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Independent Domination Number for some Special types of Snake Graph

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Abstract--Let G(V,E) be a graph,V has a subset C,contains vertices with atleast one vertex in V that is not in C, then G has the dominating set C.If C has vertices that is not adjacent to one another , then G has an independent dominating set C and so the number of vertices present in the set C represents the IDN, the minimum cardinality of the sets C.In this paper, we were going to deal with Snake graphs in specific, Alternate Triangular and Alternate Quadrilateral Snake graphs. Keeping the concepts of these graphs as our base we extend our paper by defining n-Alternative Triangular Snake graphn$A(T_n)$,n-Alternative Double Triangular Snake graph n$A(D(T_n))$, n-Alternative Quadrilateral Snake graphn$A(Q_n)$ and n-Alternative Double Quadrilateral Snake graphn$A(D(Q_n))$. Further we obtain independent domination number for some special types of snake graphs, in particular n-Alternative Triangular Snake graph n$A(T_n$,n-Alternative Double Triangular Snake graph n$A(D(T_n))$, n-Alternative Quadrilateral Snake graph n$A(Q_n)$ and n-Alternative Double Quadrilateral Snake graphn$A(D(Q_n))$.

Keywords-Domination set,ID,IDN, T_n , $A(T_n)$, $D(T_n)$, $A(D(T_n))$, Q_n , $A(Q_n)$, $D(Q_n)$, $A(D(Q_n))$.

1. INTRODUCTION

In the past the ideas of domination, is started with the game of chess. Later the work was extended by various peoples as, Ahrens in 1901 [16] Berge in 1958 [2] and ore in 1962 [9] , by 1972 Cockayne and Hedetniemi [3,4] gone through domination and commenced to review it, tereby a survey was published in 1975 and there came into existence for the topic independent domination number. Thereon, many researchers started to work in that. Thus, Goddard et al. [13,15], Kostichka [1] and Lam et al. [10] gone through regular graph and cubic graph. While Favaron [8] done under general graphs, gave its sharp upper bounds and Haviland [7] extended it. Cockayne et al. [5] found its boundary and its complement, while Shiu et al. [14] gave for triangle-free graphs and thereby characterizing its upper bounds.

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Definition 1. [11] Let G(V,E) be a graph,V has a subset C,contains vertices with atleast one vertex in V that is not in C, then G has the dominating set C.

Definition 2. [1] If C has vertices that is not adjacent to one another, then G has an independent dominating set C and so the number of vertices present in the set C represents the IDN, the minimum cardinality of the sets C.

Definition 3. [12] Triangular snake(T_n):

In the path P_n we add a vertex corresponding to each edge to form a triangle C_3.

Definition 4. [12] Alternate triangular snake$A(T_n)$:

In the path $a_1, a_2, \dots a_n$ we add a vertex v_i $to\ a_i and\ a_{i+1}$(alternately). So that each alternate edge form a triangle C_3.

Definition 5. n-Alternate triangular snake$nA(T_n)$:

In the path $a_1, a_2, \dots a_n$ we add a new vertex v_i to $a_i and\ a_{i+1}, a_{i+1} and\ a_{i+2}, \dots a_{i+(n-1)} and\ a_{i+n}$ (n-alternately). So that each n-alternate edge form a triangle C_3.

Definition 6. [12] Double Triangular snake$D(T_n)$:

$D(T_n)$ consists of two T_n which has a common(standard) path.

Definition 7. [12] Alternate Double triangular snake $A(D(T_n))$:

$A(D(T_n))$ consists of two $A(T_n)$ which has a common(standard) path.

Definition 8. n- Alternate Double triangular snake $nA(D(T_n))$:

$nA(D(T_n))$ consists of two $nA(T_n)$ which has a common (standard)path.

Definition 9. [7] Quadrilateral snakeQ_n:

In the path $a_1, a_2, \dots a_n$ we add a new vertices $b_i and\ c_i$ corresponding to the edges of the path $a_i and\ a_{i+1}$ and by joining $b_i and\ c_i$ for i=1,2,...n-1, we get a cycle C_4.

