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SP Mean Difference Labeling for Y and $< K_{1,m} @ K_{1,n} >$ Graphs

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***Abstract:** This paper discusses SP Mean difference labeling and the development of a formula for SP Mean difference. A function χ is called a SP Mean difference labeling of a graph G with q edges, if χ is a function from the vertices of G to the set $\{1,2,3,\ldots p\}$ such that when each edge uv is assigned the label $\chi(uv) = \dfrac{\chi(u+v)^2 - \chi(u-v)^2}{2}$, then the resulting edge labels are distinct even numbers. In this research paper, we have explored various families of graphs such Y and $< K_{1,m} @ K_{1,n} >$ that possess SP mean difference labeling.*

***Keywords:** Graph labeling, Mean difference labeling, SP Mean difference labeling.*

I. INTRODUCTION

Graph theory is an important branch of mathematics. The phenomenal rise in the popularity of graph theory, is not accidental. The basic concept of a graph, consisting of vertices or nodes and edges presents a very natural tool for model building. The applications of graph theory to some areas of physics, chemistry, communication science, computer technology, electrical and civil engineering, architecture, operation research, genetics, psychology. The theory is also related to many branches of mathematics including group theory, matrix theory, probability, numerical analysis and topology.

All graphs are finite and undirected. The vertex set and edge set of a graph was denoted by $V(G)$ and $E(G)$. In this paper, the new concept for SP Mean difference in graph labeling has been introduced. This concept is extended to Weiner index polynomial which is cited as [10]. Some basic definitions and notations are referred in [1,2,4,5]. Vertex Cube labeling can be applied to different types of graphs which is cited as [11,12,13,14,15,16,17,18,19,20,21,22,23,24]. Graph labeling is also extended to domination [3,6,7,8,9].

II. MAIN RESULT

A. *Definition 2.1*

A function χ is called a SP Mean difference labeling of a graph G with edges, if the vertices of G to the set $\{1,2,\ldots,p\}$ such that when each edge uv is assigned the label $\chi(uv) = \dfrac{\chi(u+v)^2 - \chi(u-v)^2}{2}$,then the resulting edge labels are distinct even numbers.

B. *Definition 2.2*

A graph G is said to be SP Mean difference graph if it admits SP Mean difference labeling.

C. *Theorem 2.1*

The graph Y_n is a SP Mean difference graphs.

Proof:

Let G be a graph of Y_n.

Let $\{v_1, v_2, v_3, \ldots, v_n, v_{n+1}, v_{n+2}\}$ be the vertices of Y_n and $\{e_1, e_2, e_3, \ldots, e_n, e_{n+1}\}$ be the edges of Y_n which are denoted as in the fig 2.1

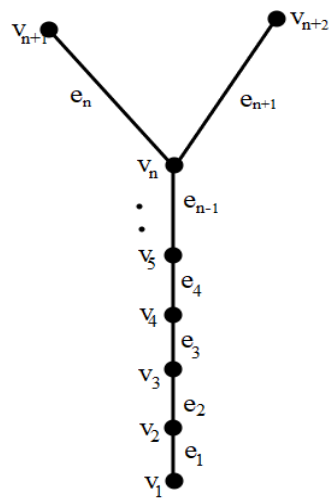

Fig 2.1 The graph Y_n with ordinary labeling.

The graph consists of n+2 vertices and n+1 edges.

The vertices of Y_n are labeled as given below.

Define $\chi : v(G) \to \{1,2,3,\ldots,n+2\}$ by

$$\chi(v_i) = i \,;\, 1 \le i \le n$$
$$\chi(v_{n+1}) = n+1$$
$$\chi(v_{n+2}) = n+2$$

Then the edges labels are :

$$\chi(e_i) = 2i(i+1)\,;\, 1 \le i \le n-1$$
$$\chi(e_n) = 2n(n+1);$$
$$\chi(e_{n+1}) = 2n(n+2);$$

The edges of Y_n graph receive distinct even numbers.

Hence, Y_n is a SP Mean difference graphs.

