

Special Class Extended Mean Cordial Graphs

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Abstract

Let $G = (V, E)$ be a graphs with p vertices and q edges. An Extended Mean Cordial Labeling of a Graph G with vertex set V is a bijection from V to $\{-1, 0, 1\}$ such that each edge uv is assigned the label $(|f(u)+f(v)|)/2$ where $|x|$ is the least integer greater than or equal to x with the condition that the number of vertices labeled with 0 and the number of vertices labeled with 1 differ by at most 1 and the number of edges labeled with 0 and the number of edges labeled with 1 differ by almost 1. The graph that admits an Extended Mean Cordial Labeling is called Extended Mean Cordial Graph. In this paper, we proved that special graphs(umbrella), $Q(n)$, $(P_n: C_3)$ are Extended Mean Cordial Graphs.

Keywords: Extended Mean Cordial Graph, Extended Mean Cordial Labeling

2000 mathematics Subject classification 05C78

I. INTRODUCTION

A graph G is finite nonempty set of objects called vertices together with a set of unordered pairs of distinct vertices of G which is called edges. Each pair $e = \{u, v\}$ of vertices in E is called edges or a line of G . In this paper, we proved that special graphs(umbrella), $Q(n)$, $(P_n: C_3)$ are Extended Mean Cordial Graphs. For graph theory terminology we follow[2].

II. PRELIMINARIES

Let $G = (V, E)$ be a graphs with p vertices and q edges. A Extended Mean Cordial Labeling of a Graph G with vertex set V is a bijection from V to $\{-1, 0, 1\}$ such that each edge uv is assigned the label $(|f(u)+f(v)|)/2$ where $|x|$ is the least integer greater than or equal to x with the condition that the number of vertices labeled with 0 and the number of vertices labeled with 1 differ by at most 1 and the number of edges labeled with 0 and the number of edges labeled with 1 differ by almost 1. The graph that admits an Extended Mean Cordial Labeling is called Extended Mean Cordial Graph. In this paper, we proved that special graphs (umbrella), $Q(n)$, $(P_n: C_3)$ are Extended Mean Cordial Graphs.

A. Definition 2.3.1

Umbrella is a graph obtained from a Fan by joining a path of length m , P_m to a middle vertex of a path P_n is Fan F_n . It is denoted by $U(m, n)$.

B. Definition 2.3.2

A Quadrilateral snake is a graph obtained from the path P_n by replacing every edge of the path with C_4 . It is denoted by Q_n .

C. Definition 2.3.3

If is graph obtained from path by joining each vertex og a path through an edge to any one of the vertex cycle C_4 .

III. MAIN RESULT

A. Theorem: 3.1

Graph (umbrella) is a extended mean cordial graph

1) Proof:

Let $v() = \{[w_1, w_2, w_3, v_i: 1 \leq i \leq n]\}$

Let $E() = \{[(w_1 v_i): 1 \leq i \leq n] \cup [(w_1 w_2) \cup (w_2 w_3)]\}$

Define $f: v() \rightarrow \{-1, 0, 1\}$ by

The vertex labeling are

$$f(v_i) = \begin{cases} f(w_1) = 1, 1 \leq i \leq n \\ -1 \text{ if } i \equiv 1 \pmod{2} \\ 0 \text{ if } i \equiv 0 \pmod{2} \end{cases}, 1 \leq i \leq n$$

$$f(w_1) = 1, 1 \leq i \leq n$$

$$f(w_2) = 0, 1 \leq i \leq n$$

The induced edge labeling is

$$\begin{aligned} f^*(w_1 v_i) &= 0, 1 \leq i \leq n \\ f^*(w_1 w_2) &= 1, 1 \leq i \leq n \\ f^*(w_2 w_3) &= 0, 1 \leq i \leq n \end{aligned}$$

Here, When $n = 2m$

$$ef(0) = 2m+1, ef(1) = 2m$$

When $n = 2m+1$

$$ef(0) = 2m+2, ef(1) = 2m+1$$

Hence, umbrella satisfies the condition $|ef(0)-ef(1)| \leq 1$

Therefore, umbrella is extended mean cordial graph

For example, umbrella is extended mean cordial graphs as shown in the figure 1.