Definition 10. [7] Alternate quadrilateral snake$A(Q_n)$:

In the path $a_1, a_2, \dots a_n$ we add a new vertices $b_i and\ c_i$corresponding to the edges of the path $a_i and\ a_{i+1}$ and by joining $b_i and\ c_i$ for i≡1(mod2) and I≤n-1then joining $b_i and\ c_i$ alternatively we get a cycle C_4.

Definition 11. n-Alternate quadrilateral snake$nA(Q_n)$:

In the path $a_1, a_2, \dots a_n$ we add new vertices $b_i and\ c_i$ corresponding to the edges of the path $a_i and\ a_{i+1}, a_{i+1} and\ a_{i+2}, \dots a_{i+(n-1)} and\ a_{i+n}$ and by joining $b_i and\ c_i$ for i≡1(modn)alternatively we get a cycle C_4.

Definition 12. [7] Double Quadrilateral snake$D(Q_n)$:

$D(Q_n)$ is obtained from two parallel Q_n with a common (standard)path.

Definition 13. [7] Alternate Double quadrilateral snake$A(D(Q_n))$:

$A(D(Q_n))$ is obtained from two parallel $A(Q_n)$ with a common (standard)path.

Definition 14. n- Alternate Double quadrilateral snake$nA(D(Q_n))$:

$nA(D(Q_n))$ is obtained from two parallel $nA(Q_n)$ with a common(standard) path.

Section-1

IDN in

(i) $2A(T_n)$ **(ii)** $3A(T_n)$**(iii)** $4A(T_n)$**(iv)** $5A(T_n)$

Theorem 1.1:

Let us take the graph $2A(T_n)$ with the path P_n,then i($2A(T_n)$)= $\left\lceil\frac{n}{4}\right\rceil$

Proof:

Procedure for $2A(T_n)$:

The $2A(T_n)$ graph is defined by adding a new vertex for every two edges of v_{i-1}, v_i *and* v_i, v_{i+1} alternatively.

We label the root path of the vertices as $v_1, v_2, \dots v_n$ thereby we add a vertex a_1, a_2 to the corresponding edges v_1, v_2 and v_2, v_3 respectively.

Leave the next two edges v_3, v_4 and v_4, v_5.

This Alternative process from the vertex v_1 to the vertex v_5 is named as A_1 [1st alternative].

Again, add two new vertex a_3, a_4 to the corresponding edges v_5, v_6 and v_6, v_7. This Alternative process from the vertex v_1 to the vertex v_7 is named as A_2 [2nd alternative].

Leave the next two edges v_7, v_8 and v_8, v_9.

Continue this process till A_n.

This graph is named as G and now we find the the set C (ID set) for a graph $2A(T_n)$, such that V-C has vertices which is adjacent to atleast one vertex in C and thus the vertices in C are independent.

The process goes in such a way, so that we get the IDN for $2A(T_n)$ as (i.e.,)

i($2A(T_n)$)= $\left\lceil\frac{n}{4}\right\rceil$

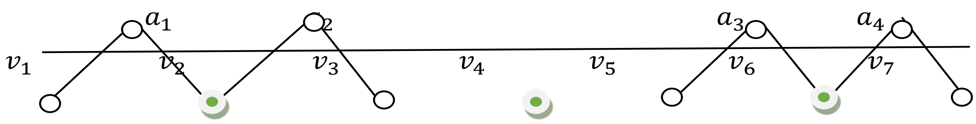

Fig. (1)

Theorem 1.2:

Let us take the graph $3A(T_n)$ with the path P_n , then i($3A(T_n)$)= $\left\lceil\frac{n}{4}\right\rceil$

Proof:

Procedure for $3A(T_n)$**:**

The $3A(T_n)$ graph is defined by adding a new vertex for every three edges of $(v_{i-1}, v_i), (v_i, v_{i+1})$ *and* (v_{i+1}, v_{i+2}) alternatively.

We label the root path of the vertices as $v_1, v_2, \dots v_n$ thereby we add a vertex a_1, a_2, a_3 to the corresponding edges (v_1, v_2), (v_2, v_3) and (v_3, v_4) respectively.

Leave the next three edges (v_4, v_5), (v_4, v_5) *and* (v_5, v_6) .

