

PRISM RELATED ANALYTIC MEAN CORDIAL GRAPH

Dr. A. Nellai Murugan and S.Frieda Mary Robina

Department of Mathematics

V.O.Chidambaram College

Tuticorin 628008

Abstract – Let $G = (V, E)$ be a graph with p vertices and q edges. A Analytic Mean Cordial Labeling of a Graph G with vertex set V is a bijection from V to $\{-1, 1\}$ such that edge uv is assigned the label $|f(u) - f(v)|/2$ with the condition that the number of vertices labeled with -1 and the number of vertices labeled with 1 differ by at most 1 and the number of edges labeled with 1 and the number of edges labeled with 0 differ at most 1 . The graph that admits a Analytic Mean Cordial Labelling is called Analytic Mean Cordial Graph. In this paper, we proved that prism related graphs Prism $P_n \times C_4$, Prism $P_n \times C_3$, Prism $P_n \times C_8$ are Analytic Mean Cordial Graphs.

Keywords – Analytic Mean Cordial Graph, Analytic Mean Cordial Labeling.

2000 Mathematics Subject classification 05C78.

I. INTRODUCTION

A Graph G is a finite nonempty set of object 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 prism related graphs Prism $P_n \times C_4$, Prism $P_n \times C_3$ Prism, $P_n \times C_8$ are Analytic Mean Cordial Graphs. For graph theory terminology, we follow [2].

II. PRELIMINARIES

Let $G = (V, E)$ be a graph with p vertices and q edges. A Analytic Mean Cordial Labeling of a Graph G with vertex set V is a bijection from V to $\{-1, 1\}$ such that edge uv is assigned the label $|f(u) - f(v)|/2$ with the condition that the number of vertices labeled with -1 and the number of vertices labeled with 1 differ

by atmost 1 and the number of edges labeled with 1 and the number of edges labeled with 0 differ atmost 1.

The graph that admits a Analytic Mean Cordial Labeling is called Analytic Mean Cordial Graph. In this paper, we proved that related graphs Prism $P_n \times C_3$, Prism $P_n \times C_4$ Prism, $P_n \times C_8$ are Analytic Mean Cordial Graphs.

Definition: 2.1

The Prism $P_n \times C_3$ and $P_n \times C_4$ is obtained taking the Cartesian product of path P_n with cycle C_n .

3.Main Result

THEOREM:3.1

Prism $P_n \times C_3$ is Analytic Mean Cordial Graph.

Proof:

Let G be $P_n \times C_3$

Let $V(G) = \{ u_i, w_i, v_i : 1 \leq i \leq n \}$

Let $E(G) = \{ [(u_i u_{i+1}) \cup (v_i v_{i+1}) \cup (u_i v_i) \cup (w_i w_{i+1}) \cup (w_i v_i) \cup (u_i w_i) : 1 \leq i \leq n - 1] \}$

Define $f : V(G) \rightarrow \{-1, 1\}$

The vertex labeling are ,

$$\begin{aligned}
 f(u_i) &= 1 \\
 f(v_i) &= -1 \quad 1 \leq i \leq n \\
 f(w_i) &= \begin{cases} 1 & i \equiv 1 \pmod{2} \\ -1 & i \equiv 0 \pmod{2} \end{cases} \quad 1 \leq i \leq n
 \end{aligned}$$

The induced edge labeling are,

$$f^*(u_i u_{i+1}) = 0 \quad 1 \leq i \leq n - 1$$

$$f^*(v_i v_{i+1}) = 0 \quad 1 \leq i \leq n - 1$$

$$f^*(w_i w_{i+1}) = 1 \quad 1 \leq i \leq n - 1$$

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

$$f^*(w_i v_i) = \begin{cases} 1 & i \equiv 1 \pmod{2} \\ 0 & i \equiv 0 \pmod{2} \end{cases} \quad 1 \leq i \leq n$$

$$f^*(w_i u_i) = \begin{cases} 0 & i \equiv 1 \pmod{2} \\ 1 & i \equiv 0 \pmod{2} \end{cases} \quad 1 \leq i \leq n$$

Here,

When $n = 2m$, $m > 0$

$$v_f(1) = v_f(-1) = 3m \text{ and}$$

$$e_f(1) = 6m - 1, \quad e_f(0) = 6m - 2$$

When $n = 2m + 1$, $m > 0$

$$v_f(1) = 3m + 2, \quad v_f(-1) = 3m + 1 \text{ and}$$

$$e_f(1) = 6m + 2, \quad e_f(0) = 6m + 1$$

Therefore, $P_n \times C_3$ satisfies the conditions

$$|v_f(1) - v_f(-1)| \leq 1$$

$$|e_f(1) - e_f(0)| \leq 1$$

Hence, $P_n \times C_3$ is Analytic Mean Cordial Graph.

