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ANTI – MAGIC LABELING ON SOME STAR RELATED GRAPHS.

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Abstract: Let G= (V,E) be a simple, finite, undirected and connected graph. A graph G= (V,E) with order p and size q is said to admit anti-magic labelling if there exists a bijection $f:E(G) \rightarrow \{1,2,...q\}$ such that for each $u,v \in V(G)$, $\sum f(e)$ are distinct for all $e= uv \in E(G)$. In this paper , we have obtained anti- magic labelling on the graphs, obtained by joining apex vertices of some star graphs to a new vertex by assigning both even and odd positive integers to these vertices and edges respectively.

Keywords: Star graphs, Edge labelling, vertex labelling, Even Anti – magic labelling, Odd Anti- magic labelling.

1.INTRODUCTION

The concept of graph labeling was introduced by Rosa in 1967. A graph labeling is an assignment of integers to the vertices or edges or both subject to certain conditions.

Hartsfield and Ringel introduced the concept of Anti – magic labeling which is an assignment of distinct values to different vertices in a graph in such a way that when taking the sums of the labels, all the sums will be having different constants [4].

Definition 1.1:

Vertex labeling :

Label the vertices of a graph with positive integers. This process is called vertex labeling. Let $f:V\rightarrow\{1,2\ldots n\}$. Under this vertex labeling , the edge weight of an edge e= uv is defined as W(e) = W(uv)= f(u)+f(v).

Definition 1.2:

Edge labeling :

Label the edges of a graph with positive integers. This process is called edge labeling. Let $f:E\rightarrow\{1,2,\ldots n\}$.Under this edge labeling, the vertex weight of a vertex $v \in V(G)$ is defined as the sum of the labels of the edges incident with v that is $w(v)= \sum f(uv)$.

Definition 1.3:

Consider t copies of stars namely $K_{1,n1},K_{1,n2}\ldots K_{1,nt}$ then the graph G= $<K_{1,n1},K_{1,n2}\ldots K_{1,nt}>$ is the graph obtained by joining apex vertices of each $k_{1,ni}$ and $k_{1,ni+1}$ to a new vertex u_i, where $1\leq i \leq t-1$.

II Main Results:

Theorem 2.1:

The graph G obtained by joining t copies of stars $< K_{1,n1}, K_{1,n2}\ldots K_{1,nt} >$ admits Edge – Even anti – magic labeling.

Proof:

Let $\{v_1,v_2\ldots.v_n\}$ be the vertices and $\{e_1,e_2,\ldots e_n\}$ be the edges of the star graphs, $K_{1,ni}$,i= 1,2…t. We shall join these graphs $K_{1,ni}$, $K_{1,ni+1}$ and $K_{1,ni+2}$ by adding a new vertex u_i, where $1\leq i \leq t-1$ to their apex vertices. We define the labeling function f as follows:

$f:E(G) \rightarrow \{2,4\ldots.2q\}$, where q is the even number of edges of G.

$f(v_{i,0}) = 3q+i$, for i = 1
$f(v_{i,0}) = 6q+3i$, for i= 2
$f(v_{i,0}) = 5q+3i$, for i = 3
$f(e_i) = 2i$, for i = 1,2….n
$f(u_i) = 2q+i-1$, for i=1

Thus, the above labeling pattern gives rise to an anti – magic labeling on the given graph G.

Illustration 2.2:

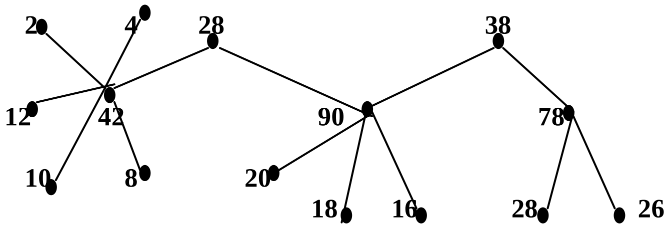

Figure 1: Edge- Even Anti- magic labeling on $< K_{1,2}\ K_{1,3,}K_{1,5} >$

Theorem 2.3:

The graph G obtained by joining t copies of stars $< K_{1,n1}, K_{1,n2}\ldots K_{1,nt} >$ admits Edge – odd anti – magic labeling.

Proof:

Let $\{v_1,v_2\ldots.v_n\}$ be the vertices and $\{e_1,e_2,\ldots e_n\}$ be the edges of the star graphs, $K_{1,ni}$, i= 1,2…t. We shall join these graphs $K_{1,ni}$, $K_{1,ni+1}$, $K_{1,ni+2,}$ $K_{1,ni+3}$ by adding a new vertex u_i, where $1\leq i \leq t-1$ to their apex vertices. We define the labeling function f as follows:

$f:E(G) \rightarrow \{1,3\ldots.q\}$,

where q is the odd number of edges of G.

$f(v_{i,0}) = 2q+i=7$, for i = 1
$f(v_{i,0}) = 6q-3i$, for i= 2
$f(v_{i,0}) = 7q+3i-1$, for i = 3
$f(v_{i,0}) = 5q+3i$, for i = 4
$f(e_i) = i$, i+1,i+2,i+3…i+q.
$f(u_i) = q-i$, for i=1
$f(u_i) = 2q+i$, for i=2
$f(u_i) = 3q+i$, for i=3.