This Alternative process from the vertex v_1 to the vertex v_6 is named as A_1 [1st alternative].

Again, add three new vertex a_4, a_5, a_6 to the corresponding edges (v_6, v_7), (v_7, v_8) and (v_8, v_9). This Alternative process from the vertex v_1 to the vertex v_9 is named as A_2 [2nd alternative].

Leave the next three edges (v_9, v_{10}), (v_{10}, v_{11}) and (v_{11}, v_{12}).

Continue this process till A_n.

This graph is named as G and now we find the set C (ID set) from a graph $3A(T_n)$, such that V-C has vertices which is adjacent to atleast one vertex in C and thus the vertices in C are independent.

The process goes in such a way, so that we get the IDN for$3A(T_n)$ as (i.e.,)

$$i(3A(T_n)) = \left\lceil \frac{n}{4} \right\rceil$$

Theorem 1.3:

Let us take the graph $4A(T_n)$ with the path P_n , then i($4A(T_n)$)= $\left\lceil \frac{n}{4} \right\rceil - N$ where N takes the values -1, -2,-3… twice in the series.

Proof:

Procedure for $4A(T_n)$:

The $4A(T_n)$ is defined by adding a new vertex for every four edges of $(v_{i-1}, v_i), (v_i, v_{i+1})$ (v_{i+1}, v_{i+2}) and (v_{i+2}, v_{i+3}) alternatively.

We label the root path of the vertices as $v_1, v_2, \ldots v_n$ thereby we add a vertex a_1, a_2, a_3, a_4 to the corresponding edges (v_1, v_2), (v_2, v_3) (v_3, v_4) and (v_4, v_5) respectively.

Leave the next four edges (v_5, v_6), (v_6, v_7) $(v_7, v_8)$$and$ (v_8, v_9).

This Alternative process from the vertex v_1 to the vertex v_9 is named as A_1 [1st alternative].

As in theorem 1.2 we follow the same procedure till A_n.

This graph is named as G and now we find the set C (ID set) from a graph $4A(T_n)$, such that V-C has vertices which is adjacent to atleast one vertex in C and thus the vertices in C are independent.

The process goes in such a way, so that we get the IDN for $4A(T_n)$ as (i.e.,) i($4A(T_n)$)= $\left\lceil \frac{n}{4} \right\rceil$-N, where N takes the values -1,-2,-3… twice in the series.

Theorem 1.4:

Let us take the graph $5A(T_n)$ with the path P_n , then i($5A(T_n)$)= $\left\lceil \frac{n}{4} \right\rceil + N$ where N takes the values 0,1 twice alternatively.

Proof:

Procedure for $5A(T_n)$:

The $5A(T_n)$ graph is defined by adding a new vertex for every five edges of $(v_{i-1}, v_i), (v_i, v_{i+1})$ (v_{i+1}, v_{i+2}) $(v_{i+2}, v_{i+3})$$and$ (v_{i+3}, v_{i+4}) alternatively.

The rest of the procedure is carried out as in theorem 1.2, till A_n.

Now this graph is named as G and now we find the set C (ID set) from a graph $5A(T_n)$, such that V-C has vertices which is adjacent to atleast one vertex in C and thus the vertices in C are independent.

The process goes in such a way, so that we get the IDN for $5A(T_n)$ as (i.e.,)

$$i(5A(T_n)) = \left\lceil \frac{n}{4} \right\rceil + N$$, where N takes the values 0,1 twice alternatively.

Section-2

IDN in

(i) $2A(D(T_n))$ **(ii)** $3A(D(T_n))$ **(iii)** $4A(D(T_n))$ **(iv)** $5A(D(T_n))$

Theorem 2.1:

Let us take the graph $2A(D(T_n))$ with the path P_n, then i($2A(D(T_n)$)= $\left\lceil \frac{n}{4} \right\rceil$+N where N takes -1,-2,-3… thrice in the series.

Proof:

Procedure for $2A(D(T_n))$:

The $2A(D(T_n))$ graph is defined by adding a new vertex above and below the common path for every two edges of v_{i-1}, v_i *and* v_i, v_{i+1} alternatively.

