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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 differby atmost 1 and the number of edges labeled with 1 anad the number of edges labeled with 0 differ atmost 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,G) be a graph with p vertices and q edges. A Analytic Mean Cordial Labeling of a Graph G with vertex set 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) = {[($u_i u_{i+1}$) U ($v_i v_{i+1}$) U ($u_i v_i$) U ($w_i w_{i+1}$) U ($w_i v_i$) U ($u_i w_i$): $1 \leq i \leq n - 1$]}

Define f : V (G) → {-1, 1}

The vertex labeling are ,

$f(u_i) = 1$

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

$$f(w_i) = \begin{cases} 1 & i \equiv 1 \bmod 2 \\ -1 & i \equiv 0 \bmod 2 \end{cases} \qquad 1 \leq i \leq n$$

The induced edge labeling are,

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

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

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

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

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

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

Here,

When n = 2m, m > 0

$v_f(1) = v_f(-1) = 3m$ and

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

When n = 2m + 1, m > 0

$v_f(1) = 3m + 2, \quad v_f(-1) = 3m + 1$ 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

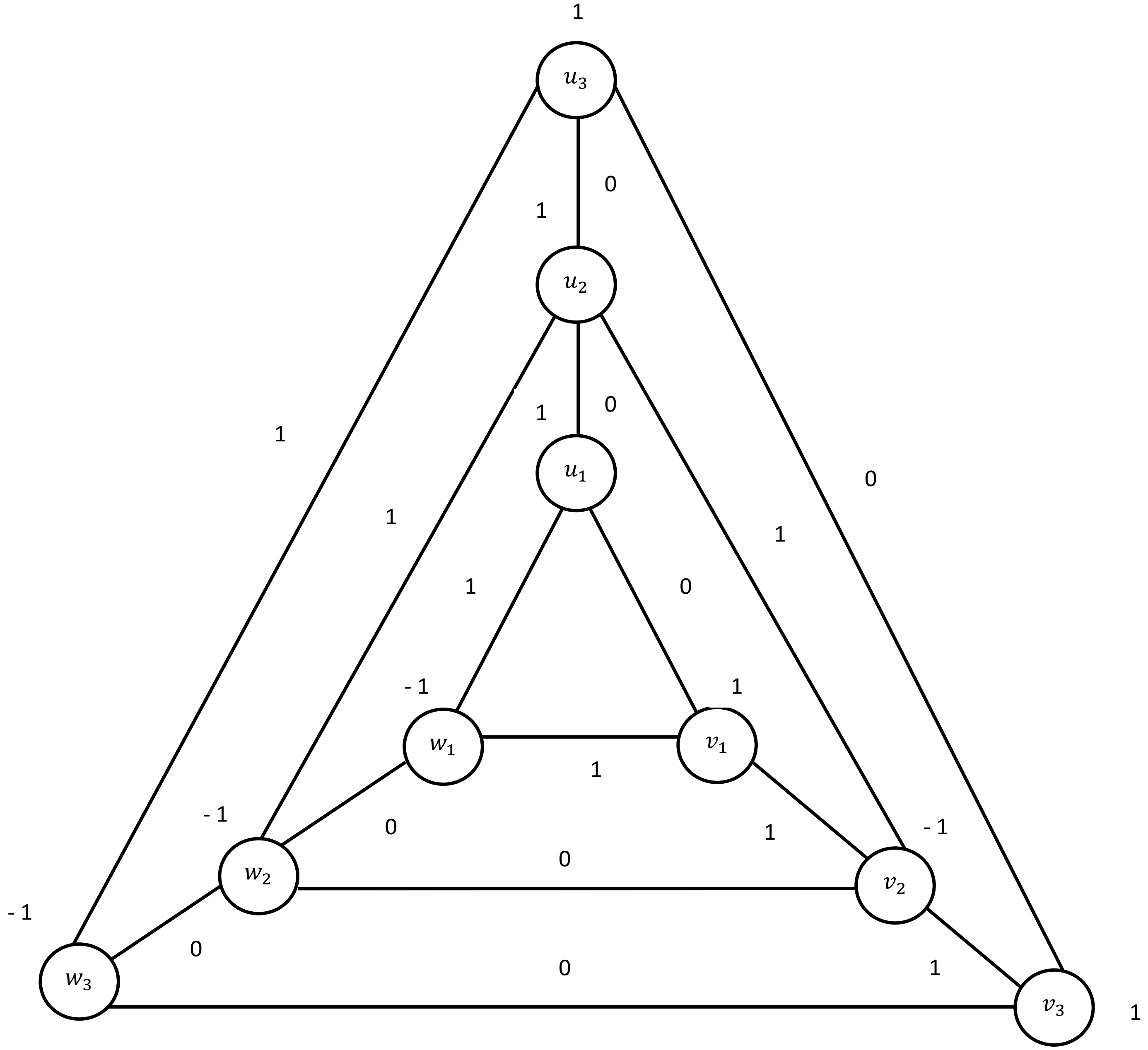

Figure 3.2

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 ≤ i ≤ n, 1 ≤ j ≤ 4 }

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

Define f : V (G) → {-1, 1}

The vertex labeling are ,

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

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

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

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

The induced edge labeling are,

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

