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

P. Shalini[1], K. Priyadarshini[2]
[1]*Associate Professor,* [2]*PG student, PG and Research Department of Mathematics, Cauvery College for Women (Autonomous), Trichy – 18*

***Abstract:*** ***This paper discusses SP Mean difference labeling and the development of a formula for SP Mean difference. A function*** $\chi$ ***is called a SP Mean difference labeling of a graph G with q edges, if*** $\chi$ ***is a function from the vertices of G to the set*** $\{1,2,3,...p\}$ ***such that when each edge*** $uv$ ***is assigned the label*** $\chi(uv) = \frac{\chi(u+v)^2 - \chi(u-v)^2}{2}$***, 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 $\chi$ is called a SP Mean difference labeling of a graph $G$ with edges, if the vertices of $G$ to the set $\{1,2,..., p\}$ such that when each edge $uv$ is assigned the label $\chi(uv) = \frac{\chi(u+v)^2 - \chi(u-v)^2}{2}$,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 $\{v_1, v_2, v_3,..., v_n, v_{n+1}, v_{n+2}\}$ be the vertices of $Y_n$ and $\{e_1, e_2, e_3,..., e_n, e_{n+1}\}$ be the edges of $Y_n$ which are denoted as in the fig 2.1

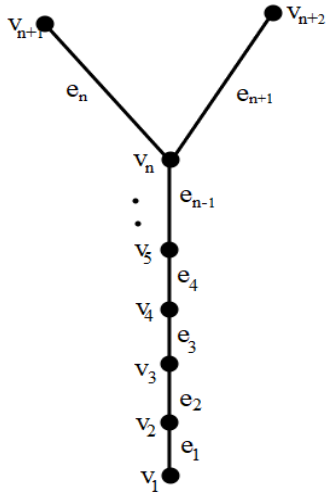



Fig 2.1 The graph $Y_n$ with ordinary labeling.