For example, The Analytic Mean Cordial Graph $P_3 \times C_3$ are shown in the figure

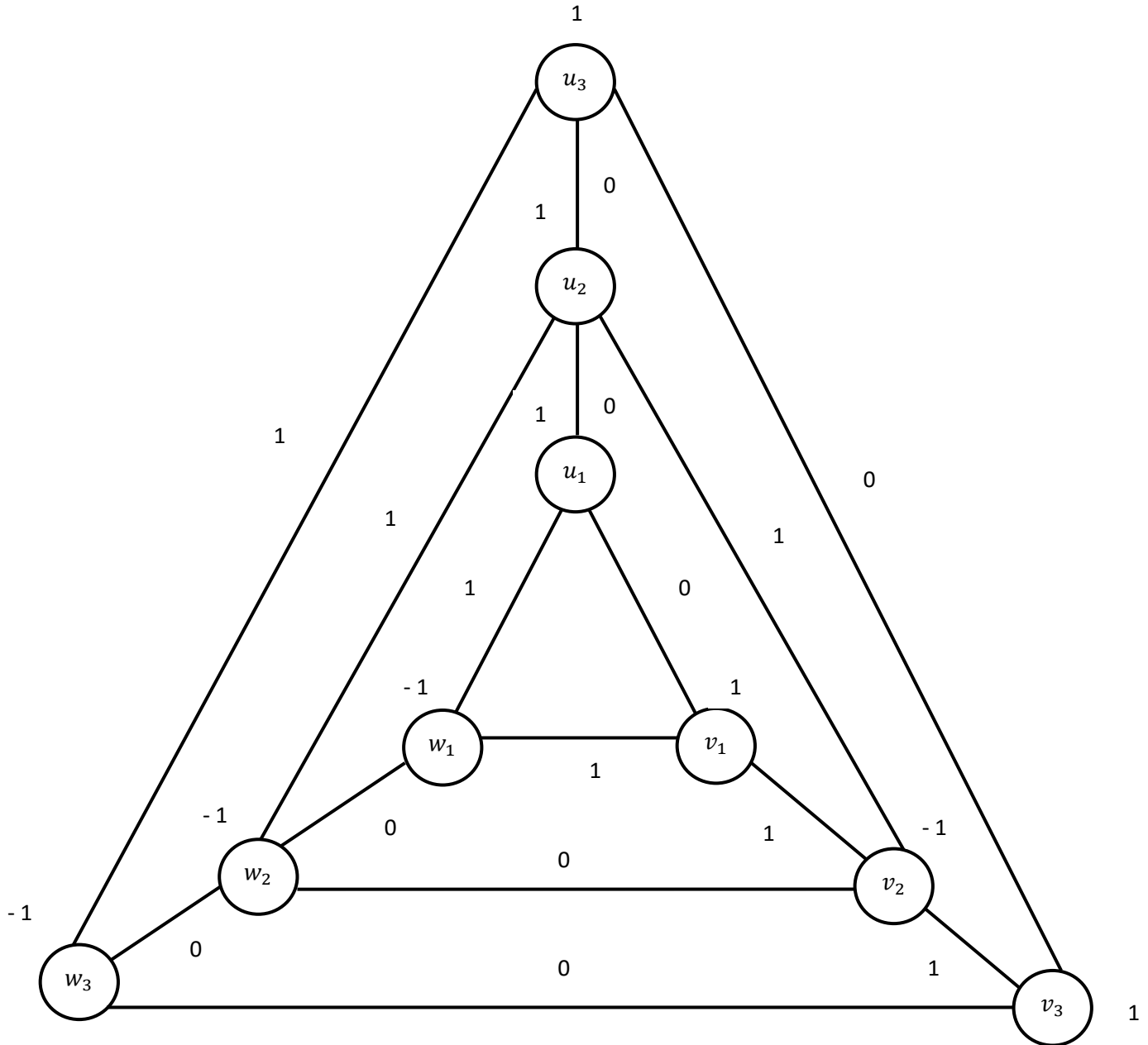


Figure 3.2

THEOREM:3.3

Prism $P_n \times C_4$ is Analytic Mean Cordial Graph.

