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Super Fibonacci Graceful Labeling of Friendship and Windmill Graph

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Abstract

The Fibonacci series is utilized to produce Fibonacci in a recursive grouping. To find, the arrangement which is produced by including the past two terms is known as a Fibonacci arrangement. The first two term of the Fibonacci arrangement is set as 0 and 1 and it proceeds till boundlessness. And this paper we discuss about the Fibonacci number and its function h :V(G)→{0,F1,F2,…….Fq} is said as super Fibonacci graceful, then the induced edge labeling f*: E(G)→{F1,F2,F3,….Fq} and it is characterized by h*(ab)=│h(a)h(b)│is bijective. And also the Cycle in Friendship graph and Dutch windmill graph, butterfly graph and $(K_4 - e)^n$ graphs are interrogated. And also few examples are given to show the result of the theory.

Key Words :*Friendship Graph, The Graph $(K_4 - e)^n$, Fibonacci Graceful and Super Fibonacci Graceful Labeling.*

I. INTRODUCTION

In diagram hypothesis, a smooth naming of a chart with m-edges is the marking of its vertices with some subset of the numbers among 0 and m comprehensive, to such an extent that no two vertices share a lable, and each ana every edge is particularly recognized by the outright distinction between its endpoints, to such an extent that this greatness lies among 1 and m comprehensive. A diagram which concedes a graceful marking is known as an graceful graph.

The chart G(p, n) will be called Fibonacci graceful if there is a naming l of its vertices with distinct number from the set $\{0,1,2,3,...,F_n\}$ so the induced edge marking l', characterized by l'(ab) = | l(a)- l(b) | is a bijection onto the set $\{F_1,F_2 , \dots ,F_n \}$.

We call a function f, the Fibonacci graceful labeling of a chart G with q edges, if f is an injection function from the vertices of G to the set $\{ 0,1,2,...,F_q\}$, where F_q is the q^{th} Fibonacci number of the Fibonacci arrangement $F_1 = 1, F_2 = 2, F_3 = 3, F_4 = 5, \dots$, to such an extent that each and every edge uv is assinged the lable |h(a)−h(b)|, the subsequent edge labeling are $F_1, F_2, \dots, F_q$. An injective function h : V(G)→ $\{F_0, F_1, \dots, F_q\}$, where F_q, q^{th} Fibonacci number, which is said to be a Super Fibonacci Graceful Labeling if the induced edge labeling |h(a)−h(b)| is a bijection onto the set $\{F_1, F_2, \dots, F_q\}$.

II. DEFINITIONS

Definition 2.1.

If the vertices or the edges or both allotted values subject to certain condition(s), at that point it is known as graph labeling.

Definition 2.2.

The function f is called a graceful labeling of the graph G, if h: V→ {0,1,2,…,q} is injective and the induced function h*: E→ {1,2,3,…,q} defined as h*(e = ab) = |h(a) –h(b)| is bijective.

Definition 2.3.

The function h : V(G)→ {0,1,2,…,F_q) (whereF_q is theq^{th} Fibonacci number) is said to be Fibonacci graceful,if the induced edge labeling h * : E(G)→{F_1, F_2,…,F_q} characterized by h*(ab) =|h(a) –h(b)| is bijective.

Definition 2.4.

The function h : V(G)→ {0, F_1, F_2,…,F_q} is said as Super Fibonacci graceful, if the induced edge labeling h* : E(G)→ {F_1, F_2,…,F_q} characterized by h*(ab) =|h(a) –h(b)| is bijective.

Definition 2.5.

A Friendship graph $F_n$is a diagram which comprise of n triangles with the common vertex.

Definition 2.6.

Two cycles of the same order n offering a common vertex with an discretionary number m of pendant edges appended at the common vertex called butterfly graph $B_{n,m}$where n and m are two positive integers.

Definition 2.7.

The wind mill graphs $(K_m)^n$ to be the family of graphs consisting of n copies of $K_m$with a common vertex.

Definition 2.8.

The graph $(K_4 - e)^n$ is obtained from the windmill graph $(K_4)^n$, by removing an edge in each K_4.

Definition 2.9.

A graph is acquired by appending a triangle at every pendant vertex of a Star graphs.