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

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

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

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

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

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

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

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 figur

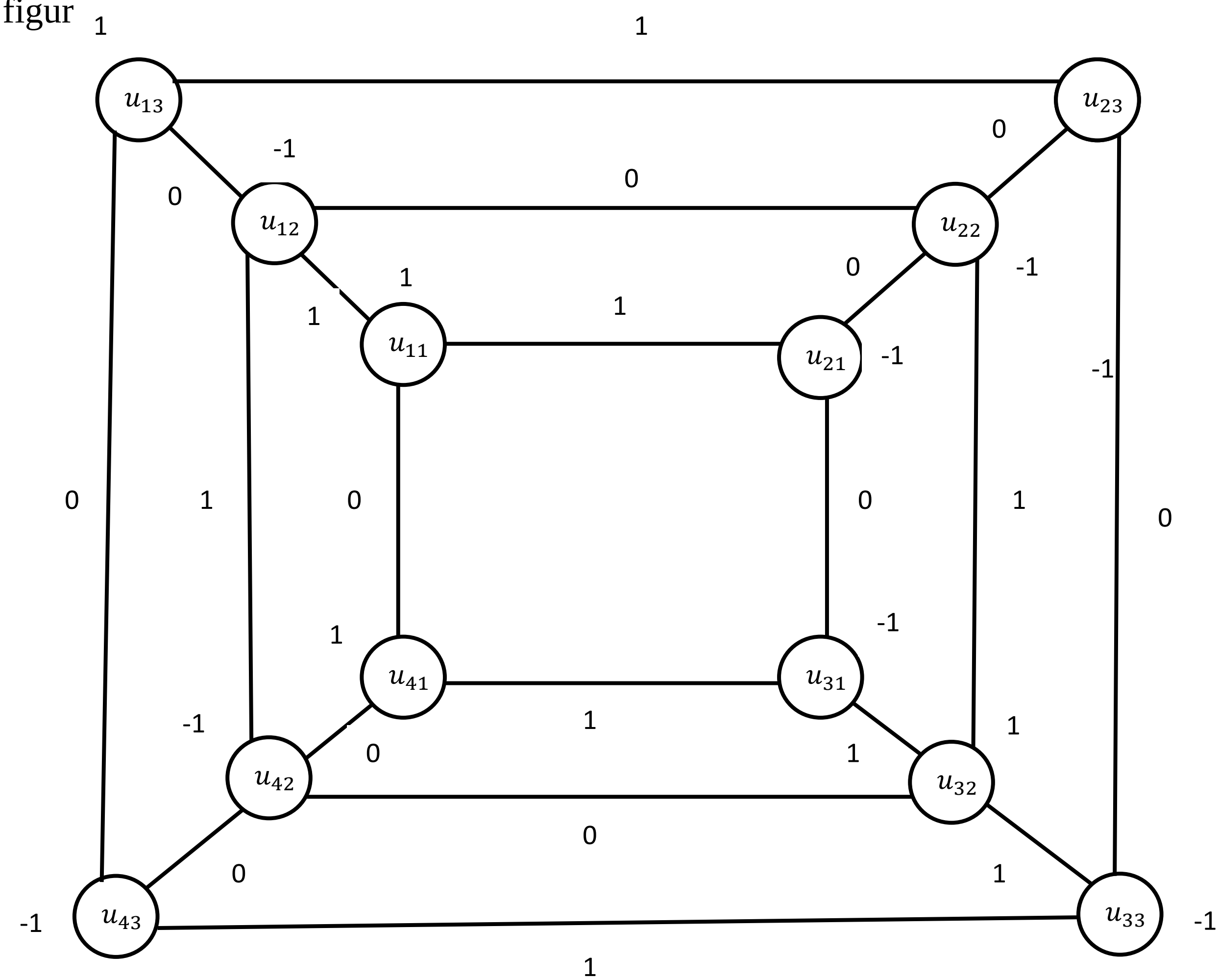

Figure 3.4

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 ≤ i ≤ n, 1 ≤ j ≤ 8}

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

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

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

The vertex labeling are ,

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

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

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

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

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

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

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

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

The induced edge labeling are,

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

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

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

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

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

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

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

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

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

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

$f^*(u_{5i}u_{5(i+1)})$ = 1 $\quad 1 \leq j \leq n - 1$

$f^*(u_{7i}u_{7(i+1)})$ = 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 $\quad 1 \leq j \leq n - 1$