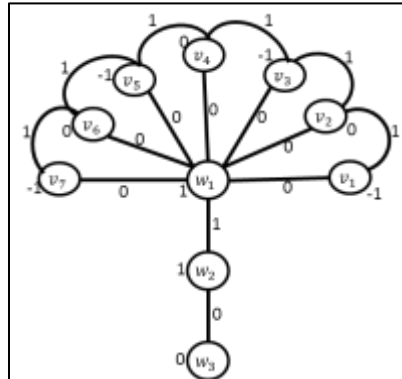


Fig. 1: (umbrella)

B. Theorem: 3.3

Graph $Q(n)$ is a extended mean cordial graph

1) Proof:

$$\text{Let } v(Q(n)) = \{(v_i): 1 \leq i \leq n, (u_{i1}u_{i2}): 1 \leq i \leq n-1\}$$

$$\text{Let } E(Q(n)) = \{(v_i v_{i+1}) \cup (v_i u_{i1}) \cup (v_{i+1} u_{i2}): 1 \leq i \leq n-1\} \cup \{(u_{i1} u_{i2}): 1 \leq i \leq n-1\}$$

Define $f: v(Q(n)) \rightarrow \{-1, 0, 1\}$ by

$$\begin{aligned} f(u_{i1}) &= -1, 1 \leq i \leq n-1 \\ f(u_{i2}) &= 0, 1 \leq i \leq n-1 \\ f(v_i) &= 1, 1 \leq i \leq n \end{aligned}$$

The vertex labeling are

The induced edge labeling are

$$\begin{aligned} f^*(u_{i1} u_{i2}) &= 1, 1 \leq i \leq n-1 \\ f^*(v_i v_{i+1}) &= 1, 1 \leq i \leq n-1 \\ f^*(v_i u_{i1}) &= 0, 1 \leq i \leq n-1 \\ f^*(v_{i+1} u_{i2}) &= 0, 1 \leq i \leq n-1 \end{aligned}$$

Here, When $n = 2m$

$$ef(0) = ef(1) = 4m-2$$

When $n=2m+1$

$$ef(0) = ef(1) = 4m$$

Hence, $Q(n)$ is satisfies the condition $|ef(0)-ef(1)| \leq 1$

Therefore, $Q(n)$ is a extended mean cordial graph

For example, $Q(n)$ is a extended mean cordial graph as shown in figure 2.

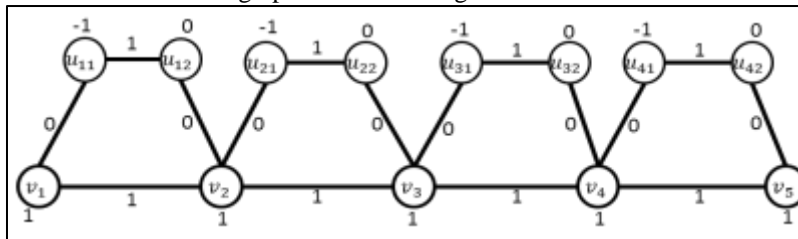


Fig. 2: $Q(n)$

C. Theorem: 3.5

Graph $(P_n: C_3)$ is a extended mean cordial graph

Proof:

Let $v(P_n: C_3) = \{[u_i, v_i, w_i, v_{i1}, v_{i2}: 1 \leq i \leq n]\}$

Let $E(P_n: C_3) = \{[(u_i u_{i+1}): 1 \leq i \leq n-1] \cup [(u_i v_i) \cup (v_i v_{i1})$

