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A Study on Root Cube Even Mean Labeling for Some Special Graphs

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Abstract: A graph $G = (V,E)$ with p vertices and q edges is said to be a Root Cube Even Mean Graph if it is possible to label the vertices $x \in V$ with distinct elements $f(x)$ from $1, 2, \dots, q+1$ in such a way that when each edge $e = uv$ is labeled with $f(e = uv)$

$$= \left\lfloor \sqrt{\frac{f(u)^2 + f(v)^2}{2}} \right\rfloor \text{ or } \left\lceil \sqrt{\frac{f(u)^2 + f(v)^2}{2}} \right\rceil, \text{ then the resulting edge labels are distinct. Here } f \text{ is called a Root Cube Even}$$

Mean Labeling of G . In this paper we prove that Quadrilateral snake, Triangular Snake, $P_n \odot K_{1,3}$, Star is a root cube even mean labeling.

Key Words: Labeling, Root Mean Square Graph, Graceful graph

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. 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 [6,7,8,9,10,11] which has a wide range of application in automata theory. There are many applications in graph labeling under undirected [16,17,18,19,20,21] and directed graph[12,13,14,15]

II. BASIC DEFINITIONS

A. Definition 2.1

The graph $P_n \odot K_{1,3}$ is obtained by attaching complete bipartite graph $K_{1,3}$ to each vertex of path P_n .

B. Definition 2.2

The graph is called a Quadrilateral Snake graph which is defined as series connection of non-adjacent vertices of N number of cycle.

C. Definition 2.3

A triangular T_n is obtained from a path $u_1, u_2, u_3, \dots, u_n$ and $v_1, v_2, v_3, \dots, v_n$. That is every edge of a path.

III. MAIN RESULTS

A. Theorem 3.1

$P_n \odot K_{1,3}$ is a Root Cube Even Mean Labeling Graph.

Proof

Let $P_n \odot K_{1,3}$ with vertices as v_1, v_2, \dots, v_n ; w_1, w_2, \dots, w_n ; u_1, u_2, \dots, u_n and x_1, x_2, \dots, x_n

Define a function $f: V(G) \rightarrow \{2, 4, 6, 8, \dots, 8n\}$

$$f(v_i) = 8i - 6, 1 \leq i \leq n$$

$$f(w_i) = 8i - 4, 1 \leq i \leq n$$

$$f(v_i) = 8i - 2, 1 \leq i \leq n$$

$$f(u_i) = 8i, 1 \leq i \leq n$$

The edge of the graph $P_n \odot K_{1,3}$ receive distinct numbers .
Hence $P_n \odot K_{1,3}$ is root cube even mean labeling graph.

