

SQUARES OF SQUARE DIFFERENCE LABELING ON PATH RELATED GRAPH

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Email alicestephen8979@gmail.com² Research Scholar, Reg. No. 19232142092007, Department of Mathematics, Nazareth Margoschis College At Pillaiyanmanai Tuticorin-Affiliated to Manonmaniam Sundaranar University, Abishekapatti, Tirunelveli – 627012, India.and St. Joseph's College of Arts and Science for Women- Hosur. Email jebaselvikavitha@gmail.com**Abstract**

Let $G(V, E)$ be a graph with p vertices and q edges. Let $f: V(G) \rightarrow \{0, 1, 2, \dots, p-1\}$ be a bijection. Define $f^*: E(G) \rightarrow N$ by $f_{ssd}^*(uv) = \left[(f(u))^2 - (f(v))^2 \right]^2, \forall uv \in E(G)$. If f_{ssd}^* is injective then f_{ssd}^* is called squares of square difference labeling of G . A graph G which admits squares of square difference labeling is called squares of square difference graph. We applied squares of square difference labeling to Path related graphs

1. Introduction

Every graph in this paper are simple finite, undirected and non-trivial graph $G = (V, E)$ with vertex set V and Edge set E . For graph theoretic terminology we refer to Harary. The square sum labeling is defined by V. Ajitha, S. Arumugam and K. A. Germina.

We have improved to the square of square difference and we investigated it for path related graph

2. Definition**Definition 2.1**

A Path P_n in a graph is a sequence of edges, each one incident to the next.

Definition 2.2

A Path P_n^2 is a graph is obtained by appending $v_i v_{i+1}$ and $v_j v_{j+2}$ for $1 \leq i \leq n-1$ and $1 \leq j \leq n-2$

3. Theorems

Theorem 3.1 The Path graph P_n is a squares of square difference graph.

Proof

Let $V = \{v_i / 1 \leq i \leq n\}$ be the vertex set of P_n graph.

Let $E = \{v_i v_{i+1} / 1 \leq i \leq n-1\}$ be the edge set of P_n graph.

Here $|V(G)| = n$ and $|E(G)| = n-1$.

Define $f: V \rightarrow \{0, 1, 2, \dots, p-1\}$ by

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

Clearly f is a bijection.

Then the corresponding edge label are as follows

$$\begin{aligned} f_{ssd}^*(v_i v_{i+1}) &= [[f(v_i)]^2 - [f(v_{i+1})]^2]^2 = [i^2 - 2i + 1 - i^2]^2 \\ &= [-2i + 1]^2 = 4i^2 + 1 - 4i; \forall 1 \leq i \leq n-1. \end{aligned}$$

Clearly the edge labels are distinct.

P_n is a square of square difference graph.

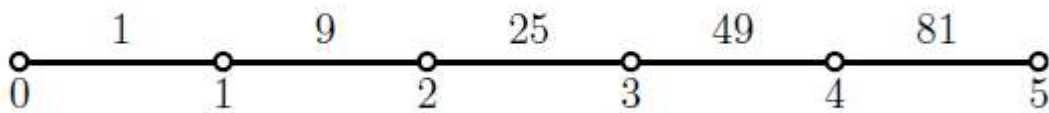


Figure 3.1

Theorem3.2 The Path graph P_n^2 is a squares of square difference graph.

Proof

Let $V = \{v_i/1 \leq i \leq n\}$ be the vertex set of P_n^2 graph.

Let $E = \{v_i v_{i+1} / 1 \leq i \leq n-1\} \cup \{v_i v_{i+2} / 1 \leq i \leq n-2\}$ be the edge set of P_n^2 graph.

Here $|V(G)| = n$ and $|E(G)| = 2n - 3$.

Define $f: V \rightarrow \{0, 1, 2, \dots, p-1\}$ by

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

Clearly f is a bijection.

Then the corresponding edge label are as follows

$$\begin{aligned} f_{ssd}^*(v_i v_{i+1}) &= [[f(v_i)]^2 - [f(v_{i+1})]^2]^2 = [i^2 - 2i + 1 - i^2]^2 \\ &= [-2i + 1]^2 = 4i^2 + 1 - 4i; \forall 1 \leq i \leq n-1. \end{aligned}$$

$$\begin{aligned} f_{ssd}^*(v_i v_{i+2}) &= [[f(v_i)]^2 - [f(v_{i+2})]^2]^2 = [i^2 - 2i + 1 - (i^2 + 2i + 1)]^2 \\ &= [-4i]^2 = 16i^2; \forall 1 \leq i \leq n-1. \end{aligned}$$

Clearly the edge labels are distinct.

P_n^2 is a square of square difference graph.

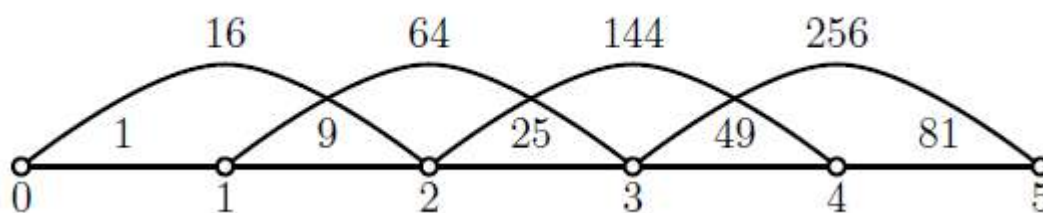


Figure 3.2

4 Conclusions

In this paper, we proved Path P_n graphs and P_n^2 graphs are squares of square difference graphs. There may be interesting squares of square difference graphs can be constructed in future.

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