$\cup (v_i v_{i2}) \cup (v_{i1} w_i) \cup (v_{i2} w_i): 1 \leq i \leq n]\}$

Define $f: v(P_n: C_3) \rightarrow \{-1, 0, 1\}$ by

$f(u_i) = 1, 1 \leq i \leq n$

$f(w_i) = 1, 1 \leq i \leq n$

$f(v_i) = -1, 1 \leq i \leq n$

$f(v_{i1}) = 1, 1 \leq i \leq n$

$f(v_{i2}) = 0, 1 \leq i \leq n$

The vertex labeling are

$f^*(u_i u_{i+1}) = 1, 1 \leq i \leq n-1$

$f^*(u_i v_i) = 0, 1 \leq i \leq n$

$f^*(v_i v_{i1}) = 0, 1 \leq i \leq n$

$f^*(v_i v_{i2}) = 1, 1 \leq i \leq n$

$f^*(v_{i1} w_i) = 1, 1 \leq i \leq n$

$f^*(v_{i2} w_i) = 0, 1 \leq i \leq n$

The induced edge labeling are

Here, When $n = m$

$ef(0) = 3m, ef(1) = 3m-1$

Hence, $(P_n: C_3)$ is satisfies the condition $|ef(0)-ef(1)| \leq 1$

Therefore, $(P_n: C_3)$ is a extended mean cordial graph

For example, $(P_n: C_3)$ is a extended mean cordial graph as shown in figure 3.

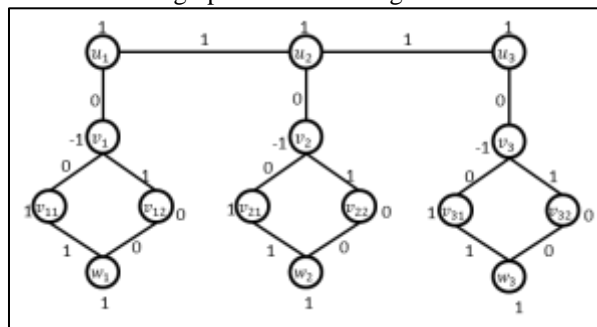


Fig. 3: $6(P_n: C_3)$

REFERENCES

- [1] Gallian J.A, A Dynamic Survey of Graph Labelling, The Electronic Journal of Combinatorics, 6 (2001) #DS6
- [2] Harray. F, Graph Theory, Adadison-Wesley Publishing Company Inc, USA, 1969
- [3] A.Nellai Murugan and V.Baby Suganya, A study on cordial labeling of star Attached C_3 and $(2k+1)C_3$ ISSN 2321 8835, Outreach , A Multi Disciplinary Refreed Journal, Volume . VII, 2014, 142 -147. I.F 6.531
- [4] A.Nellai Murugan and V.Brinda Devi , A study on Star Related Divisor cordial Graphs ,ISSN 2321 8835, Outreach , A Multi Disciplinary Refreed Journal, Volume . VII, 2014, 169-172. I.F 6.531
- [5] A.Nellai Murugan and M. Taj Nisha, A study on Divisor Cordial Labeling Star Attached Path Related Graphs, ISSN 2321 8835, Outreach , A Multi Disciplinary Refreed Journal, Volume . VII, 2014, 173-178. I.F 6.531
- [6] A. Nellai Murugan and V .Sripratha, Mean Square Cordial Labelling , International Journal of Innovative Research & Studies, ISSN 2319-9725 ,Volume 3, Issue 10Number 2 ,October 2014, PP 262-277.
- [7] A.Nellai Murugan and A.L Poornima ,Meanness of Special Class Of Graphs, International Journal of Mathematical Archive. ISSN 2229-5046, Vol 5 , issue 8, 2014, PP 151-158.
- [8] A.Nellai Murugan and A.Mathubala, Path Related Homo- cordial graphs, International Journal of Innovative Science, Engineering & Technology , ISSN 2348-7968, Vol.2, Issue 8 ,August. 2015,PP 888-892. IF 1.50,IBI-Factor 2.33
- [9] A.Nellai Murugan ,V.Selva Vidhya and M Mariasingam, Results On Hetro- cordial graphs, International Journal of Innovative Science, Engineering & Technology , ISSN 2348-7968, Vol.2, Issue 8 ,August. 2015,PP 954-959. IF 1.50,IBI-Factor 2.33
- [10] A.Nellai Murugan , and R.Megala, Path Related Relaxed Cordial Graphs , International Journal of Scientific Engineering and Applied Science (IJSEAS) - ISSN: 2395-3470, Volume-1, Issue-6, September ,2015 ,PP 241-246 IF ISRA 0.217.
- [11] A.Nellai Murugan and J.Shiny Priyanka, Tree Related Extended Mean Cordial Graphs, International Journal of Research -Granthaalayah, ISSN 2350-0530, Vol.3, Issue 9 ,September. 2015, PP 143-148. I .F . 2.035(I2OR).
- [12] A.Nellai Murugan and S.Heerajohn, Cycle Related Mean Square Cordial Graphs, International Journal Of Research & Development Organization – Journal of Mathematics, Vol.2, Issue 9 ,September. 2015, PP 1-11.
- [13] A.Nellai Murugan and A.Mathubala, Special Class Of Homo- Cordial Graphs, International Journal Emerging Technologies in Engineering Research, ISSN 2524-6410, Vol.2, Issue 3 ,October 2015, PP 1-5.