Example: 2.1

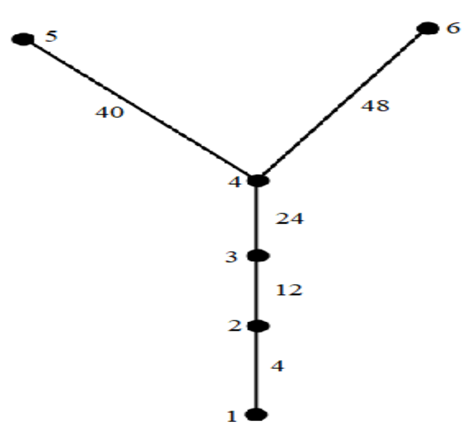

Fig 2.2: Y_4

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Example: 2.2

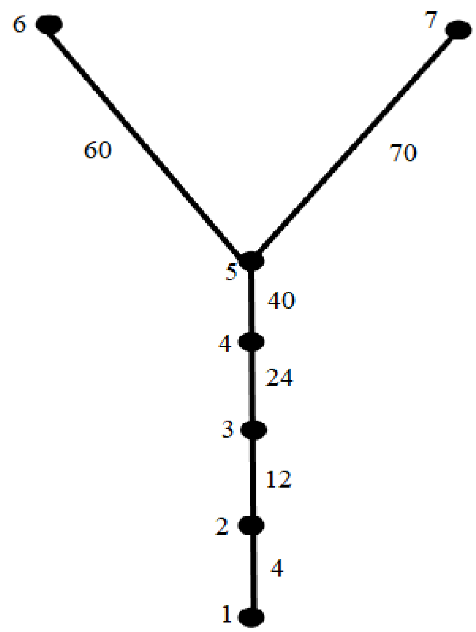

Fig 2.3: Y_5

D. Theorem 2.2:

$< K_{1,m} @ K_{1,n} >$ is a SP Mean difference graph.

Proof:

Let G be a graph of $< K_{1,m} @ K_{1,n} >$.

Let $\{u_0, u_1, u_2, u_3, \ldots, u_m\}$ represents the vertices of $K_{1,m}$ and $\{v_0, v_1, v_2, v_3, \ldots, v_n\}$ be the vertices of $K_{1,n}$. $\{e_1, e_2, e_3, \ldots, e_m, e_1, e_2, e_3, \ldots, e_n, e\}$ be the edges of $K_{1,m}$ and $K_{1,n}$. Which are denoted in the fig 2.4.

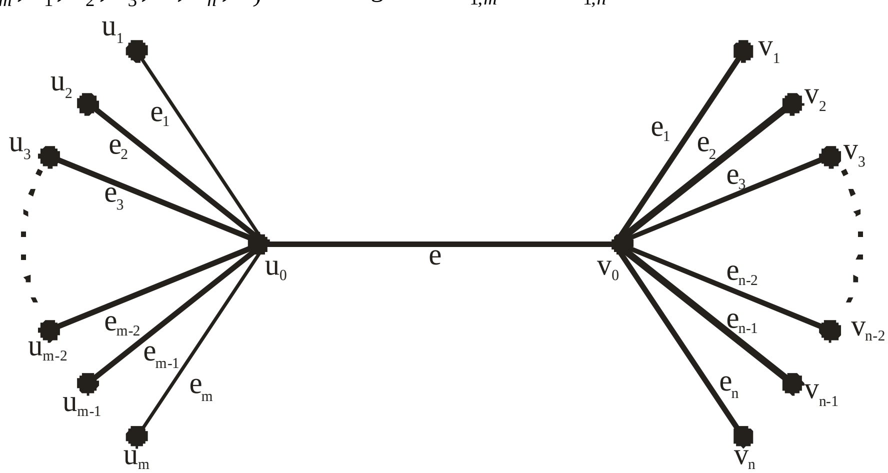

Fig 2.4: $< K_{1,m} @ K_{1,n} >$ with ordinary labeling.

The vertices of $< K_{1,m} @ K_{1,n} >$ are labeled as given below.

$< K_{1,m} @ K_{1,n} >$ consists of $m+n+2$ vertices and $m+n+1$ edges.

Define $\chi : V(G) \to \{1,2,3,\ldots,m+n+2\}$ by

$$\chi(u_0) = 1$$
$$\chi(v_o) = m+2$$
$$\chi(u_i) = i+1 ; 1 \le i \le m$$
$$\chi(v_i) = m+i+2;\ 1 \le i \le n$$

Then the induced edges labels are,

$$\chi(e_i) = 2(i+1);\ 1 \le i \le m$$
$$\chi(e_i) = 2(m+2)(m+2+i);\ 1 \le i \le n$$
$$\chi(e) = 2(m+2)$$

The edges of the $< K_{1,m} @ K_{1,n} >$ receives distinct even numbers.

Hence, $< K_{1,m} @ K_{1,n} >$ are the SP Mean difference graphs.

