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Fibonacci Antimagic Labeling of Some Special Graphs

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ABSTRACT

In this paper we introduce Fibonacci Antimagic labeling . A bijective function

f : V(G) →{F0,F1,....Fn} where Fj is the jth Fibonacci number (j = 0,1,...n) is said to the Fibonacci Antimagic labeling if the induced function

f : E(G) →{1,2,...2P} is defined by f*(uv) = (f(u) + f(v)) and all these edge labelings are distinct is called Fibonacci Antimagic labeling and a graph which admits Fibonacci Antimagic labeling is called a Fibonacci Antimagic graphs. Here we investigate Fibonacci Antimagic labeling of some special kind of graphs.*

Keywords: *Fibonacci Antimagic labeling, Tree, Path, Spider, Caterpillar, Unicyclic graph.*

AMS SUBJECT CLASSIFICATION (2010): 05C78

INTRODUCTION

In this paper we consider finite, connected, undirected and simple graphs only. The vertex set and edge set of a graph G are denoted by V(G) and E(G) respectively. For various graph theoretic notation and terminology by D.B. west [7]. Fibonacci graceful labeling was introduced by kathiresan and Amutha [5] and antimagic labelings was introduce by N.Hartsfield and G.Ringel [4]. In this paper we introduce a new concept called Fibonacci Antimagic labelings.

Definition 1.1

The Fibonacci sequence is a set of numbers that starts with zero followed by a one and proceed based on the rule that each number is equal to the sum of the proceeding two numbers is called a *Fibonacci labelings*.

Definition 1.2

A graph G is antimagic if the Q edges of G can be distinctly labelled in such a way that when taking the sum of the edges labels incident to each vertex they all will have distinct constants is called the *antimagic labeling.*

Definition 1.3

A *Tree* is an undirected graph in which any two vertices are connected by exactly one path.

Definition 1.4

A Walk is a path if all its vertices and also edges are distinct. In addition, if all the vertices are distinct then the trail is a *path.*

Definition 1.5

Caterpillar is a tree with all vertices either on a single central path or distance 1 away from it. The central path may be considered to be the largest path in the caterpillar so that both end vertices have valency 1.

Definition 1.6

A *spider* is a tree with one vertex of degree atleast 3 and all others with degree atmost 2.

Definition 1.7

The graph $C_n \Theta mK_1$ is a *unicyclic graph* with p=q=n(m+1) obtained from the cycle C_n by attaching m-pendent edges at each vertex of the cycle C_n.

MAIN RESULTS

Definition 2.1

Let G be a (p,q) graph. An bijective function f : V(G) $\rightarrow\{F_0,F_1,....F_n\}$ where F_j is the j^{th} Fibonacci number (j=0,1,...n) is said to the Fibonacci Antimagic labeling if the induced function f^* : E(G) →{1,2,...2P} is defines by $f^*(uv) = (f(u) + f(v))$ and all these edge labelings are distinct Fibonacci Antimagic labeling.

Theorem 2.2

Every path P_n, $n \geq 2$ admits a Fibonacci Antimagic labeling.

Proof

Let $G=P_n$ be a graph with n vertices and n-1 edges.

Define a vertex labeling by f: $V(G) \rightarrow \{F_0, F_1, \ldots. F_n\}$ and the induced edge labeling

$f^*: E(G) \rightarrow \{1,2,\ldots 2P\}$ defined by $f^*(uv)=(f(u)+f(v))$ and all these edge labeling are distinct.

Therefore the resulting every path P_n, $n \geq 2$ admits a Fibonacci Antimagic labeling.

Example 2.3

The following is an example of the Fibonacci Antimagic labeling of the Path P_4 and P_5

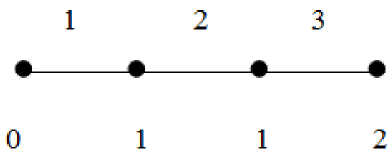


Fig (1.1) - P_4

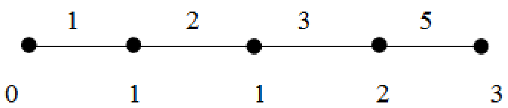


Fig (1.2) - P_5

Theorem 2.4

All trees are Fibonacci Antimagic labelings.

Proof

A tree has n vertices and n-1 edges.

Define a vertex labeling by f: $V(G) \rightarrow \{F_0, F_1, \ldots. F_n\}$ and the induced edge labeling

$f^*: E(G) \rightarrow \{1,2,\ldots 2P\}$ defined by $f^*(uv)=(f(u)+f(v))$ and all these edge labeling are distinct.

Therefore the resulting all trees are Fibonacci Antimagic labeling.

Example 2.5 -

The following is an example of the Fibonacci Antimagic labeling of the tree.