- [14] A.Nellai Murugan , and R.Megala ,Tree Related Relaxed Cordial Graphs, International Journal of Multi disciplinary Research & Development , ISSN: 2349-4182,Volume-2, Issue-10, October ,2015 ,PP 80-84 . IF 5.742.
- [15] A.Nellai Murugan , and A.Mathubala ,Cycle Related Homo-Cordial Graphs , International Journal of Multi disciplinary Research & Development, ISSN: 2349-4182,Volume-2, Issue-10, October ,2015 ,PP 84-88 . IF 5.742.
- [16] L. Pandiselvi , A. Nellai Murugan , and S. Navaneethakrishnan , Some Results on Near Mean Cordial , Global Journal of Mathematics , ISSN 2395-4760,Volume 4,No : 2, August-2015, PP 420-427.
- [17] A.Nellai Murugan and V.Selvavidhya , Path Related Hetro- Cordial Graphs, International Journal Emerging Technologies in Engineering Research, ISSN 2524-6410,Vol.2, Issue 3 ,October 2015, PP 9-14.
- [18] A.Nellai Murugan and S.Heerajohn, Special Class of Mean Square Cordial Graphs, International Journal Of Applied Research ,ISSN 2394-7500,Vol.1, Issue 11 ,Part B , October 2015, PP 128-131.IF 5.2
- [19] A.Nellai Murugan and J.Shinny Priyanka , Extended Mean Cordial Graphs of Snakes ,International Journal Emerging Technologies in Engineering Research, ISSN 2524-6410,Vol.3, Issue 1 ,October 2015, PP 6-10.
- [20] A.Nellai Murugan and R.Megala Special Class of Relaxed Cordial Graphs ,International Journal Emerging Technologies in Engineering Research, ISSN 2524-6410,Vol.3, Issue 1 ,October 2015, PP 11-14.
- [21] A.Nellai Murugan and P. Iyadurai Selvaraj, Cycle and *Armed Cap Cordial graphs*, Global Scholastic Research Journal of Multidisciplinary , ISSN 2349-9397,Volume , Issue 11, October 2015, PP 1-14. ISRA 0.416
- [22] A.Nellai Murugan and J.Shinny Priyanka , Path Related Extended Mean Cordial Graphs ,International Journal of Resent Advances in Multi- Disciplinary Research, ISSN 2350-0743,Vol.2, Issue 10 ,October 2015, PP 0836-0840. I F 1.005.
- [23] A.Nellai Murugan and G.Devakiruba., Divisor cordial labeling of Book and $C_n @_{K_{1,n}}$. OUTREACH, A Multi-Disciplinary Refereed Journal, Volume VIII, 2015, Pp. 86-92.
- [24] A. Nellai Murugan and P. Iyadurai Selvaraj, Path Related Cap Cordial Graphs, OUTREACH, A Multi- Disciplinary Refereed Journal, Volume VIII, 2015, Pp. 100-106.
- [25] A. Nellai Murugan, and A.Meenakshi Sundari, Product Cordial Graph of Umbrella and $C_4 @ S_n$. OUTREACH , A Multi-Disciplinary Refereed Journal, Volume VIII, 2015, Pp. 113 – 119.
- [26] A. Nellai Murugan, and V.Sripriatha, Mean Square Cordial Labeling, OUTREACH, A Multi-Disciplinary Refereed Journal, Volume VIII, 2015, Pp. 125 – 131.
- [27] A.Nellai Murugan and A.L.Poornima, Meanness of Special Class of Graph, OUTREACH, A Multi-Disciplinary Refereed Journal, Volume VIII, 2015, Pp. 140 – 145.
- [28] A.Nellai Murugan and G.Esther, Mean Cordial Labeling of Star, Bi-Star and Wheel, OUTREACH , A Multi-Disciplinary Refereed Journal, Volume VIII, 2015, Pp. 155 – 160.
- [29] A. Nellai Murugan and P. Iyadurai Selvaraj, Cycle & Armed Cap Cordial Graphs, International Journal of Mathematical Combinatorics, ISSN 1937 1055 , Volume II, June 2016, Pp. 144-152.
- [30] A.Nellai Murugan and V.Baby Suganya, A study on cordial labeling of star Attached C_3 and $(2k+1)C_3$ ISSN 2321 8835, Outreach , A Multi Disciplinary Refreed Journal, Volume . VII, 2014, 142 -147. I.F 6.531
- [31] A.Nellai Murugan and V.Brinda Devi , A study on Star Related Divisor cordial Graphs ,ISSN 2321 8835, Outreach , A Multi Disciplinary Refreed Journal, Volume . VII, 2014, 169-172. I.F 6.531
- [32] A.Nellai Murugan and M. Taj Nisha, A study on Divisor Cordial Labeling Star Attached Path Related Graphs, ISSN 2321 8835, Outreach , A Multi Disciplinary Refreed Journal, Volume . VII, 2014, 173-178. I.F 6.531
