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# A Study on Power-3 Heronian Odd Mean Labeling for some Path Related Graphs

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**Abstract:** In this article, we discussed Power-3 Heronian odd Mean Labeling for some path related 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,.....,2p-1} such that when each edges uv is assigned the label, then the resulting edge labels are distinct numbers.

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

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

## I. INTRODUCTION

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. 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. Bloom and Hsu [2] extended the notion of graceful labeling to directed graphs. Further this work can be extended in the field of automata theory [13,14,15,16,17,18,19] which has a wide range of application in automata theory. There are many applications in graph labeling under undirected [20,24,25,26,27,28,29,30] and directed graph [21,22,23]. Graph labeling is also extended to different types of domination as cited [3,4,5,9,10,11,12]

## II. BASIC DEFINITIONS

DEFINITION 2.1

A Star  $S_n$  is the complete bipartite graph  $K_{1,n}$

DEFINITION 2.2

$Y_n$  is connected graph without any circuits.

DEFINITION 2.3

A Bistar graph is the graph obtained by joining the centre(apex) vertices of two copies of  $K_{1,n}$  by an edge and it is denoted by  $BS_n$

## III. MAIN RESULTS

A. Theorem 3.1

The Star  $K_{1,n}$  is a Power 3 Heronian odd mean Labeling of graphs for  $n \geq 2$

PROOF:

Let G be a graph of Star  $K_{1,n}$

Let  $K_{1,n}$  be a star with vertices as  $v_1 ; u_1, u_2, u_3, \dots, u_n$

Define  $f : V(G) \rightarrow \{1,3,5, \dots, p-1\}$  by

$$f(v_1) = 1$$

$$f(u_i) = 2i+1 ; 1 \leq i \leq n$$

Therefore, the edges of the star graph receive distinct numbers.

Hence, the Star  $K_{1,n}$  is a Power 3 Heronian Odd Mean Labeling of Graphs.

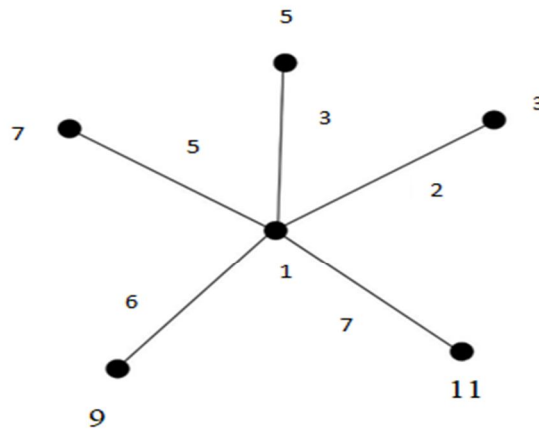


Fig 3.1 Star  $K_{1,5}$

**B. Theorem 3.2**

$Y_n$  is a Heronian Odd Mean Labeling of Graphs for  $n \geq 2$

PROOF:

Let  $G$  be a graph of  $Y_n$

Let  $Y_n$  be a graph with vertices as  $u_1 ; v_1 ; w_1, w_2, \dots, w_n$

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

$$f(u) = 2n + 1$$

$$f(v) = 2n + 3$$

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

Therefore, the edges of  $Y_n$  graph receive distinct numbers

Hence,  $Y_n$  is a Heronian Odd Mean Labeling of Graphs

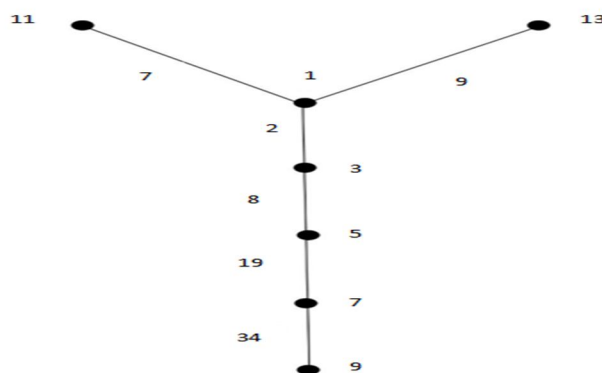


Fig 3.6  $Y_5$

**C. Theorem 3.3**

The Bistar  $BS_n$  is a Heronian odd mean Labeling of graph for  $n \geq 2$

Proof:

Let  $G$  be a graph of Bistar  $BS_n$

Let  $BS_n$  be a bistar with vertices as  $u_1, v_1, v_2, \dots, v_n; w_{n+1}, w_{n+2}, \dots, w_{n+n-1}$

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

$$f(u_i) = 1$$

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

$$f(w_i) = 2i + 11, 1 \leq i \leq n$$

Therefore, the edges of the bistargraph  $BS_5$  receive distinct numbers

Hence, the bistar graph  $BS_5$  is a Power -3 Heronian Odd mean Labeling of graphs.

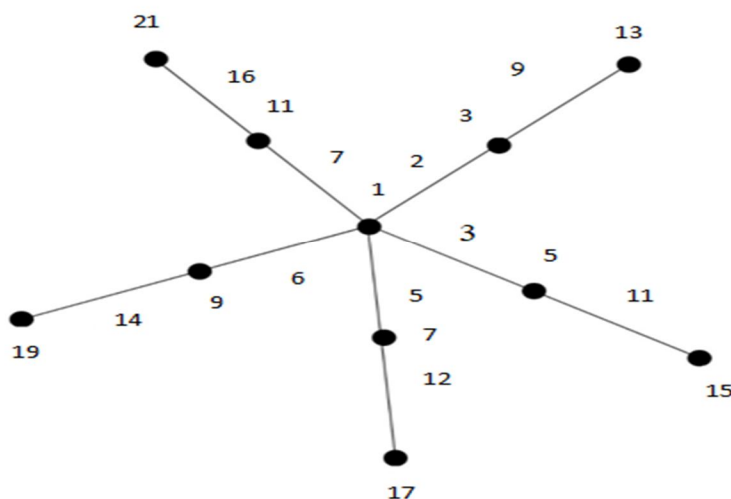


Figure 3.3 :  $BS_5$

#### IV. CONCLUSION

In this article, we proved some families of graphs which admits Power-3 Heronian odd Mean Labeling .Therefore, Star  $S_n$ ,  $Y_n$ , Bistar are Power-3 Heronian Odd Mean Labeling

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