We label the root path of the vertices as $v_1, v_2, \dots v_n$ thereby we add a vertex above the root path as a_1, a_2 and below the root path as b_1, b_2 to the corresponding edges v_1, v_2 and v_2, v_3 respectively.

Leave the next two edges v_3, v_4 and v_4, v_5.

This Alternative process from the vertex v_1 to the vertex v_5 is named as A_1 [1st alternative].

Again, add a new vertex above the path as a_3, a_4 and below he path as b_3, b_4 to the corresponding edges v_5, v_6 and v_6, v_7. This Alternative process from the vertex v_1 to the vertex v_7 is named as A_2 [2nd alternative].

Leave the next two edges v_7, v_8 and v_8, v_9.

Continue this process till A_n.

This graph is named as G and now we find the set C (ID set) from a graph $2A(D(T_n))$, such that V-C has vertices which is adjacent to atleast one vertex in C and thus the vertices in C are independent.

The process goes in such a way, so that we get the IDN for $2A(D(T_n))$ as (i.e.,)

$$i(2A(D(T_n))) = \left\lceil \frac{n}{4} \right\rceil + N$$ where N takes -1,-2,-3… thrice in the series.

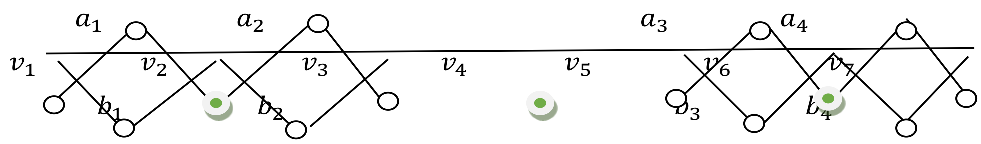

Fig.2:

Theorem 2.2:

Let us take the graph $3A(D(T_n))$ with the path P_n, then i($3A(D(T_n)$)= $\left\lceil \frac{n}{4} \right\rceil$+N where N takes -1,-2,-3… thrice in the series.

Proof:

Procedure for $3A(D(T_n))$:

The $3A(D(T_n))$ graph is defined by adding a new vertex above and below the common path for every three edges of $(v_{i-1}, v_i), (v_i, v_{i+1})$ *and* (v_{i+1}, v_{i+2}) alternatively.

We label the root path of the vertices as $v_1, v_2, ... v_n$ thereby we add a vertex a_1, a_2, a_3 and b_1, b_2, b_3 above and below the common path the to the corresponding edges (v_1, v_2), (v_2, v_3) and (v_3, v_4) respectively.

Leave the next three edges (v_4, v_5), (v_4, v_5) *and* (v_5, v_6) .

Continue this process till A_n as in theorem 2.1.

This graph is named as G and now we find the set C (ID set) from a graph $2A(D(T_n))$, such that V-C has vertices which is adjacent to atleast one vertex in C and thus the vertices in C are independent.

The process goes in such a way, so that we get the IDN for $3A(D(T_n))$ as (i.e.,)

i($3A(D(T_n)$)= $\left\lceil \frac{n}{4} \right\rceil$+N where N takes -1,-2,-3… thrice in the series.

Theorem 2.3:

Let us take the graph $4A(D(T_n))$ with the path P_n, then i($4A(D(T_n)$)= $\left\lceil \frac{n}{5} \right\rceil$+N where N takes -1,0 twice alternatively in the series.

Proof:

Procedure for $4A(D(T_n))$:

The $4A(D(T_n))$ graph is defined by adding a new vertex above and below the common path for every four edges of $(v_{i-1}, v_i), (v_i, v_{i+1})$ (v_{i+1}, v_{i+2}) *and* (v_{i+2}, v_{i+3}) alternatively.

Continue the process as in theorem 2.2 till A_n.

This graph is named as G and now we find the set C (ID set) from a graph $2A(D(T_n))$, such that V-C has vertices which is adjacent to atleast one vertex in C and thus the vertices in C are independent.

The process goes in such a way, so that we get the IDN for $4A(D(T_n))$ as (i.e.,)

i($4A(T_n)$)= $\left\lceil \frac{n}{5} \right\rceil$+N where N takes -1,0 twice alternatively in the series.

