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# Power-3 Heronian odd Mean Labeling of Graphs

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**Abstract:** In this article, we discuss Power-3 Heronian odd Mean Labeling for some families of graphs. A function is said to be Power-3 Heronian odd mean labeling of a graph  $G$  with  $q$  edges, if  $f$  is a bijective function from the vertices of  $G$  to the set  $\{1, 3, 5, \dots, 2p-1\}$  such that when each edge  $uv$  is assigned the label.

The resulting edge labels are distinct numbers.

$$\beta^*(e = uv) = \left\lfloor \sqrt[3]{\frac{\beta(u)^3 + (\beta(u)\beta(v))^2 + \beta(v)^3}{3}} \right\rfloor$$

**Keywords:** Mean labeling, multiplicative labeling, Additive labeling.

## I. INTRODUCTION

In this paper, the graphs are taken as simple, finite and undirected.  $V(G)$  represents the vertex set and  $E(G)$  represents Edge set. A graph labeling is an assignment of integers to its vertices or edges subject to some certain conditions. A vertex labeling is a function of  $V$  to a set of labels. A graph with such a vertex labeling function is defined as Vertex – labeled graph. An edge labeling is a function of  $E$  to a set of labels and a graph with such a function is called an edge labeled graph. In this article path, triangular snake, caterpillar are discussed Power-3 Heronian odd Mean Labeling Of Graphs.

All Graphs in this paper are finite and undirected. The symbols  $V(G)$  and  $E(G)$  denote the vertex set and edge set of a graph  $G$ . The cardinality of the vertex set is called the order of  $G$  denoted by  $p$ . The cardinality of the edge set is called the size of  $G$  denoted by  $q$  edges is called a  $(p, q)$  graph. A graph labeling is an assignment of integers to the vertices or edges. Bloom and Hsu[2] extended the notion of graceful labeling to directed graphs. Graceful signed graphs  $f(uv)$  is the difference between  $f(v)$  and  $f(u)$ , that is  $f(uv) = f(v) - f(u)$ . Shalini, Paul Dhayabaran [14] introduced the concept A Study on Root Mean Square Labelings in Graphs. Shalini, Paul Dhayabaran [13] defined An Absolute Differences of Cubic and Square Difference Labeling. Shalini, Gowri, Paul Dhayabaran [15] discussed An Absolute Differences of Cubic and Square Difference Labeling For Some Families of Graphs. Shalini, Sri Harini, Paul Dhayabaran [19] introduced Sum of an Absolute Differences of Cubic And Square Difference Labeling For Cycle Related Graphs. Shalini, Gowri, Paul Dhayabaran [16] studied An Absolute Differences of Cubic and Square Difference Labeling for Some Shadow and Planar Graphs. Shalini, Subha, Paul Dhayabaran [20] investigated A Study on Disconnected Graphs for an Absolute Difference Labeling. Shalini, Subha, Paul Dhayabaran [22] discussed A Study on Disconnected Graphs for Sum of an Absolute Difference of Cubic and Square Difference Labeling. Shalini, Sri Harini, Paul Dhayabaran [21] extended Sum of an Absolute Differences of Cubic And Square Difference Labeling For Path Related Graphs. Shalini, P. S.A.Meena[25] introduced “Lehmer -4 mean labelling of graphs”.

## II. BASIC DEFINITIONS

### 1) Definition 2.1

In graph theory, a **path** in a graph is a finite or infinite sequence of edges which joins a sequence of vertices which, by most definitions, are all distinct (and since the vertices are distinct, so are the edges)

### 2) Definition 2.2

Caterpillar is attained by removing the pendant vertices of a path from the tree. It has vertices and edges.

### 3) Definition 2.3

A Triangular snake  $T_m$  is attained by attaching every pair of vertices of a path to another new vertex. (i.e.,) we can replace each edge of a path  $P_n$  by a cyclic graph  $C_3$ . Generally, it has vertices and edges.