$f^*(u_{6i}u_{6(i+1)})$ = 0 $\quad 1 \leq j \leq n - 1$

$f^*(u_{8i}u_{8(i+1)})$ = 0 $\quad 1 \leq j \leq n - 1$

Here,

When n = 2m, m > 0

$v_f(1) = v_f(-1) = 8m$ and

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

When n = 2m + 1, m > 0

$v_f(1) = v_f(-1) = 8m + 4$ 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

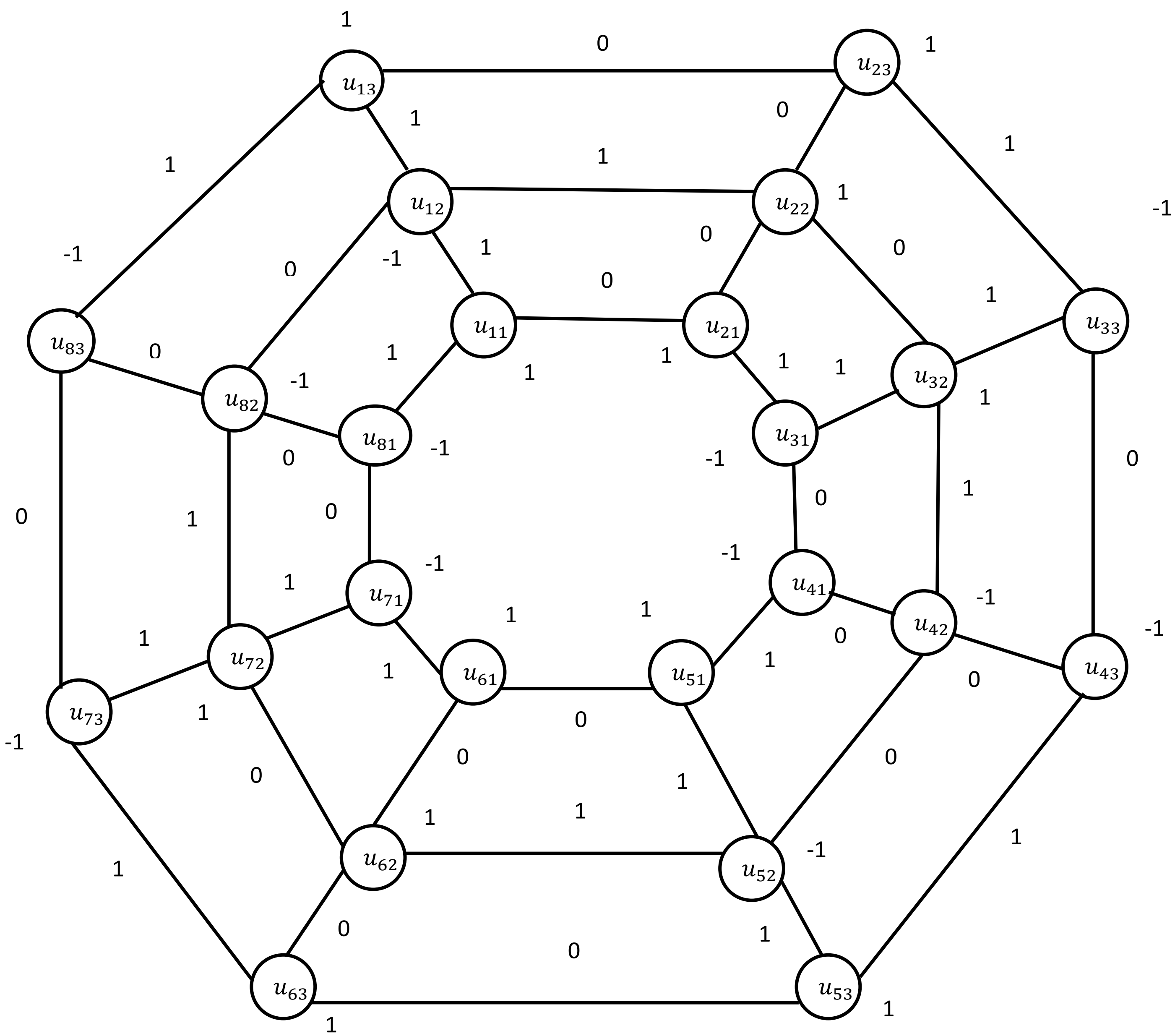

Figure 3.6

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