III. THEOREMS

Theorem 3.1

Super Fibonacci gracefulness in Friendship graph

Proof:

Consider F_n be the friendship graph. The order of F_n is p= 2n+1 and the size of F_n is q= 3n. By the meaning of F_n, the vertex set V= $\{a_1, a_2, \dots, a_n, b_0, b_1, b_{2,\dots,} b_n\}$. Let $a_1, a_2, \dots, a_n$be second vertices of the triangles and let $b_1, b_{2\ ,\dots,} b_n$be third vertices of the triangles, and let the apex vertex b_0 be first vertex of all the triangles. The edge set E= $\{e_i, e_{ii,} e_i *\}$, where$e_i = (b_0, b_i), e_{ii,} = (b_i, a_i)$ and$e_i{}^* = (b_0, a_i)$.

Presently, let us characterize the function h : V→ {0, F_1, F_2,…,F_q} follows

h(b_0)=0

h(a_j)=F_{3j-1} for j=1,2,3,…,n

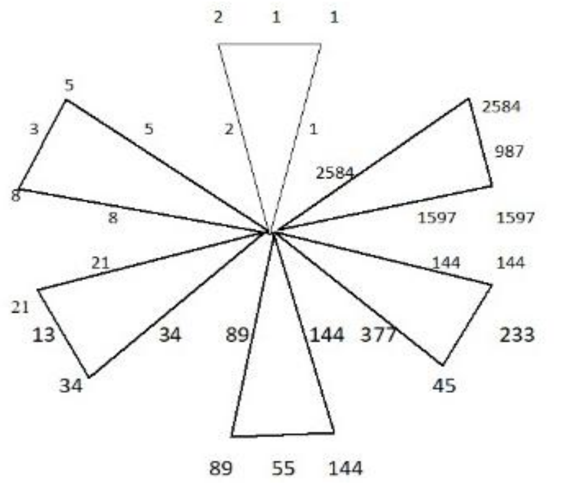
h(b_j)=F_{3j} for j=1,2,3,…,n

Then the defined function admits the Super Fibonacci graceful labeling. Hence Super Fibonacci gracefulness in friendship graph.

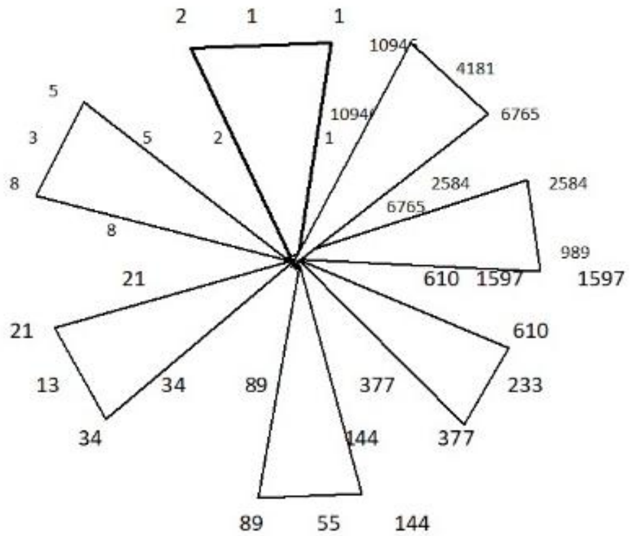
Example:

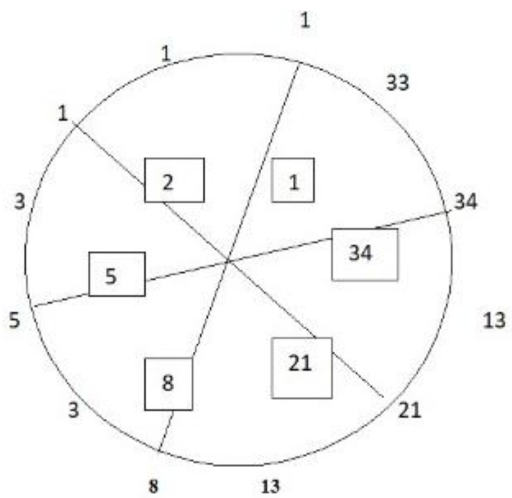
The friendship graph ofF_5, the order is p=13 and the size is q=18

January - February 2020
ISSN: 0193 - 4120 Page No. 4503 - 4506



The friendship graph of F_7 the order is p=15 and the size is q=21





Theorem 3.2

The graph $(K_4-e)^n$ are super fibonacci graceful.

