vertices $u_1, u_2, \ldots, u_t$ and assign the label 2 to the vertices $u_{t+1}, u_{t+2}, \ldots, u_{2t}$. Next we assign the label 3 to the vertices $u_{2t+1}, u_{2t+2}, \ldots, u_{3t}$ then we assign 4 to the vertices $u_{3t+1}, u_{3t+2}, \ldots, u_{\frac{7t}{2}}$. Finally we assign the label 2 to the vertices $u_{\frac{7t}{2}+1}, \ldots, u_{4t}$. Next we move to the vertices v_i $(1 \leq i \leq n)$. Assign the label 4 to the vertices $v_1, v_2, \ldots, v_t$ and assign the label 2 to the vertices $v_{t+1}, v_{t+2}, \ldots, v_{2t}$. Next we assign the label 3 to the vertices $v_{2t+1}, v_{2t+2}, \ldots, v_{3t}, \ldots, v_{\frac{7t}{2}}$. Finally we assign the label 1 to the vertices $v_{\frac{7t}{2}+1}, \ldots, v_{4t}$. Here $t_f(1) = t_f(3) = t_f(4) = 5t + 1$ and $t_f(2) = 5t$.

Subcase 2. t is odd.

Assign the label 4 to the vertex u and 3 to the vertex v. Next we assign the label 4 to the vertices $u_1, u_2, \ldots, u_t$ and assign the label 2 to the vertices $u_{t+1}, u_{t+2}, \ldots, u_{2t}$. Next we assign the label 3 to the vertices $u_{2t+1}, u_{2t+2}, \ldots, u_{3t}$ then we assign 4 to the vertices $u_{3t+1}, u_{3t+2}, \ldots, u_{\frac{7t-1}{2}}$. Next we assign the label 2 to the vertices $u_{\frac{7t-1}{2}+1}, \ldots, u_{4t-1}$. Finally we assign the label 3 to the vertex u_{4t}. Next we move to the vertices v_i $(1 \leq i \leq n)$. Assign the label 4 to the vertices $v_1, v_2, \ldots, v_t$ and assign the label 2 to the vertices $v_{t+1}, v_{t+2}, \ldots, v_{2t}$. Next we assign the label 3 to the vertices $v_{2t+1}, v_{2t+2}, \ldots, v_{3t}, \ldots, v_{\frac{7t-1}{2}}$. Now we assign the label 2 to the vertices $v_{\frac{7t-1}{2}+1}, \ldots, v_{4t-1}$. Finally we assign the label 4 to the vertex v_{4t}. Here $t_f(1) = 5t$ and $t_f(2) = t_f(3) = t_f(4) = 5t + 1$.

Case 2. $n \equiv 1 \pmod 4$.

Let $n = 4t + 1$, $t > 1$ $t \in \mathbb{N}$. Assign the same label as in case 1 to the vertices u, v, u_i $(1 \leq i \leq 4t - 1)$ and v_i $(1 \leq i \leq 4t - 1)$. Next we relabel the vertex u_{4t-1} by 4 and v_{4t-1} by 3. Finally we assign the labels 1, 2 respectively to the vertices u_{4t} and v_{4t}. Clearly $t_f(1) = t_f(2) = t_f(3) = t_f(4) = 5t + 2$.

Case 3. $n \equiv 2 \pmod 4$.

Let $n = 4t+2$, $t > 1$ $t \in \mathbb{N}$. Assign the same label as in case 1 to the vertices u, v, u_i $(1 \leq i \leq 4t-2)$ and v_i $(1 \leq i \leq 4t-2)$. Finally we assign the labels 4, 2, 3, 1 to the vertices u_{4t-1}, u_{4t}, v_{4t-1} and v_{4t} respectively. It is easy to verify that $t_f(1) = 5t + 4$ and $t_f(2) = t_f(3) = t_f(4) = 5t + 3$.

Case 4. $n \equiv 3 \pmod 4$.

Let $n = 4t + 3$, $t > 1$ $t \in \mathbb{N}$. Assign the same label as in case 3 to the vertices u, v, u_i $(1 \le i \le 4t - 2)$ and v_i $(1 \le i \le 4t - 2)$. Finally we assign the labels 2, 3, 2, 4 respectively to the vertices u_{4t-1}, u_{4t}, v_{4t-1} and v_{4t}. Here $t_f(1) = t_f(2) = 5t + 5$ and $t_f(3) = t_f(4) = 5t + 4$.

Case 5. $n = 2, 3, 6, 7$.

A 4-total prime cordial labeling follows from Table 4.

n	2	3	6	7
u	4	4	4	4
v	3	3	3	3
u_1	4	4	4	4
u_2	2	4	4	4
u_3		2	4	3
u_4			3	3
u_5			2	2
u_6			2	2
u_7				2
v_1	3	3	3	4
v_2	2	3	3	4
v_3		2	3	3
v_4			4	3
v_5			2	2
v_6			2	2
v_7				1

Table 4:

□

Example 4.5. A 4-total prime cordial labeling of B_6 is given in Figure 9.

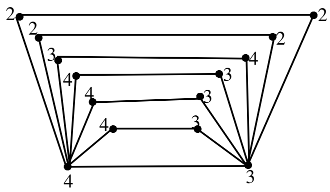

FIGURE 9

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