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TREE RELATED EXTENDED MEAN CORDIAL GRAPHS

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ABSTRACT

Let G = (V, E) be a graph 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 {0, 1, 2} such that each edge uv is assigned the label $(\lceil f(u)+f(v)) \rceil/2$ 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 tree related graphs Hdn, $K_{1,n}$, Tg_n, $<K_{1,n}:n>$ are Extended Mean Cordial Graphs.

Keywords:
Extended Mean Cordial Graph, Extended Mean Cordial Labeling.

2000 Mathematics Subject classification 05C78.

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1. INTRODUCTION

A graph G is a 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 tree related graphs Hdn , $K_{1,n}$, Tg_n, $<K_{1,n}:n>$ are Extended mean cordial graphs. For graph theory terminology, we follow [2].

2. PRELIMINARIES

Let G = (V,E) be a graph 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 {0, 1,2} such that each edge uv is assigned the label $(\lceil f(u)+f(v)) \rceil/2$ where ⌈ x ⌉ (ceilex) 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 at most 1.

The graph that admits an Extended Mean Cordial Labeling is called Extended Mean Cordial Graph. In this paper, we proved that tree related graphs Hdn , $K_{1,n}$, Tg_n, $<K_{1,n}:n>$ are Extended Mean Cordial Graphs.

Definition: 2.1

A graph obtained from a path P_n by attaching a pendent edges to every internal vertices of the Path. It is called Hurdle graph with n-2 hurdles and is denoted by Hd_n.

Definition: 2.2

A bipartite graph is a graph whose vertex set V(G) can be partitioned into two subsets V_1 and V_2 such that every edge of G has one end in V_1 and the other end in V_2 ; (V_1,V_2) is called a bipartition of G. If further, every vertex of V_1 is joined to all the vertices of V_2, then G is called a complete bipartite graph. The complete bipartite graph with bipartition (V_1, V_2) such that $|V_1|=m$ and $|V_2|=n$ is denoted by $K_{m,n}$. A complete bipartite graph $K_{1,n}$ is called a star

Definition: 2.3

Subdivided star$<K_{1,n}:n>$ is a graph obtained as one point union of n paths of path- length 2

Definition: 2.4

A graph obtained from a path by attaching exactly two pendent edges to each internal vertex of a path is called a twig and is denoted by Tg_n , $n \geq 1$

3. MAIN RESULTS

Theorem 3.1

Graph Hd_n is a Extended Mean Cordial Graph.

Proof:

Let $V(Hd_n) =\{[u_i:1\leq i\leq n],[v_i:1\leq i\leq n-2]\}$

Let $E(Hd_n)=\{[(u_iu_{i+1}):1\leq i\leq n-1]\cup[(v_iu_{i+1}):1\leq i\leq n-2]\}$

Define $f:V(G)\rightarrow\{0,1,2\}$

The Vertex labeling are

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

$f(v_i)=0 \quad 1\leq i\leq n-2$

The induced edge labeling are,

$f(u_iu_{i+1})=1 \quad 1\leq i\leq n-1$

$f(v_iu_{i+1})=0 \quad 1\leq i\leq n-2$

Here, $e_f(1) = e_f(0)+1$

Hence, Hdn is Satisfies the condition$|\,ef(0) – ef(1)\,| \leq 1$

Therefore , Hdn is a Extended Mean Cordial Graph.

For example, Hd_4 is a Extended Mean Cordial Graph as shown in the figure 3.2

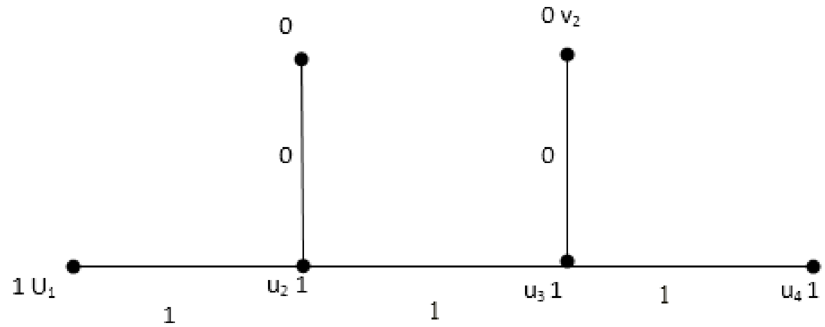

Figure 3.2:

Theorem 3.3

$k_{1,n}$ is a Extended Mean Cordial Graph.

Proof:

Let $V(k_{1,n}) = \{[u_1\, v_i : 1 \leq i \leq n]\}$

Let $E(k_{1,n}) = \{[(uv_i): 1 \leq i \leq n]\}$

Define $f: (k_{1,n}) \rightarrow \{0,1,2\}$

The vertex labeling are,

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

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

The edge labeling are,

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

Here, $ef(1) = ef(0)+1$

Hence $k_{1,n}$ is Satisfies the condition$|\, ef(0) - ef(1)\, | \leq 1$

Therefore , $k_{1,n}$ is a Extended Mean Cordial Graph.