Proof:

Let G be $P_n \times C_4$

Let $V(G) = \{ u_{ij} : 1 \leq i \leq n, 1 \leq j \leq 4 \}$

Let $E(G) = \{ [(u_{i1}v_{(i+1)1}) \cup (u_{i2}v_{(i+1)2}) \cup (u_{i3}v_{(i+1)3}) \cup (u_{i4}v_{(i+1)4})] : 1 \leq i \leq n - 1 \} \cup \{ (u_{1i}u_{2i}) \cup (u_{2i}u_{3i}) \cup (u_{3i}u_{4i}) \cup (u_{4i}u_{1i}) : 1 \leq i \leq n \}$

Define $f : V(G) \rightarrow \{-1, 1\}$

The vertex labeling are ,

$$\begin{aligned}
 f(u_{4i}) &= 1 & 1 \leq i \leq n \\
 f(u_{2i}) &= -1 & 1 \leq i \leq n \\
 f(u_{1i}) &= \begin{cases} 1 & i \equiv 1 \pmod{2} \\ -1 & i \equiv 0 \pmod{2} \end{cases} & 1 \leq i \leq n \\
 f(u_{3i}) &= \begin{cases} 1 & i \equiv 1 \pmod{2} \\ -1 & i \equiv 0 \pmod{2} \end{cases} & 1 \leq i \leq n
 \end{aligned}$$

The induced edge labeling are,

$$\begin{aligned}
 f^*(u_{1i}u_{2i}) &= \begin{cases} 1 & i \equiv 1 \pmod{2} \\ 0 & i \equiv 0 \pmod{2} \end{cases} & 1 \leq i \leq n \\
 f^*(u_{2i}u_{3i}) &= \begin{cases} 1 & i \equiv 0 \pmod{2} \\ 0 & i \equiv 1 \pmod{2} \end{cases} & 1 \leq i \leq n
 \end{aligned}$$

$$f^*(u_{3i}u_{4i}) = \begin{cases} 1 & i \equiv 1 \pmod{2} \\ 0 & i \equiv 0 \pmod{2} \end{cases} \quad 1 \leq i \leq n$$

$$f^*(u_{4i}u_{1i}) = \begin{cases} 1 & i \equiv 0 \pmod{2} \\ 0 & i \equiv 1 \pmod{2} \end{cases} \quad 1 \leq i \leq n$$

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

$$f^*(u_{3i}u_{3(i+1)}) = 1 \quad 1 \leq j \leq n - 1$$

$$f^*(u_{2i}u_{2(i+1)}) = 0 \quad 1 \leq j \leq n - 1$$

$$f^*(u_{4i}u_{4(i+1)}) = 0 \quad 1 \leq j \leq n - 1$$

Here,

When $n = 2m$, $m > 0$

$$v_f(1) = v_f(-1) = 4m \text{ and}$$

$$e_f(1) = e_f(0) = 8m - 2$$

When $n = 2m + 1$, $m > 0$

$$v_f(1) = v_f(-1) = 4m + 2 \text{ and}$$

$$e_f(1) = e_f(0) = 8m + 2$$

Therefore, $P_n \times C_4$ satisfies the conditions

$$|v_f(1) - v_f(-1)| \leq 1$$

$$|e_f(1) - e_f(0)| \leq 1$$

Hence, $P_n \times C_4$ is Analytic Mean Cordial Graph.

For example, The Analytic Mean Cordial Graph $P_3 \times C_4$ are shown in the figure 1