4) *Definition 2.4*

A graph G is said to be power-3 Heroine odd Mean Labeling graph, if it admits power-3 Heroine odd Mean labeling.

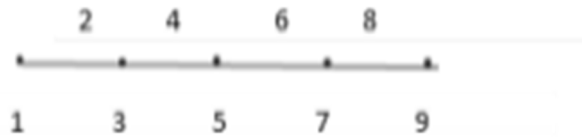
**III. MAIN RESULTS**

1) *Theorem:3.1*

The path is a Power-3 Heronian odd Mean Labeling for  $n \geq 2$ .

Proof: Let G be a graph of path  $p_n$ .

The path  $p_n$  consists of n vertices and n-1 edges. The vertices of  $p_n$  are labeled as given below.



**Figure 3.1: Path  $p_5$**

Define  $\beta: V(G) \rightarrow \{1,3,5,7,\dots,2n-1\}$  by,

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

Then the edge labels as  $f(e_i) = 2i; 1 \leq i \leq n$

Therefore  $p_n$  is said to be power-3 Heronian odd Mean graph.

2) *Theorem: 3.2*

The Triangular snake  $T_n$  a Power-3 Heronian Mean graph for  $n \geq 3$ .

Proof:

Let G be a graph of  $T_n$

Generally,  $T_n$  consists of  $2n-1$  vertices.

Now, defining a function  $\beta: V(G) \rightarrow \{1,3,5,\dots,n\}$  by,

$$\beta(u) = 2i - 1, \text{ where } i = 1, 2, 3, 4, \dots, n$$

$$\beta(v) = 4i - 1, \text{ where } i = 1, 2, 3, 4, \dots, n$$

Then the induced edge labels are given by,

$$\beta(e_i) = 2i, \text{ where } i = 1, 2, 3, 4, \dots, n \quad \beta(e_i) = 4i - 1, \text{ where } i = 1, 2, 3, 4, \dots, n$$

The edges receives weight as distinct integers. Therefore, it is said to be a Power-3 Heronian odd Mean labeling graph.



**Figure 3.2: Triangular snake  $T_5$**

3) *Theorem:3.3*

The caterpillar  $CP_n$  is a Power-3 Heronian Mean Labeling Graph for  $n \geq 2$ .

Proof:

Then the induced edge labels are given by,

$$\beta^*(v_i v_i) = 6i - 1, \text{ where } i = 1, 2, 3, 4, \dots, n$$

$\beta^*(v_i u_i) = 6i + 1$ , where  $i = 1, 2, 3, 4, \dots, n$ . Assume  $G$  be a graph attained by joining a single edge to the two sides of each vertex of  $P_n$ . Let  $P_n$  be a path  $v_1, v_2, \dots, v_n$ . Let  $u_i$  and  $w_i$  be the pendant vertices adjacent to  $v_i$ . Generally, it has  $3n$  vertices and  $3n - 1$  edges.

Now, defining a function by  $\beta: V(G) \rightarrow \{1, 3, 5, \dots, 3n - 1\}$

$\beta(u_i) = 6i - 5$ , where  $i = 1, 2, 3, 4, \dots, n$   $\beta(v_i) = 6i - 3$ , where

$i = 1, 2, 3, 4, \dots, n$   $\beta(w_i) = 6i - 1$ , where  $i = 1, 2, 3, 4, \dots, n$

$\beta(v_i w_i) = 6i - 1$ , where  $i = 1, 2, 3, 4, \dots, n$

The edge receives weight as a distinct integers. Therefore, it is said to be a Power-3

Heronian odd Mean graph



Figure 3.3: Caterpillar  $CP_n$

#### IV. CONCLUSION

In this article, we proved some families of graphs which admits Power-3 Heronian odd Mean Labeling. Therefore, Path, Triangular snake, Caterpillar are Power-3 Heronian Odd Mean Labeling.

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