For example, $k_{1,n}$ is a Extended Mean Cordial Graph as shown in the figure 3.4

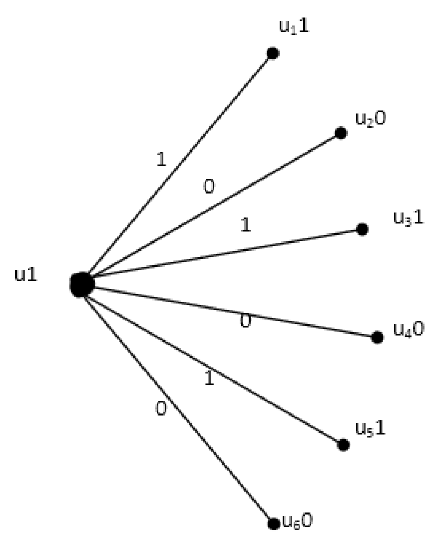

Figure 3.4:

Theorem: 3.5

Tg_n is a Extended Mean Cordial Graph

Proof:

Let $V(Tg_n) = \{[u_i : 1 \leq i \leq n] U [v_i : 1 \leq i \leq n-2] U [w_i : 1 \leq i \leq n-2]\}$

Let $E(Tg_n) = \{[(u_iu_{i+1}) : 1 \leq i \leq n-1]\ U[(v_iu_{i+1}) : 1 \leq i \leq n-2]\ U$
$[w_iu_{i+1}) : 1 \leq i \leq n-2]\}$

Define $f:V(Tg_n) \rightarrow \{0,1,2\}$

The vertex labeling are,

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

$f(v_i) = 1, \quad 1 \leq i \leq n-2$

$f(w_i) = \begin{cases} 0 & i \equiv 1,2 \bmod 4 \\ 1 & i \equiv 0,3 \bmod 4 \end{cases}, 1 \leq i \leq n-2$

The edge labeling are,

$f^*(u_iu_{i+1}) = 1, \quad 1 \leq i \leq n$

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

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

Here, $ef(0) = ef(1) \quad n \equiv 1 \bmod 2$

$ef(0) = ef(1)+1 \quad n \equiv 0 \bmod 2$

Hence Tg_n is Satisfies the condition $|ef(0) - ef(1)| \leq 1$

Therefore , Tg_n is a Extended Mean Cordial Graph.

For example, Tg_5 is a Extended Mean Cordial Graph as shown in the figure 3.6

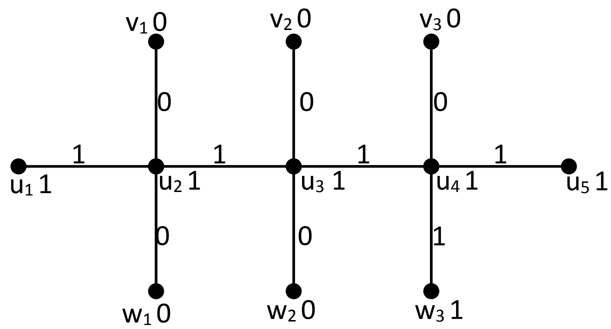

Figure 3.6:

Theorem : 3.7

Graph < $K_{1,n}$: n > be a Extended Mean Cordial Graph.

Proof:

Let $v(K_{1,n}: n) = \{[u, u_i, v_i : , \quad 1 \leq i \leq n]\}$

Let $E(K_{1,n}: n) = \{[(uu_i)\ U\ (u_iv_i) : 1 \leq i \leq n]\}$

Define $f: v(K_{1,n}: n) \rightarrow \{0,1,2\}$

The vertex labeling are,

$f(u) = 1, \quad 1 \leq i \leq n$

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

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

The edge labeling are,

$f^*[(uu_i)] = 1, \quad 1 \leq i \leq n$

$f^*[(u_iv_i)] = 0, \quad 1 \leq i \leq n$

Here , ef(1) = ef(0)
Hence $< K_{1,n}: n >$ is Satisfies the condition| ef(0) – ef(1) | ≤ 1
Therefore , $< K_{1,n}: n >$ is a Extended Mean Cordial Graph.
For example, $< K_{1,4}: n >$ is a Extended Mean Cordial Graph as shown in the figure 3.8

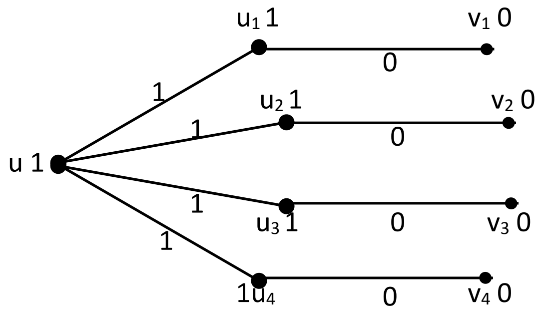

Figure 3.8:

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