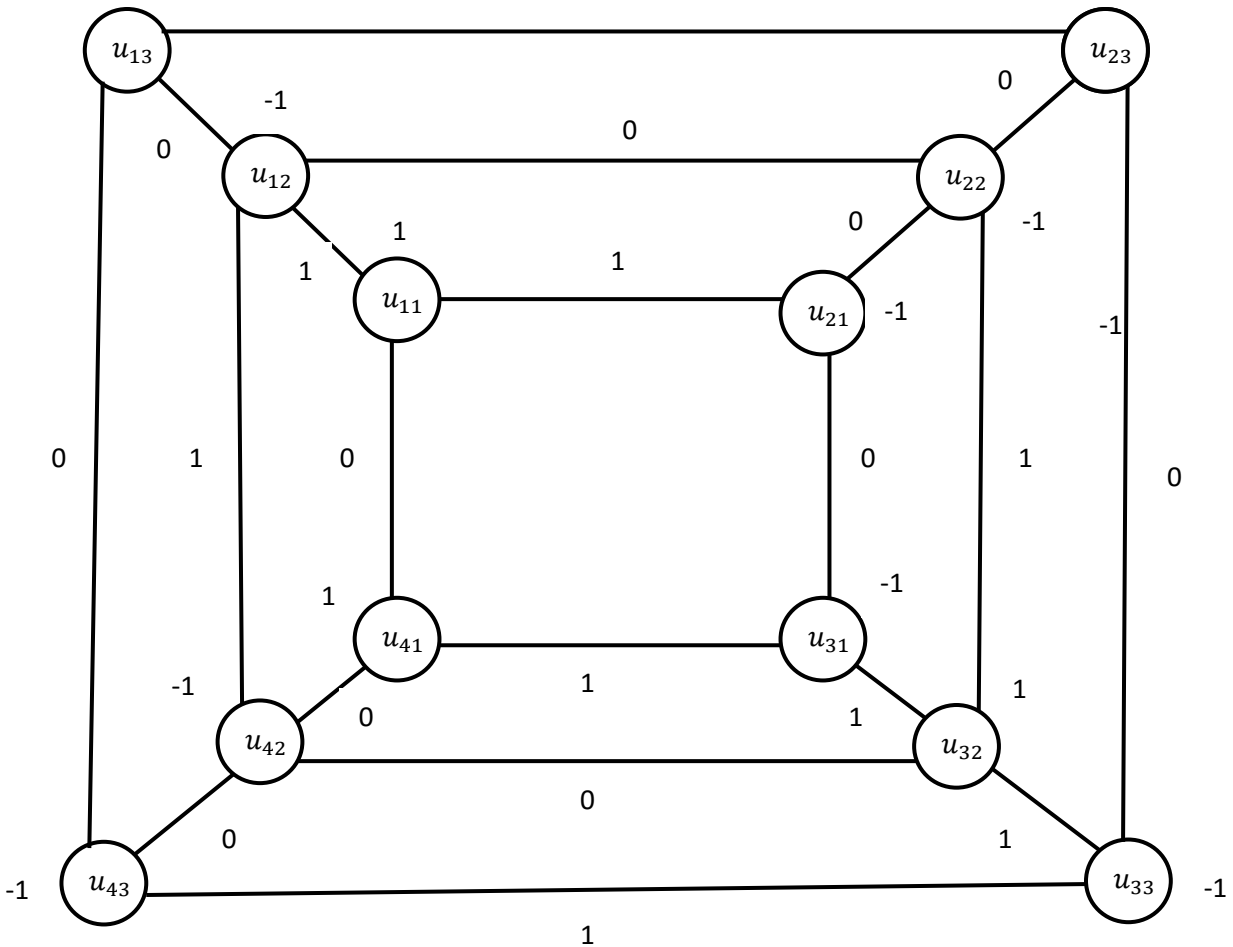


Figure 3.4

THEOREM:3.5

Prism $P_n \times C_8$ is Analytic Mean Cordial Graph.

Proof:

Let G be $P_n \times C_8$

Let $V(G) = \{ u_{ij} : 1 \leq i \leq n, 1 \leq j \leq 8 \}$

Let $E(G) = \{ [(u_{i1}v_{(i+1)1}) \cup (u_{i2}v_{(i+1)2}) \cup (u_{i3}v_{(i+1)3}) \cup (u_{i4}v_{(i+1)4}) \cup$

$$(u_{i5}v_{(i+1)5}) \cup (u_{i6}v_{(i+1)6}) \cup (u_{i7}v_{(i+1)7}) \cup (u_{i8}v_{(i+1)8}): 1 \leq i \leq n - 1] \cup [(u_{1i}u_{2i}) \cup (u_{2i}u_{3i}) \cup (u_{3i}u_{4i}) \cup (u_{4i}u_{5i}) \cup (u_{5i}u_{6i}) \cup (u_{6i}u_{7i}) \cup (u_{7i}u_{8i}) \cup (u_{8i}u_{1i}): 1 \leq i \leq n]$$

