ISSN: 0975-766X
CODEN: IJPTFI
Research Article

Available Online through
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0-EDGE MAGIC LABELING OF SHADOW GRAPH

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Received on 20-01-2016 *Accepted on 22-02-2016*

Abstract: In this paper existence of *0*-edge magic labeling of shadow graph for $D_2(P_n)$, $D_2(C_n)$, $D_2(K_{1,n})$, $D_2(B_{m,n})$, $m,n \geq 2$ are exhibited .

Key words: Graph labeling, shadow graph, $D_2(P_n)$, $D_2(C_n)$, $D_2(K_{1,n})$, $D_2(B_{m,n})$ etc.

1. Introduction: Graph labeling plays a vital role in Engineering Science and Technology. Growth of labeling has yielded many Applications. A useful survey to know about the numerous graph labeling methods is the one by (Gallian, 2013).Here in this article some results on 0-edge magic labeling of shadow graph is proved which was introduced by J.Jayapriya in the year 2012. A *0*-edge magic labeling of a simple graph G with vertex set V is a function f from V to $\{-1, 1\}$ such that every edge uv has the label $f(u) + f(v) = 0$.

2. Results on 0-edge magic labeling of shadow graph:

Theorem 2.1. The graph $D_2(P_n)$ admits *0*-edge magic labeling.

Proof. The graph G $(V, E) = D_2(P_n)$ has $2n$ vertices and $4n-4$ edges.

Let $V(G) = \{v_i : 1 \leq i \leq n\} \cup \{v_i' : 1 \leq i \leq n\}$ and

$E(G) = \{v_i v_{i+1} : 1 \leq i \leq n-1\} \cup \{v_i' v'_{i+1} : 1 \leq i \leq n-1\} \cup \{v_i' v_{i+1} :$

$1 \leq i \leq n-1\} \cup \{v_i' v_{i-1} : 2 \leq i \leq n\}$.

Let $f : V \to \{1, -1\}$ such that $f(v_i) = f(v_i') = (-1)^i : 1 \leq i \leq n.$

The edge weights are calculated as follows:

For $1 \leq i \leq n-1;\ f(v_i) + f(v_{i+1}) = 0.$

For $1 \leq i \leq n-1;\ f(v_i') + f(v'_{i+1}) = 0.$

For $2 \leq i \leq n;\ f(v_i') + f(v_{i-1}) = 0.$

For $1 \le i \le n-1$; $f(v_i') + f(v_{i+1}) = 0$.

Thus all edge receives value 0. Hence the graph $D_2(P_n)$ admits 0-edge magic labeling.

0-edge magic labeling of $D_2 (P_5)$ is given in Figure 2.1

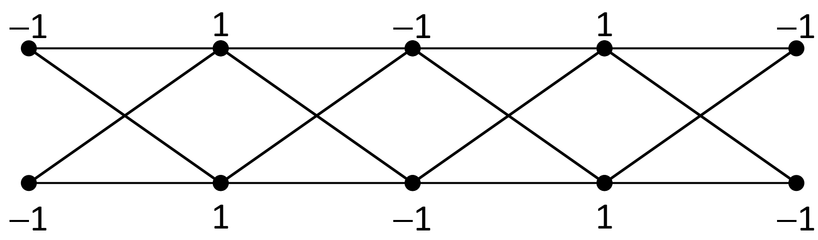

Figure 2.1 *0*-Edge Magic Labeling of $D_2 (P_5)$

Theorem 2.2. The graph $D_2 (C_n)$ when $n \equiv 0 \pmod 2$ admits 0-edge magic labeling.

Proof. The graph G $(V, E) = D_2 (C_n)$ has $2n$ vertices and $4n$ edges.

Let $V(G) = \{ v_i : 1 \le i \le n\} \cup \{ v_i' : 1 \le i \le n\}$ and

$E(G) = \{ v_i v_{i+1} : 1 \le i \le n-1\} \cup \{ v_i' v'_{i+1} : 1 \le i \le n-1\} \cup$

$\{ v_i' v_{i+1} : 1 \le i \le n-1 \} \cup \{ v_i' v_{i-1} : 2 \le i \le n\} \cup \{v_1 v_n , v_n' v_1 , v_n' v_1' , v_n' v_n\}$.

Let $f : V \rightarrow \{1, -1\}$ such that $f(v_i) = f(v_i') = (-1)^i : 1 \le i \le n$.

The edge weights are calculated as follows:

For $1 \le i \le n-1$; $f(v_i) + f(v_{i+1}) = 0$.

For $2 \le i \le n$; $f(v_i') + f(v_{i-1}) = 0$.

For $1 \le i \le n-1$; $f(v_i') + f(v_{i+1}) = 0$.

Also $f(v_1) + f(v_n) = 0$,

$f(v_n') + f(v_1) = 0$.

Thus all edge weight receives value 0. Hence the graph $D_2 (C_n)$ admits 0-edge magic labeling.

Figure 2.2 is an example of 0-edge magic labeling of $D_2 (C_4)$.