Theorem 2.4:

Let us take the graph $5A(D(T_n))$ with the path P_n, then i($5A(D(T_n)$)= $\left\lceil \frac{n}{4} \right\rceil$+N where N takes -1,-2,-3… twice in the series.

Proof:

Procedure for $5A(D(T_n))$:

The $5A(D(T_n))$ graph is defined by adding a new vertex above and below the common path for every five edges of $(v_{i-1}, v_i), (v_i, v_{i+1})$ (v_{i+1}, v_{i+2}) (v_{i+2}, v_{i+3})*and* (v_{i+3}, v_{i+4}) alternatively.

The rest of the procedure is carried out as in theorem 2.2, till A_n.

This graph is named as G and now we find the set C (ID set) from a graph $2A(D(T_n))$, such that V-C has vertices which is adjacent to atleast one vertex in C and thus the vertices in C are independent.

The process goes in such a way, so that we get the IDN for $5A(D(T_n))$ as (i.e.,) i($5A(T_n)$)= $\left\lceil \frac{n}{4} \right\rceil$+N where N takes -1,-2,-3… twice in the series.

Section-3

IDN in

(i) $2A(Q_n)$ **(ii)** $3A(Q_n)$ **(iii)** $4A(Q_n)$ **(iv)** $5A(Q_n)$

Theorem 3.1:

Let us take the graph $2A(Q_n)$ with the path P_n, then i($2A(Q_n)$)= $\left\lceil\frac{n}{3}\right\rceil$

Proof:

Procedure for $2A(Q_n)$:

The $2A(Q_n)$ is defined by adding two new vertices for every two edges of v_{i-1}, v_i *and* v_i, v_{i+1} alternatively.

We label the root path of the vertices as $v_1, v_2, \dots v_n$ thereby we add a vertices a_1, b_1 *and* a_2, b_2 to the corresponding edges v_1, v_2 and v_2, v_3 respectively.

Leave the next two edges v_3, v_4 and v_4, v_5.

This Alternative process from the vertex v_1 to the vertex v_5 is named as A_1 [1st alternative].

Again, add the vertices a_3, b_3 *and* a_4, b_4 to the corresponding edges v_5, v_6 and v_6, v_7. This Alternative process from the vertex v_1 to the vertex v_7 is named as A_2 [2nd alternative].

Leave the next two edges v_7, v_8 and v_8, v_9.

Continue this process till A_n.

This graph is named as G and now we find the set C (ID set) from a graph $2A(Q_n)$, such that V-C has vertices which is adjacent to atleast one vertex in C and thus the vertices in C are independent.

The process goes in such a way, so that we get the IDN for $2A(Q_n)$ as (i.e.,)

i($2A(Q_n)$)= $\left\lceil\frac{n}{3}\right\rceil$

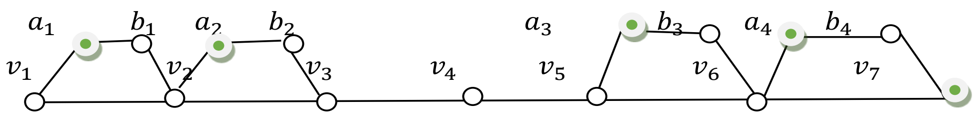

Fig.3:

Theorem 3.2

Let us take the graph $3A(Q_n)$ with the path P_n, then i($3A(Q_n)$)= $\left\lceil\frac{n}{3}\right\rceil$

Proof:

Procedure for $3A(Q_n)$:

The $3A(Q_n)$ graph is defined by adding two new vertex for every three edges of $(v_{i-1}, v_i), (v_i, v_{i+1})$ *and* (v_{i+1}, v_{i+2}) alternatively.

We label the root path of the vertices as $v_1, v_2, \dots v_n$ thereby we add the a_1b_1, a_2b_2, a_3b_3 to the corresponding edges (v_1, v_2), (v_2, v_3) and (v_3, v_4) respectively.