Define $f : V(G) \rightarrow \{-1, 1\}$

The vertex labeling are ,

$$f(u_{2i}) = 1 \quad 1 \leq i \leq n$$

$$f(u_{4i}) = -1 \quad 1 \leq i \leq n$$

$$f(u_{6i}) = 1 \quad 1 \leq i \leq n$$

$$f(u_{8i}) = -1 \quad 1 \leq i \leq n$$

$$f(u_{1i}) = \begin{cases} 1 & i \equiv 1 \pmod{2} \\ -1 & i \equiv 0 \pmod{2} \end{cases} \quad 1 \leq i \leq n$$

$$f(u_{3i}) = \begin{cases} 1 & i \equiv 0 \pmod{2} \\ -1 & i \equiv 1 \pmod{2} \end{cases} \quad 1 \leq i \leq n$$

$$f(u_{5i}) = \begin{cases} 1 & i \equiv 1 \pmod{2} \\ -1 & i \equiv 0 \pmod{2} \end{cases} \quad 1 \leq i \leq n$$

$$f(u_{7i}) = \begin{cases} 1 & i \equiv 0 \pmod{2} \\ -1 & i \equiv 1 \pmod{2} \end{cases} \quad 1 \leq i \leq n$$

The induced edge labeling are,

$$f^*(u_{1i}u_{2i}) = \begin{cases} 1 & i \equiv 0 \pmod{2} \\ 0 & i \equiv 1 \pmod{2} \end{cases} \quad 1 \leq i \leq n$$

$$f^*(u_{2i}u_{3i}) = \begin{cases} 1 & i \equiv 1 \pmod{2} \\ 0 & i \equiv 0 \pmod{2} \end{cases} \quad 1 \leq i \leq n$$

$$f^*(u_{3i}u_{4i}) = \begin{cases} 1 & i \equiv 0 \pmod{2} \\ 0 & i \equiv 1 \pmod{2} \end{cases} \quad 1 \leq i \leq n$$

$$f^*(u_{4i}u_{5i}) = \begin{cases} 1 & i \equiv 1 \pmod{2} \\ 0 & i \equiv 0 \pmod{2} \end{cases} \quad 1 \leq i \leq n$$

$$f^*(u_{5i}u_{6i}) = \begin{cases} 1 & i \equiv 0 \pmod{2} \\ 0 & i \equiv 1 \pmod{2} \end{cases} \quad 1 \leq i \leq n$$

$$f^*(u_{6i}u_{7i}) = \begin{cases} 1 & i \equiv 1 \pmod{2} \\ 0 & i \equiv 0 \pmod{2} \end{cases} \quad 1 \leq i \leq n$$

$$f^*(u_{7i}u_{8i}) = \begin{cases} 1 & i \equiv 0 \pmod{2} \\ 0 & i \equiv 1 \pmod{2} \end{cases} \quad 1 \leq i \leq n$$

$$f^*(u_{8i}u_{1i}) = \begin{cases} 1 & i \equiv 1 \pmod{2} \\ 0 & i \equiv 0 \pmod{2} \end{cases} \quad 1 \leq i \leq n$$

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

$$f^*(u_{3i}u_{3(i+1)}) = 1 \quad 1 \leq j \leq n - 1$$

$$\begin{aligned}
 f^*(u_{5i}u_{5(i+1)}) &= 1 & 1 \leq j \leq n - 1 \\
 f^*(u_{7i}u_{7(i+1)}) &= 1 & 1 \leq j \leq n - 1 \\
 f^*(u_{2i}u_{2(i+1)}) &= 0 & 1 \leq j \leq n - 1 \\
 f^*(u_{4i}u_{4(i+1)}) &= 0 & 1 \leq j \leq n - 1 \\
 f^*(u_{6i}u_{6(i+1)}) &= 0 & 1 \leq j \leq n - 1 \\
 f^*(u_{8i}u_{8(i+1)}) &= 0 & 1 \leq j \leq n - 1
 \end{aligned}$$

Here,

When $n = 2m, m > 0$

$$v_f(1) = v_f(-1) = 8m \text{ and}$$

$$e_f(1) = e_f(0) = 16m - 4$$

When $n = 2m + 1, m > 0$

$$v_f(1) = v_f(-1) = 8m + 4 \text{ and}$$

$$e_f(1) = e_f(0) = 16m + 4$$

Therefore, $P_n \times C_8$ satisfies the conditions

$$|v_f(1) - v_f(-1)| \leq 1$$

$$|e_f(1) - e_f(0)| \leq 1$$

Hence, $P_n \times C_8$ is Analytic Mean Cordial Graph.