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

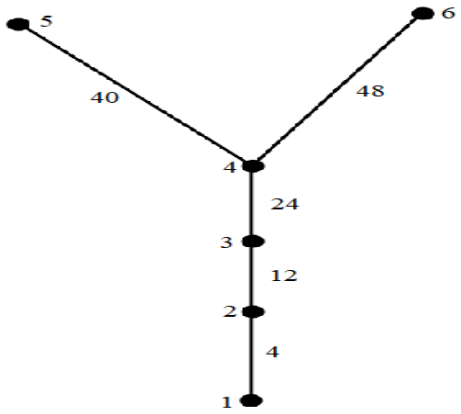



Fig 2.2: $Y_4$

Example: 2.2

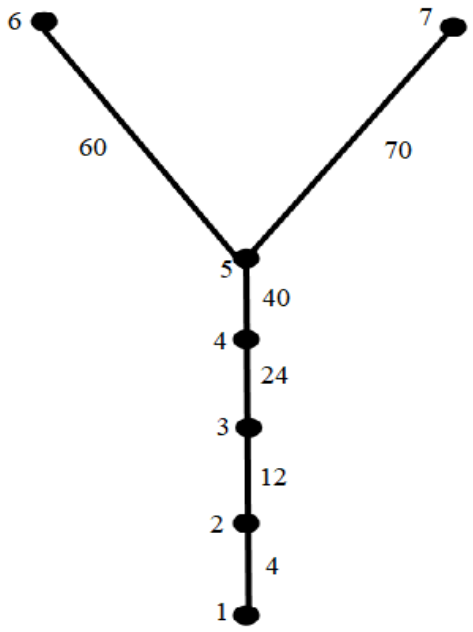



Fig 2.3: $Y_5$

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

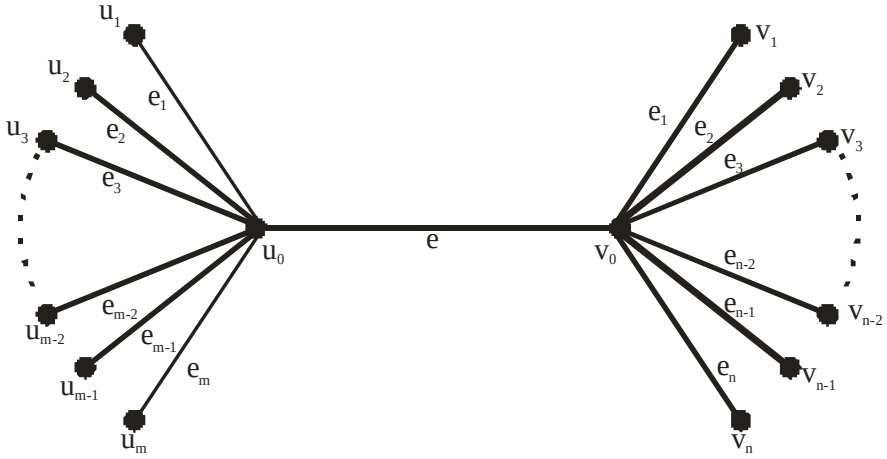



Fig 2.4: $< K_{1,m} @ K_{1,n} >$ with ordinary labeling.