Example 3.1

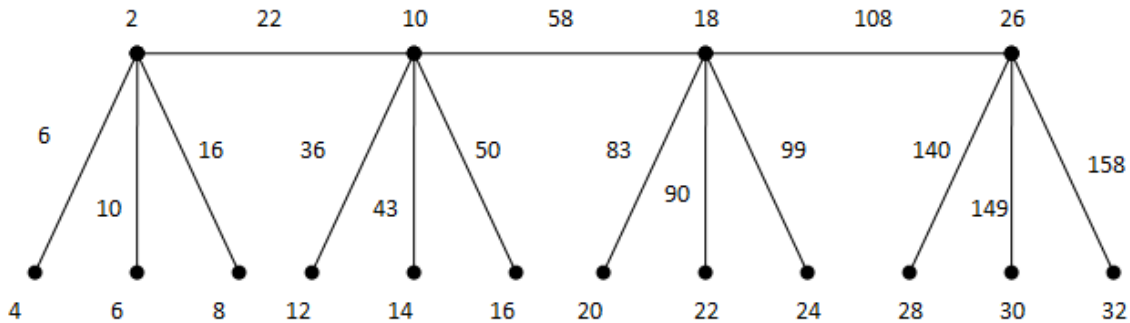


Figure: 3.1 $P_n \odot K_{1,3}$

B. Theorem:3.2

The Star $K_{1,n}$ is a Root Cube Even Mean Labeling Graph

Proof

Let G be a graph $k_{1,n}$

Let $k_{1,n}$ be a star with vertices as v_1, v_2, \dots, v_n

Define $f: V(G) \rightarrow \{2, 4, 6, 8, \dots, 2n+1\}$

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

Then the edge labels as $2i + 1; 1 \leq i \leq n$

Therefore, the edge of the star graph receive distinct numbers

Hence, the star $K_{1,n}$ is a root cube even mean labeling

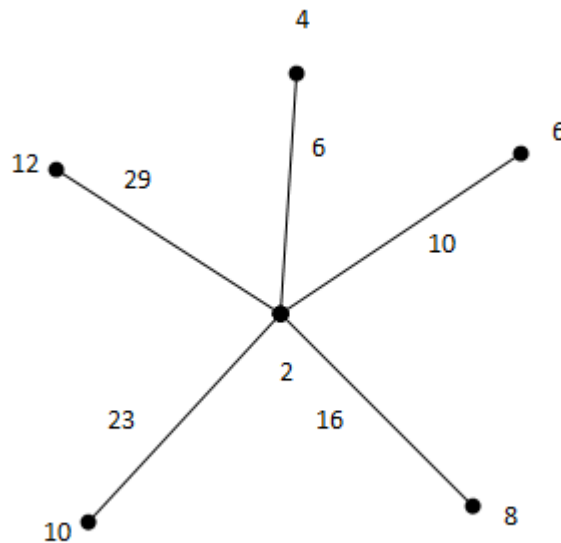


Figure:3.2 Star $k_{1,n}$

C. Theorem: 3.3

Q_3 is a root cube even mean labeling graph

Proof

Let Q_3 is a graph

Let Q_3 with vertices v_1, v_2, \dots, v_n ; w_1, w_2, \dots, w_n ; u_1, u_2, \dots, u_n and x_1, x_2, \dots, x_n

Define a function $f: V(G) \rightarrow \{2, 4, 6, \dots, n\}$

$$f(u_i) = 6i - 2$$

$$f(v_i) = 6i - 4$$

$$f(w_i) = 6i$$

Then the edge labels are distinct.

Therefore, Q_3 is said to be a root cube even mean labeling of graph.

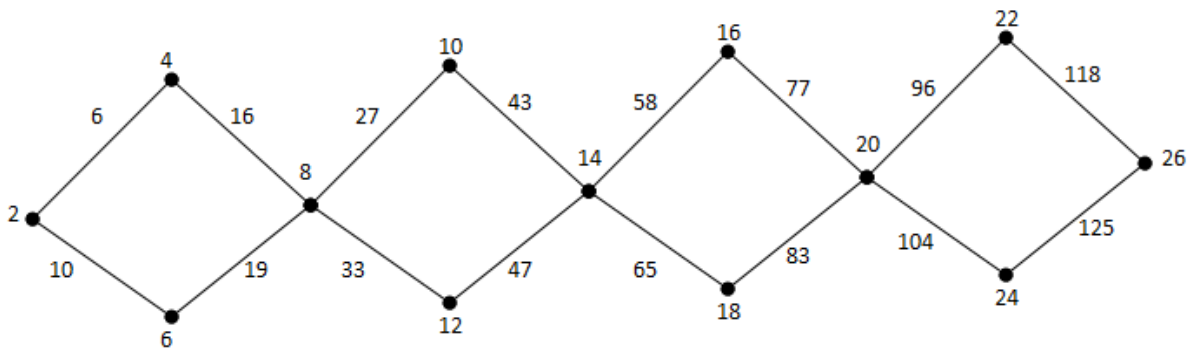


Figure:3.3 Quadrilateral snake

D. Theorem :3.4

T_4 is a root cube even mean labeling of graph

Proof

Let T_4 be a triangular snake

Let T_4 with vertices v_1, v_2, \dots, v_n ; w_1, w_2, \dots, w_n ; u_1, u_2, \dots, u_n and x_1, x_2, \dots, x_n

Define a function $f: V(G) \rightarrow \{2, 4, 6, \dots, n\}$

$$f(u_i) = 2i - 2$$

$$f(v_i) = 2i$$

Then the edge labels are distinct.

Therefore, T_n is said to be a root cube even mean labeling of graph.

Example: 3.4

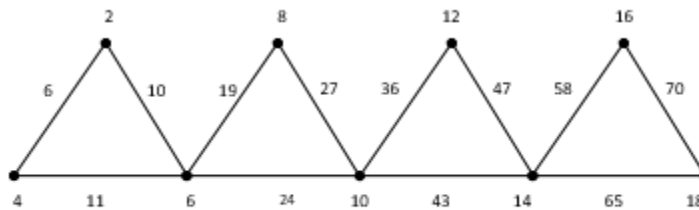


Figure 3.4 Triangular Snake

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