Leave the next three edges (v_4, v_5), (v_4, v_5) and (v_5, v_6) .Continue the process as in theorem 3.1, till A_n.This graph is named as G and now we find the set C (ID set) from a graph $3A(Q_n)$, such that V-C has vertices which is adjacent to atleast one vertex in C and thus the vertices in C are independent.

The process goes in such a way, so that we get the IDN for $3A(Q_n)$ as (i.e.,)

i($3A(Q_n)$)= $\left\lceil\frac{n}{3}\right\rceil$

Theorem 3.3:

Let us take the graph $4A(Q_n)$ with the path P_n, then i($4A(Q_n)$)= $\left\lceil\frac{n}{3}\right\rceil$+N where N takes the values 0,1 twice alternatively in the series.

Proof:

Procedure for $4A(Q_n)$:

The $4A(Q_n)$ graph is defined by adding two new vertex for every four edges of $(v_{i-1}, v_i), (v_i, v_{i+1})$ (v_{i+1}, v_{i+2}) and (v_{i+2}, v_{i+3}) alternatively.

Continue the process as in theorem 3.1, till A_n.

This graph is named as G and now we find the set C (ID set) from a graph $4A(Q_n)$, such that V-C has vertices which is adjacent to atleast one vertex in C and thus the vertices in C are independent.

The process goes in such a way, so that we get the IDN for $4A(Q_n)$ as (i.e.,) i($4A(Q_n)$)= $\left\lceil\frac{n}{4}\right\rceil$+N where N takes the values 0,1 twice alternatively in the series.

Theorem 3.4:

Let us take the graph $5A(Q_n)$ with the path P_n, then i($5A(Q_n)$)= $\left\lceil\frac{n}{3}\right\rceil$

Proof:

Procedure for $5A(Q_n)$:

The $5A(Q_n)$ is defined by adding two new vertex for every five edges of $(v_{i-1}, v_i), (v_i, v_{i+1})$ (v_{i+1}, v_{i+2}) $(v_{i+2}, v_{i+3})$$and$ (v_{i+3}, v_{i+4}) alternatively.

The rest of the procedure is carried out as in theorem 3.1, till A_n.

This graph is named as G and now we find the set C (ID set) from a graph $5A(Q_n)$, such that V-C has vertices which is adjacent to atleast one vertex in C and thus the vertices in C are independent.

The process goes in such a way, so that we get the IDN for $5A(Q_n)$ as (i.e.,)

i($5A(Q_n)$)= $\left\lceil\frac{n}{3}\right\rceil$

Section-4

IDN in

(i) $2A(D(Q_n))$ **(ii)** $3A(D(Q_n))$ **(iii)** $4A(D(Q_n))$ **(iv)** $5A(D(Q_n))$

Theorem 4.1:

Let us take the graph $2A(D(Q_n))$ with the path P_n then i($2A(D(Q_n)$)= $\left\lceil\frac{n}{3}\right\rceil$+N where N takes 0,1,2… twice in the series.

Proof:

Procedure for $2A(D(Q_n))$:

The $2A(D(Q_n))$ graph is defined by adding two vertices above and below the common path for every two edges of v_{i-1}, v_i *and* v_i, v_{i+1} alternatively.

We label the root path of the vertices as $v_1, v_2, \dots v_n$ thereby we add the vertices above the root path as $a_1 b_1, a_2 b_2$ and below the root path as $c_1 d_1, c_2 d_2$ to the corresponding edges v_1, v_2 and v_2, v_3 respectively.

Leave the next two edges v_3, v_4 and v_4, v_5.

Continue process till A_n as in section 3 theorem 3.1 (by adding the vertices above and below the common path).

This graph is named as G and now we find the set C (ID set) from a graph $2A(D(Q_n))$, such that V-C has vertices which is adjacent to atleast one vertex in C and thus the vertices in C are independent.