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

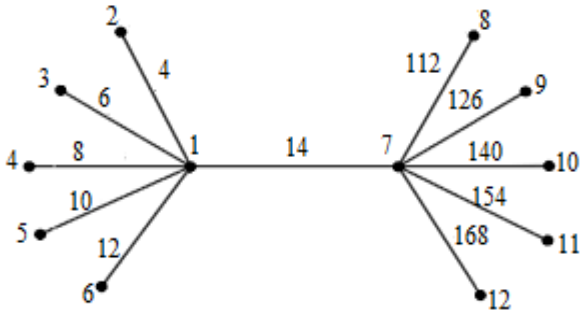



Fig 2.5 $< K_{1,5} @ K_{1,5} >$

Example: 2.4

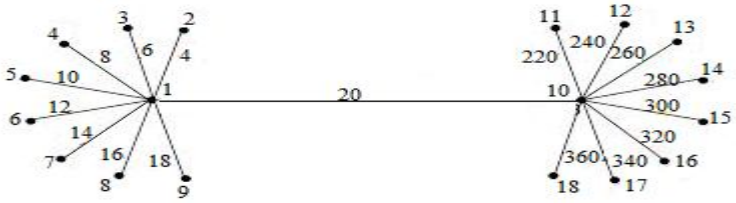


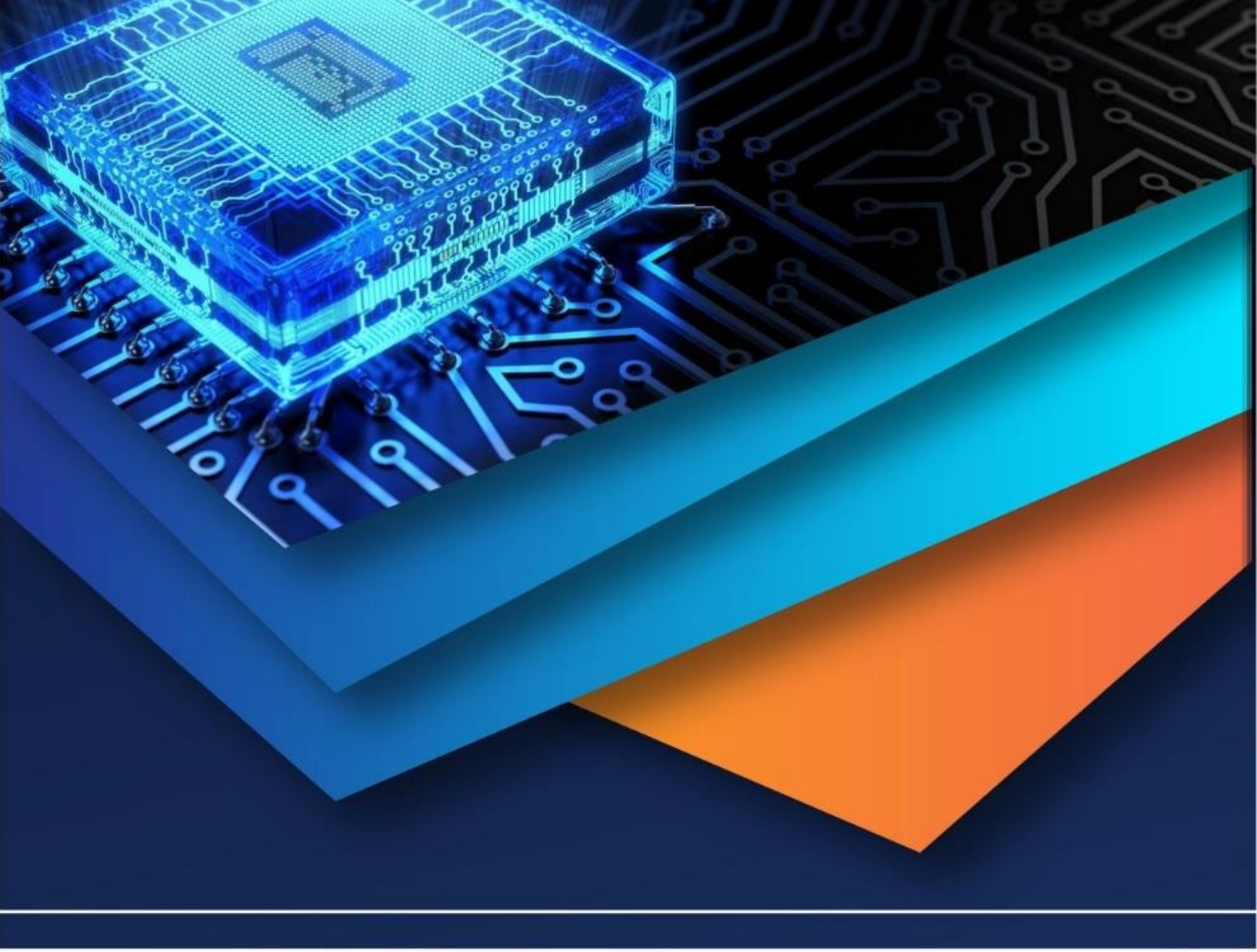

Fig 2.6 $< K_{1,8} @ K_{1,8} >$

## 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.

## REFERENCES

[1] Bodendick, R. and Walther, G., On number theoretical methods in graph labelings Res.Exp.Maths (2, /1995) 3-25.
[2] Bloom, D.F. Hsu, On graceful directed graphs, SIAMJ, Alg. Discrete Math.,6(1985),519-536.
[3] Felix, J., Litta, E., Benedict Michael Raj, L., Changing and Unchanging Properties of Single Chromatic Transversal Domination Number of Graphs, International Journal of Mathematics Trends and Technology, Volume 52, Issue 4, December 2017, Pg. No. 262 – 266.
[4] Gallian, M.A., "A Dynamic survey of graph labelings" Electronic journal, 2000 (Volume-23).
[5] Harary, F., Graph Theory, New Delhi: Narosa Publishing House, 2001.
[6] Litta E., Maragatha Dharshini S., Proper Colourings in r – Regular Modified Zagreb Index Graph, International Journal for Research in Applied Science & Engineering Technology (IJRASET), Volume 11, Issue 3, Mar 2023, P.No.: 1553- 1558.
[7] Litta, E., Datchini, S, Proper Colourings in r – Regular Zagreb Index Graph", Aryabhatta Journal of Mathematics and Informatics, Volume 15, Issue 1, Jan - June 2023. Pg. No. 149-154, Impact Factor: 5.856, ISSN No: 0975-7139(P) 2394-9309.
[8] Litta, E., Narmadha, S, Proper Colourings in r – Regular Inverse sum Indeg Index Graph", Research and Applications Towards Mathematics and Computer Science, Volume 9, February 2024, Pg. No. 66-76, B P International, Print ISBN: 978-81-970187-8-7 eBook ISBN: 978-81-970187-9-4.
[9] Litta, E., Jayavarshini, N., Proper Colourings in r – Regular Randic Index Graph",International Journal for Research in Applied Science and Engineering Technology (IJRASET),Volume12,Issue,II, February 2024 Pg. No. 1603-1607.
[10] Palanikumar, R, Rameshkumar, A, Wiener Index of Physio-Chemical Labeled Graph, Bulletin of pure and Applied Sciences, Vol. 37E(Math & Stat), No. 2, 2018, PP: 519 – 522.
[11] Prakash, V., Gopi, R., Shalini, P., Anti Skolem Mean Labeling of Quadrilateral Snake Related Graphs, Tuijin Jishu/Journal of Propulsion Technology, Vol. 44, No. 5(2023), 495 – 500.
[12] Shalini, P., Paul Dhayabaran, D., An Absolute Differences of Cubic and Square Difference Labeling, International Journal of Advanced Scientific and Technical Research, May-June 2015, Issue-5, Volume-3, pages 1-8.