- [33] A. Nellai Murugan and V. Sripriatha, Mean Square Cordial Labelling , International Journal of Innovative Research & Studies, ISSN 2319-9725 ,Volume 3, Issue 10Number 2 ,October 2014, PP 262-277.
- [34] A.Nellai Murugan and A.L.Poornima ,Meanness of Special Class Of Graphs, International Journal of Mathematical Archive. ISSN 2229-5046, Vol 5 , issue 8, 2014, PP 151-158.
- [35] A.Nellai Murugan and A.Mathubala, Path Related Homo- cordial graphs, International Journal of Innovative Science, Engineering & Technology , ISSN 2348-7968,Vol.2, Issue 8 ,August. 2015,PP 888-892. IF 1.50,IBI-Factor 2.33
- [36] A.Nellai Murugan ,V.Selva Vidhya and M Mariasingam, Results On Hetro- cordial graphs, International Journal of Innovative Science, Engineering & Technology , ISSN 2348-7968,Vol.2, Issue 8 ,August. 2015,PP 954-959. IF 1.50,IBI-Factor 2.33
- [37] A.Nellai Murugan , and R.Megala, Path Related Relaxed Cordial Graphs , International Journal of Scientific Engineering and Applied Science (IJSEAS) - ISSN: 2395-3470,Volume-1, Issue-6, September ,2015 ,PP 241-246 IF ISRA 0.217.
- [38] A.Nellai Murugan and J.Shiny Priyanka, Tree Related Extended Mean Cordial Graphs, International Journal of Research -Granthaalayah, ISSN 2350-0530,Vol.3, Issue 9 ,September. 2015, PP 143-148. I .F . 2.035(I2OR).
- [39] A.Nellai Murugan and S.Heerajohn, Cycle Related Mean Square Cordial Graphs, International Journal Of Research & Development Organization – Journal of Mathematics,Vol.2, Issue 9 ,September. 2015, PP 1-11.
- [40] A.Nellai Murugan and A.Mathubala, Special Class Of Homo- Cordial Graphs, International Journal Emerging Technologies in Engineering Research, ISSN 2524-6410,Vol.2, Issue 3 ,October 2015, PP 1-5.
- [41] A.Nellai Murugan , and R.Megala ,Tree Related Relaxed Cordial Graphs, International Journal of Multi disciplinary Research & Development , ISSN: 2349-4182,Volume-2, Issue-10, October ,2015 ,PP 80-84 . IF 5.742.
- [42] A.Nellai Murugan , and A.Mathubala ,Cycle Related Homo-Cordial Graphs , International Journal of Multi disciplinary Research & Development, ISSN: 2349-4182,Volume-2, Issue-10, October ,2015 ,PP 84-88 . IF 5.742.
- [43] L. Pandiselvi , A. Nellai Murugan , and S. Navaneethakrishnan , Some Results on Near Mean Cordial , Global Journal of Mathematics , ISSN 2395-4760,Volume 4,No : 2, August-2015, PP 420-427.
- [44] A.Nellai Murugan and V.Selvavidhya , Path Related Hetro- Cordial Graphs, International Journal Emerging Technologies in Engineering Research, ISSN 2524-6410,Vol.2, Issue 3 ,October 2015, PP 9-14.
- [45] A.Nellai Murugan and S.Heerajohn, Special Class of Mean Square Cordial Graphs, International Journal Of Applied Research ,ISSN 2394-7500,Vol.1, Issue 11 ,Part B , October 2015, PP 128-131.IF 5.2
- [46] A.Nellai Murugan and J.Shinny Priyanka , Extended Mean Cordial Graphs of Snakes ,Priyanka , International Journal Emerging Technologies in Engineering Research, ISSN 2524-6410,Vol.3, Issue 1 ,October 2015, PP 6-10.
- [47] A.Nellai Murugan and R.Megala Special Class of Relaxed Cordial Graphs ,International Journal Emerging Technologies in Engineering Research, ISSN 2524-6410,Vol.3, Issue 1 ,October 2015, PP 11-14.
- [48] A.Nellai Murugan and P. Iyadurai Selvaraj, Cycle and *Armed Cap Cordial graphs*, Global Scholastic Research Journal of Multidisciplinary , ISSN 2349-9397,Volume , Issue 11, October 2015, PP 1-14. ISRA 0.416
- [49] A.Nellai Murugan and J.Shinny Priyanka , Path Related Extended Mean Cordial Graphs ,International Journal of Resent Advances in Multi- Disciplinary Research, ISSN 2350-0743,Vol.2, Issue 10 ,October 2015, PP 0836-0840. I F 1.005.
- [50] A.Nellai Murugan and G.Devakiruba., Divisor cordial labeling of Book and $C_n @_{K_{1,n}}$. OUTREACH, A Multi-Disciplinary Refereed Journal, Volume VIII, 2015, Pp. 86-92.