Thus, the above labeling pattern gives rise to an anti – magic labeling on the given graph G.

Illustration 2.4:

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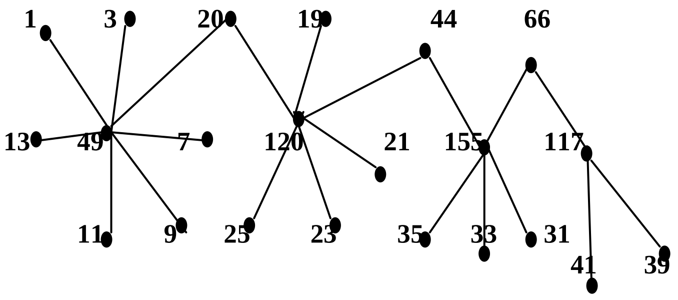

Figure 2: Edge- Odd Anti- magic labeling on < $K_{1,2}$ $K_{1,3}$,$K_{1,4}$,$K_{1,6}$>

Theorem 2.5:

The graph G obtained by joining t copies of stars < $K_{1,n1}$, $K_{1,n2}$…$K_{1,nt}$ > admits Vertex – even anti – magic labeling.

Proof:

Let {v_1,v_2….v_n} be the vertices and {e_1,e_2,…e_n} be the edges of the star graphs, $K_{1,ni}$,i= 1,2…t. We shall join these graphs $K_{1,ni}$ and $K_{1,ni+1}$ by adding a new vertex u_i, where 1≤ i ≤ t-1 to their apex vertices. We define the labeling function f as follows:

f:V(G) → {2,4….2q} ,

where q is the even number of edges of G.

$f(v_{i,0})$ = q+2i , for i = 1
$f(v_{i,0})$ = q+4i+2, for i= 2
$f(v_{1,j})$ = q+2j+2 , for j = 1,2,…t
$f(u_i)$ = q+6i+2i , for i=1
$f(v_{2,j})$ = 3q+2j+4 , for j=1,2…t

Thus ,the above labeling pattern gives rise to an anti – magic labeling on the given graph G.

Illustration 2.6:

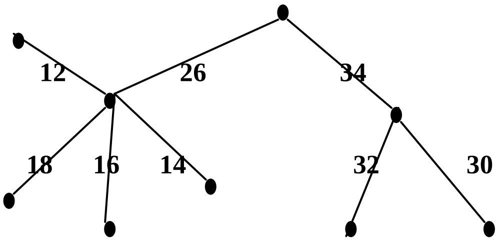

Figure 3: Vertex- Even Anti- magic labeling on < $K_{1,2}$,$K_{1,4}$>

Theorem 2.7:

The graph G obtained by joining t copies of stars < $K_{1,n1}$, $K_{1,n2}$…$K_{1,nt}$ > admits Vertex – odd anti – magic labeling.

Proof:

Let {v_1,v_2….v_n} be the vertices and {e_1,e_2,…e_n} be the edges of the star graphs, $K_{1,ni}$, i= 1,2…t. We shall join these graphs $K_{1,ni}$, $K_{1,ni+1}$ and $K_{1,ni+2}$ by adding a new vertex u_i, where 1≤ i ≤ t-1 to their apex vertices. We define the labeling function f as follows:

f:V(G) → {1,3….q} ,

where q is the odd number of edges of G.

$f(v_{i,0})$ = i , for i = 1
$f(v_{i,0})$ = q+i-2, for i= 2
$f(v_{i,0})$ = 2q-i, for i=3
$f(v_{1,j})$ = q+2j-11 , for i = 1,2,…t
$f(u_i)$ = q-2i , for i=1
$f(u_i)$ =2q-2i-1 , for i=2
$f(v_{2,j})$ = 2q-2i , for j=1
$f(v_{2,j})$ = 2q+i,2q+i+1,2q+i+2,…2q+i+t.
$f(v_{3,j})$ = 3q+5i , for j=1
$f(v_{3,j})$ = 4q-2i , for j=2
$f(v_{3,j})$ = 4q-i+1 , for j=3.

Thus, the above labeling pattern gives rise to an anti – magic labeling on the given graph G.

Illustration 2.8:

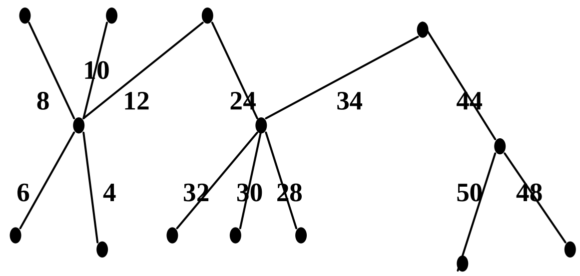

Figure 4:Vertex- Odd Anti- magic labeling on < $K_{1,2}$ $K_{1,3}$,$K_{1,4}$>

CONCLUSION:

In this paper, We have presented anti- magic labeling on some star related graphs by assigning even and odd positive integers for both the vertices and edges respectively. Here, we obtained anti- magic labeling on 2 copies, 3 copies and 4 copies of star related graphs. Similar results for finite number of copies of star related graphs are under investigation.

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