Proof:

Let G= $(K_4-e)^n$ be the graph. The order of the graph G is p=3n+1and the size of the graph G is q=5n.Then the vertex set V=$\{x, a_1, a_2, \dots, a_n, b_1, b_{2,\dots,} b_n, c_1, c_{2,\dots,} c_n\}$.Let $a_1, a_2, \dots, a_n$be second vertices of the$(K_4-e)^n$, let $b_1, b_{2,\dots,} b_n$be third vertices of the$(K_4-e)n$,let$c1,c2,\dots,cn$ be fourth vertices of the$(K_4-e)^n$.And let the central vertex x be first vertex of all the$(K_4-e)^n$.The edge set E=$\{e_i, g_{i,} e_{ii,} e^*{}_{ii}\}$ where e_i=(x, a_i),e_{ii}=(a_i, b_i),g_i=(x, b_i),h_i=(x, c_i), $e^*{}_{ii}$=(b_i, c_i).

Presently, let us characterize the function

h : V⟶ $\{0, F_1, F_2,\dots,F_q\}$ as follows

h(x)=0

h(a_{j+1}) = F_{5j+1} for j = 0,1,2,3,……,n-1

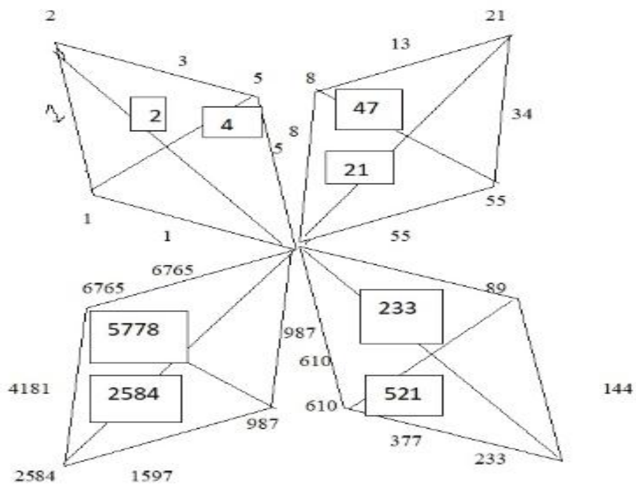
h(b_j) =$F_{5j-2}$for j = 1,2,3,……..,n

h(b_j) =F_{5j} for j = 1,2,3,…….,n

At that point, the above defined characterized work h concedes Super Fibonacci Graceful labeling.

Example:

The graph $(K_4-e)^4$ is appeared below .The order and the size of the graph $(K_4-e)^4$ is p=13 and q=20 individually.



January - February 2020
ISSN: 0193 - 4120 Page No. 4503 - 4506

Theorem 3.3

The Butterfly graphs are Super Fibonacci graceful graphs.

Proof :

Let$B_{3,m}$be the Butterfly graph. The order of the Butterfly graph be p=5+m and the size of the Butterfly graph be q=6+m. By the definition of the Butterfly graph, the vertex set V(G)={$a_1, a_2, a_3, a_4, a_5, b_1, b_{2,...,} b_m$}. Let a_1, a_2, a_3, a_4, a_5 be the vertices of the two cycles C_3 and a_1 be the apex vertex of the two cycles C_3 . The edge set E= $\{e_i, e_{ij}, \}$ where $e^* = (a_1, b_i)$and $e_{ij} = \left(a_i, a_j\right)$.

Presently, let us characterize the function

h : V→ {0, F_1,F_1, F_2,…,F_q} as follows

h(a_1)=0

h(a_j)=F_j for j=1,2,3,…,n

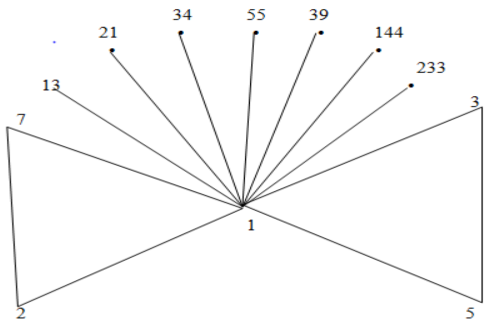
h(a_j)=F_{j+1} for j= 4,5

h(b_j)=F_{j+6} for j=1,2,…,m

At that point, the above defined characterized work h concedes Super Fibonacci Graceful labeling. Hence the Butterfly graphs are Super Fibonacci Graceful.

Example:

The Butterfly graph$B_{3,m}$ is appeared in figure. The order and size of the graph is p=13 and q=14 individually.



CONCLUSION

In this paper we observed that the super Fibonacci gracefulness, if the induced edge labeling h*: E (G) →{F_1, F_2,…,F_q} and it is characterized by h*(ab) =|h(a)- h(b)| is bijective, when the function is h: V(G) →{0,F_1, F_2,…,F_q}. An investigation is made on Friendship diagram, Wind mill diagram and the Butterfly diagram by using Super Fibonacci graceful labeling.

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