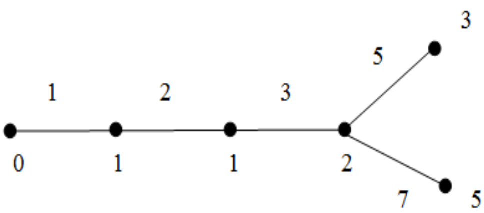


Fig (1.3)

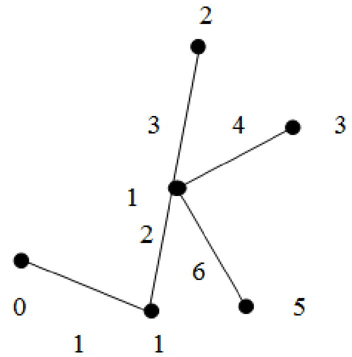


Fig (1.4)

Theorem2.6

The caterpillar graph admits a Fibonacci Antimagic labeling.

Proof

Let G be a caterpillar graph.

Define a vertex labeling by f : V(G) $\rightarrow \{F_0, F_1, \ldots. F_n\}$ and the induced edge labeling

$f^*: E(G) \rightarrow \{1,2,\ldots 2P\}$ defined by $f^*(uv) = (f(u) + f(v))$ and all these edge labeling are distinct.

Therefore the resulting caterpillar graph admits a Fibonacci Antimagic labeling.

Example 2.7

The following is an example of the Fibonacci Antimagic labeling of the caterpillar graph.

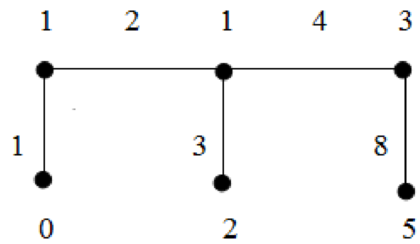
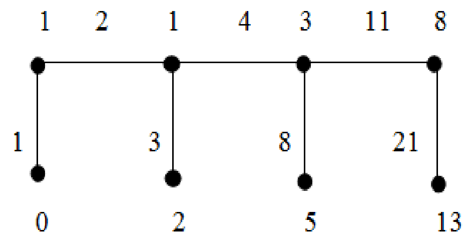


Fig (1.5) - $T(X_1, X_2, X_3)$



Fig(1.6) - $T(X_1, X_2, X_3, X_4)$

Theorem 2.8

The spider graph admits a Fibonacci Antimagic labeling.

Proof

Let $G=S_{n,m}$ be a spider graph with n spokes in which each spoke is a path on length m.

Define a vertex labeling by $f : V(G) \rightarrow \{F_0, F_1, \ldots F_n\}$ and the induced edge labeling

$f^* : E(G) \rightarrow \{1,2,\ldots 2P\}$ defined by $f^*(uv) = (f(u) + f(v))$ and all these edge labeling are distinct.

Therefore the resulting spider graph admits a Fibonacci Antimagic labeling.

Example 2.9

The following is an example of the Fibonacci Antimagic labeling of the spider graph.

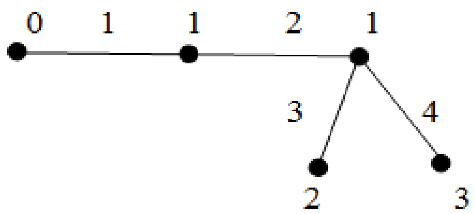


Fig (1.7)

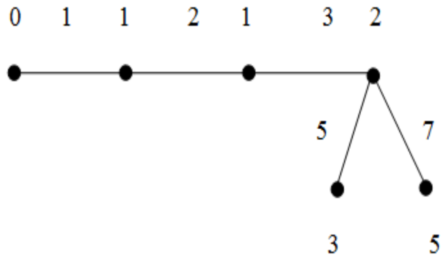


Fig (1.8)

Theorem 2.10

Every unicyclic graph admits a Fibonacci Antimagic labeling.

Proof

Let G be a unicyclic graph with p vertices and q edges.

Define a vertex labeling by $f : V(G) \rightarrow \{F_0, F_1, \ldots F_n\}$ and the induced edge labeling

$f^* : E(G) \rightarrow \{1,2,\ldots 2P\}$ defined by $f^*(uv) = (f(u) + f(v))$ and all these edge labeling are distinct.

Therefore the resulting every unicyclic graph admits a Fibonacci Antimagic labeling.

Example 2.11

The following is an example of the Fibonacci Antimagic labeling of the unicyclic graph.

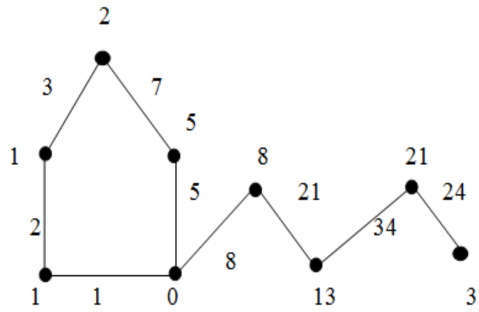


Fig 1.9 *(C_5 at P_4)*

CONCLUSION

In this paper we have shown that path, tree, spider, caterpillar and unicyclic graphs are fibonacci Antimagic labeling. In future, the same process will be analysed for other graphs.

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