[13] Shalini, P., Paul Dhayabaran, D., A Study on Root Mean Square Labelings in Graphs, International Journal of Engineering Science and Innovative Technology, May 2015, Volume-4, Issue-3, pages 305-309.
[14] Shalini, P., Gowri, R., Paul Dhayabaran, D., An Absolute Differences of Cubic and Square Difference Labeling For Some Families Of Graphs, The International journal of analytical and experimental modal analysis, Volume XI, Issue 10, October 2019, Page no: 538-544.
[15] Shalini, P., Paul Dhayabaran, D., Maximization of Multiplicative Labeling, International journal of Research in Advent Technology(IJRAT), Special Issue January 2019, Page no: 209-214.
[16] Shalini, P., Meena, S. A., Lehmer -4 mean labeling of graphs, International journal for research in Applied Science and Engineering Technology, Volume 10, Issue XII, December 2022,Page no: 1348-1351,ISSN : 2321-9653.
[17] Shalini, P., Tamizharasi, S., Power-3 Heronian Odd Mean Labeling of Graphs, International Journal for Research in Applied Science and Engineering Technology , Volume 10 Issue XII , December 2022, Page no: 1605-1608.
[18] Shalini, P., Tamizharasi, S., A Study on Power-3 Heronian Odd Mean Labeling for Some Path Related Graphs, International Journal for Research in Applied Science and Engineering Technology, Volume 11 Issue IV , April 2023, Page no: 1136 – 1139.
[19] Shalini, P., Madhumitha, D., Root Cube Even Mean Labeling of Graph, Aryabhatta Journal of Mathematics and Informatics, Volume 15, Issue 1, Jan -June 2023. Pg. No. 33-38.
[20] Shalini, P., Meena, S.A., Lehmer-4 Mean Labeling for Some Path Related Graphs, Aryabhatta Journal of Mathematics and Informatics, Volume 15, Issue 1, Jan -June 2023. Pg. No. 105-110.
[21] Shalini, P., Skolem Odd Vertex Graceful Signed Graphs for Star Graphs, International Journal of Mathematics Trends and Technology, Volume 69, Issue 8, August 2023, Pg. No. 30 – 35
[22] Shalini, P., Priyadarshini, K., SP Mean Difference Labeling for Some Families of Graphs", Research and Applications Towards Mathematics and Computer Science, Volume 9, February 2024, Pg. No. 1-12, B P International, Print ISBN: 978-81-970187-8-7, eBook ISBN: 978-81-970187-9-4.
[23] Shalini, P., Prema, S., Vertex Sum Cube Labeling For Split and Mirror Graphs,International Journal for Research in Applied Science and Engineering Technology (IJRASET),Volume12, Issue II, February 2024, Pg. No.1598-1602
[24] Shalini, P., Prema, S., Vertex Sum Cube Labeling For Some Special Graphs, Research updates in Mathematics and Computer Science, Volume 1, March 2024, Pg. No. 48-60, B P International, Print ISBN: 978-81-971164-3-8, eBook ISBN: 978-81-971164-0-7.



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