For example, The Analytic Mean Cordial Graph $P_3 \times C_3$ are shown in the figure

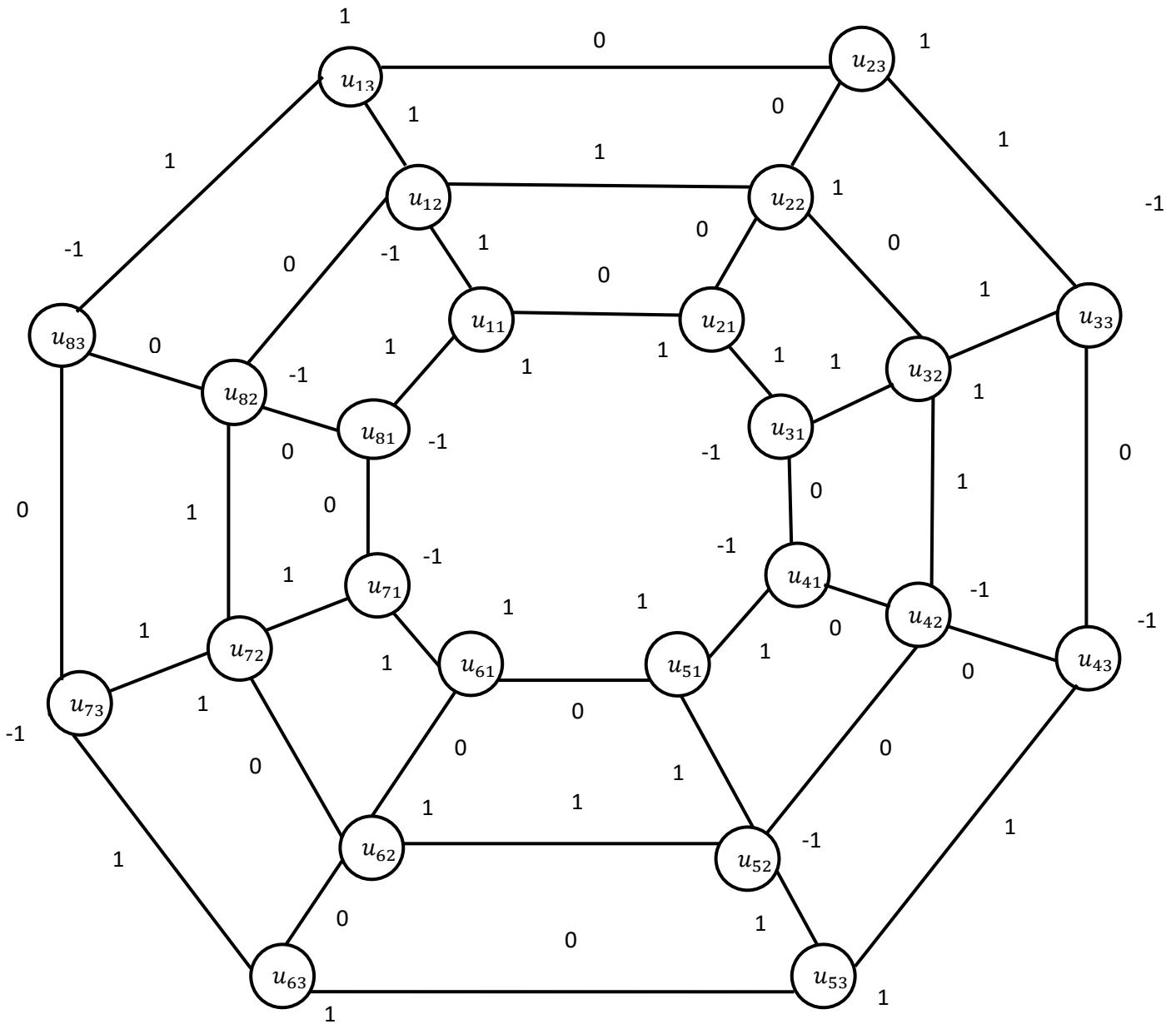


Figure 3.6

4. References

1. A.Nellai Murugan and V.Baby Suganya, A study on cordial labeling of Splitting Graphs 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

2. 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
3. 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
4. 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.
5. 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.
6. 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
7. 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
8. 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.
9. 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).
10. 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.

11. 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.
12. 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.
13. 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.
14. 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.
15. 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.
16. 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. I F 5.2
17. 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.
18. 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.
19. 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

20. 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.
21. 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.
22. A. Nellai Murugan and P. Iyadurai Selvaraj, Path Related Cap Cordial Graphs, OUTREACH, A Multi- Disciplinary Refereed Journal, Volume VIII, 2015, Pp. 100-106.
23. 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.
24. A. Nellai Murugan, and V.Sripratha, Mean Square Cordial Labeling, OUTREACH, A Multi-Disciplinary Refereed Journal, Volume VIII, 2015, Pp. 125 – 131.
25. 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.
26. 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.
27. 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.