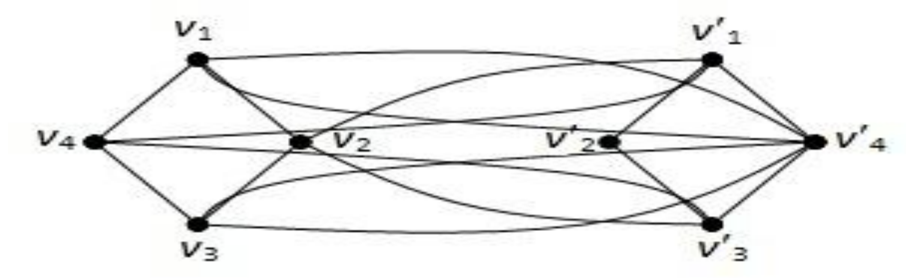

Figure 2.2 *0*-Edge Magic Labeling of D_2 (C_4)

Theorem 2.3. The graph $D_2\ (K_{1,n})$ admits *0*-edge magic labeling.

Proof. The graph $G(V,E)= D_2\ (K_{1,n})$ has $2n+2$ vertices and $4n$ edges.

Let $V(G)= \{ v_i:1\leq i\leq n+1\}\cup\{ v_i':1\leq i\leq n+1\}$ and

$E(G)= \{ v_1 v_i: 2\leq i\leq n+1\}\cup\{ v_1' v_i': 2\leq i\leq n+1\}\cup\{ v_1' v_i: 2\leq i\leq n+1 \}\cup\{ v_i' v_i: 2\leq i\leq n+1\}$. Let $f:V\rightarrow\{1, -1\}$ such that

$f(v_i) = f(v_i')=(-1)^i$:

$1\leq i\leq n$.

The edge weights are calculated as follows :

For $2\leq i\leq n+1; f(v_1)+f(v_i)= 0.$

For $2\leq i\leq n+1; f(v_1'))+f(v_i'))= 0.$

For $2\leq i\leq n; f(v_1')+f(v_i)= 0.$

For $1\leq i\leq n-1; f(v_i')+f(v_i)= 0.$

Thus all edge receives value *0*. Hence the graph $D_2\ (K_{1,n})$ admits *0*-edge magic labeling.

0-edge magic labeling of $D_2\ (K_{1,3})$ is shown in 2.3

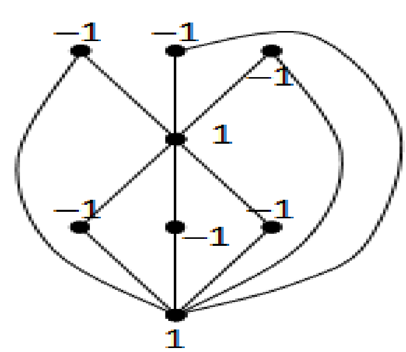

Figure 2.3 *0*-Edge Magic Labeling Of $D_2\ (K_{1,3})$

Theorem 2.4. The graph $D_2(B_{m,\,n})$ $m, n \geq 2$ admits *0*-edge magic labeling.

Proof. The graph $G(V,E)= D_2(B_{m,n})$ has $2m+2n+4$ vertices and $4m+4n+4$ edges.

Let $V(G)= \{ v_i, v_i' : 1 \le i \le m+1\} \cup \{ u_i, u_i' : 1 \le i \le n+1\}$ and

$E(G)= \{v_1v_i: 2 \le i \le m+1\} \cup \{u_1u_i: 2 \le i \le n+1\} \cup \{v_1'v_i: 2 \le i \le m+1\} \cup$

$\{u_1'u_i: 2 \le i \le n+1\} \cup \{u_1v_1\} \cup \{u_1v_1'\} \cup \{u_1'v_1\} \cup \{v_i'v_1: 2 \le i \le m+1\} \cup$

$\{u_i'u_1: 2 \le i \le n+1\}$.

Let $f: V \rightarrow \{1, -1\}$ such that $f(u_i) = f(u_i') = -1 : 2 \le i \le n+1$,

$f(v_i) = f(v_i') = 1 : 2 \le i \le m+1$,

$f(u_1') = f(u_1) = 1$, $f(v_1') = f(v_1) = -1$.

The edge weights are calculated as follows:

For $2 \le i \le m+1$; $f(v_1)+f(v_i)= 0$.

For $2 \le i \le n+1$; $f(u_1)+f(u_i)= 0$.

For $2 \le i \le m+1$; $f(v_1')+f(v_i)= 0$.

For $2 \le i \le n+1$; $f(u_1')+f(u_i)= 0$.

For $2 \le i \le m+1$; $f(v_i')+f(v_1)= 0$.

For $2 \le i \le n+1$; $f(u_i')+f(u_1)= 0$.

Also $f(u_1)+f(v_1)=0$,

$f(u_1)+f(v_1')=0$,

$f(u_1')+f(v_1)=0$.

Thus all edge receives value 0. Hence the graph $D_2(B_{m,n})$ admits 0-edge magic labeling.

Figure2.4 is an example of 0-edge magic labeling of $D_2(B_{3,2})$.

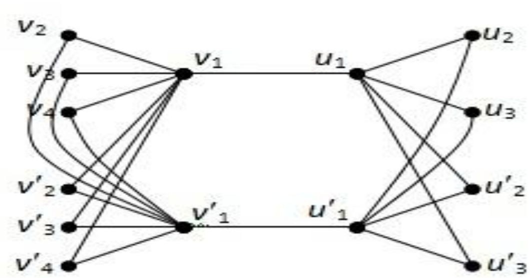

Figure 2.4 *0*-Edge Magic Labeling of $D_2(B_{3,2})$

3. Conclusion

Thus *0*-edge magic labeling for some class of graphs namely $D_2(P_n)$, $D_2(C_n)$, $D_2(K_{1,n})$, $D_2(B_{m,n})$, $m,n \geq 2$ are exhibited.

4. References:

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