Example: 2.3

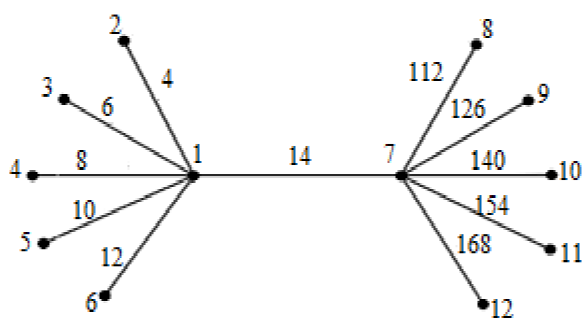

Fig 2.5 $< K_{1,5} @ K_{1,5} >$

Example: 2.4

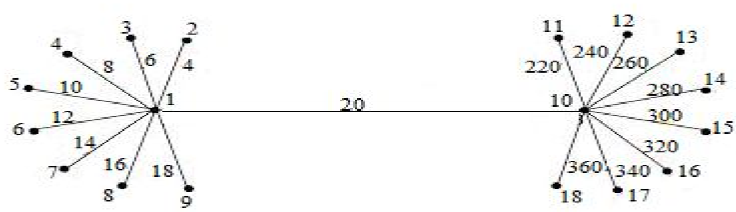

Fig 2.6 $< K_{1,8} @ K_{1,8} >$

III. CONCLUSION

In this paper, formula has been established for an SP Mean difference labeling and some families of graphs have been investigated under SP Mean difference labeling. It is concluded that some families of graphs such as Y_n and $< K_{1,m} @ K_{1,n} >$ are SP Mean difference labeling graphs.

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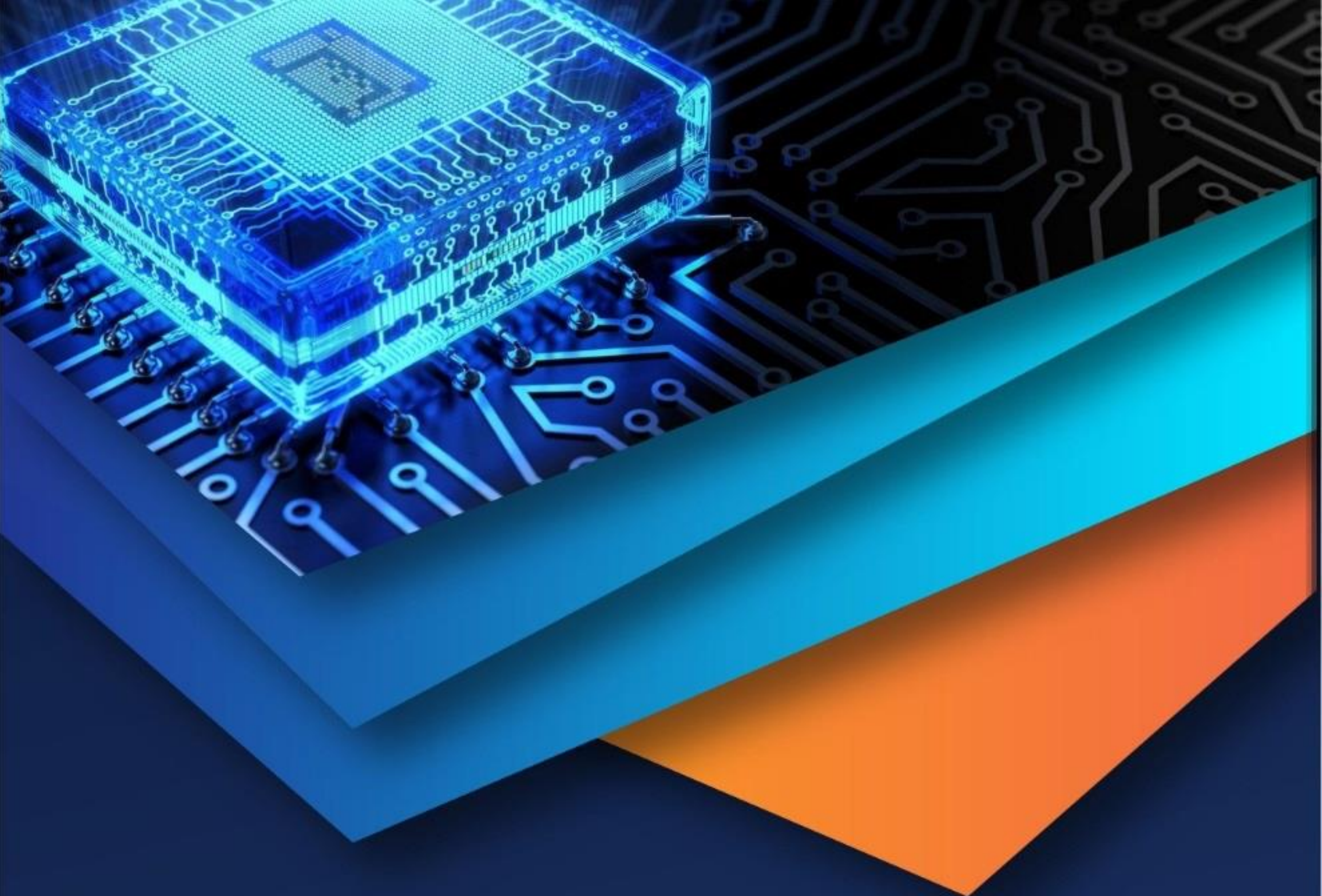

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