- [51] A. Nellai Murugan and P. Iyadurai Selvaraj, Path Related Cap Cordial Graphs, OUTREACH, A Multi- Disciplinary Refereed Journal, Volume VIII, 2015, Pp. 100-106.
- [52] A. Nellai Murugan, and A.Meenakshi Sundari, Product Cordial Graph of Umbrella and $C_4 @ S_n$, OUTREACH , A Multi-Disciplinary Refereed Journal, Volume VIII, 2015, Pp. 113 – 119.
- [53] A. Nellai Murugan, and V.Sripratha, Mean Square Cordial Labeling, OUTREACH, A Multi-Disciplinary Refereed Journal, Volume VIII, 2015, Pp. 125 – 131.
- [54] A.Nellai Murugan and A.L.Poornima, Meanness of Special Class of Graph, OUTREACH, A Multi-Disciplinary Refereed Journal, Volume VIII, 2015, Pp. 140 – 145.
- [55] A.Nellai Murugan and G.Esther, Mean Cordial Labeling of Star, Bi-Star and Wheel, OUTREACH , A Multi-Disciplinary Refereed Journal, Volume VIII, 2015, Pp. 155 – 160.
- [56] A. Nellai Murugan and P. Iyadurai Selvaraj, Cycle & Armed Cap Cordial Graphs, International Journal of Mathematical Combinatorics, ISSN 1937 1055 , Volume II, June 2016, Pp. 144-152.