The process goes in such a way, so that we get the IDN for $2A(D(Q_n))$ as (i.e.,)

$$i(2A(D(Q_n))= \left\lceil \frac{n}{3} \right\rceil + N \text{ where N takes 0,1,2… twice in the series.}$$

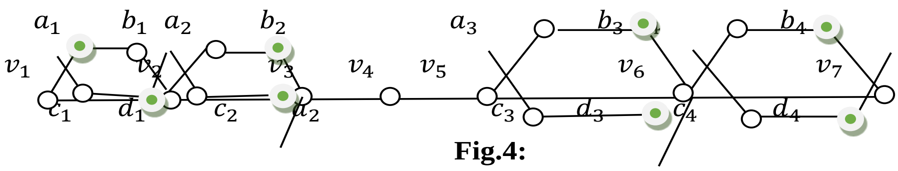

Fig.4:

Theorem 4.2:

Let us take the graph $3A(D(Q_n))$ with the path P_n then $i(3A(D(Q_n))= \left\lceil \frac{n}{3} \right\rceil$+N where N takes 0,1,2… twice in the series.

Proof:

Procedure for $3A(D(Q_n))$:

The $3A(D(Q_n))$ graph is defined by adding two new vertices above and below the common path for every three edges of $(v_{i-1}, v_i), (v_i, v_{i+1})$ *and* (v_{i+1}, v_{i+2}) alternatively.

Continue the process till A_n as in section 3 theorem 3.1 (by adding the vertices above and below the common path).

This graph is named as G and now we find the set C (ID set) from a graph $3A(D(Q_n))$, such that V-C has vertices which is adjacent to atleast one vertex in C and thus the vertices in C are independent.

The process goes in such a way, so that we get the IDN for $3A(D(Q_n))$ as (i.e.,)

$$i(3A(D(Q_n))= \left\lceil \frac{n}{3} \right\rceil + N \text{ where N takes 0,1,2… twice in the series.}$$

Theorem 4.3:

Let us take the graph $4A(D(Q_n))$ with the path P_n then $i(4A(D(Q_n))= \left\lceil \frac{n}{3} \right\rceil$+N where N takes 1,2,3… twice in the series.

Proof:

Procedure for $4A(D(Q_n))$:

The $4A(D(Q_n))$ graph is defined by adding two new vertex above and below the common path for every four edges of $(v_{i-1}, v_i), (v_i, v_{i+1})$ (v_{i+1}, v_{i+2}) and (v_{i+2}, v_{i+3}) alternatively.

Continue the process till A_n as in section 3 theorem 3.1 (by adding the vertices above and below the common path).

This graph is named as G and now we find the set C (ID set) from a graph $3A(D(Q_n))$, such that V-C has vertices which is adjacent to atleast one vertex in C and thus the vertices in C are independent.

The process goes in such a way, so that we get the IDN for $4A(D(Q_n))$ as (i.e.,)

$$i(4A(D(Q_n))= \left\lceil\frac{n}{3}\right\rceil + N$$ where N takes 1,2,3… twice in the series.

Theorem 4.4:

Let us take the graph $5A(D(Q_n))$ with the path P_n then $i(5A(D(Q_n))= \left\lceil\frac{n}{3}\right\rceil$+N where N takes 1,3,5,7… twice in the series.

Proof:

Procedure for $5A(D(Q_n))$:

The $5A(D(Q_n))$ graph is defined by adding two new vertex above and below the common path for every five edges of $(v_{i-1}, v_i), (v_i, v_{i+1})$ (v_{i+1}, v_{i+2}) $(v_{i+2}, v_{i+3})and$ (v_{i+3}, v_{i+4}) alternatively.

Continue the process till A_n as in section 3 theorem 3.1 (by adding the vertices above and below the common path).

Now this graph is named as G and now we find the set C (ID set) from a graph $3A(D(Q_n))$, such that V-C has vertices which is adjacent to atleast one vertex in C and thus the vertices in C are independent.

The process goes in such a way, so that we get the IDN for $5A(D(Q_n))$ as (i.e.,)

$$i(5A(D(Q_n))= \left\lceil\frac{n}{3}\right\rceil + N$$ where N takes 1,3,5,7… twice in the series.

2. CONCLUSION

In our previous works we have found IDN for different types of networks. In this paper we found IDN for some special types of snake graphs. Further, this work can be extended for n-number of types of alternate snake graphs, which we restricted in our research from 2-5 alternate snake graphs, therefore the remaining networks are left to the readers as an open question.

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