Domination number of Antipodal Graph and Antipodal Middle graph

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Abstract

In this paper we are finding Domination number of Antipodal graph, Introduce the new notation Antipodal Middle graph also by using domination number of Antipodal graph and Antipodal Middle graph, we discussed the different properties of Antipodal graph and Antipodal Middle graph.

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1. INTRODUCTION:

A set D of vertices in a graph G is a dominating set if every vertex in $V - D$ is adjacent to some vertex in D. The domination number γ (G) is the minimum cardinality of a dominating set of G.

A set S of vertices in a graph G is called an independent set if no two vertices in S are adjacent.

An independent set S is called maximal independent set if any vertex set properly containing S is not independent.

The lower independence number i(G) is the minimum cardinality of a maximal independent set of G

Antipodal graph

Singleton (1968) introduced the concept of the Antipodal graph of a graph G denoted by A(G), is the graph on the same vertices as of G, two vertices being adjacent if the distance between them is equal to the diameter of G.

Domination number of Antipodal graph

By the motivation of existing definition of Domination number of a graph and Antipodal graph we can find the Domination number of Antipodal graph.

Middle graph

The Middle graph of G [5], is defined with the vertex set V(G) U E(G) where two vertices are adjacent if and only if they are either adjacent edges of G or one is a vertex and the other is an edge incident with it and it is denoted by M(G).

Antipodal Middle graph

We introduce a new notation called Antipodal Middle graph of a graph G, denoted by A[M(G)], is the graph on the same vertices as of M(G), two vertices being adjacent if the distance between them is equal to the diameter of M(G).

Domination number of Antipodal Middle graph

By the motivation of existing definition of Domination number of a graph and Antipodal Middle graph we can find the Domination number of Antipodal Middle graph.

We consider only finite undirected graphs G = (V, E) without loops and multiple edges and follow Harary [4] for notation and terminology.

2. RESULTS AND DISCUSSION:

Proposition 1. (Aravamudhan and Rajendran [1])

For a graph G = (V,E), G = A(G) if, and only if G is complete.

From the above result we have the following

Proposition 2. For a complete graph G = (V, E), $\gamma(G) = \gamma(A(G))$

Proof. Since G is a complete graph and n is the number of vertices of G, $\gamma(G) = 1$ and by Proposition 1, G = A(G) hence $\gamma(G) = \gamma(A(G)) = 1$.

For any positive integer k, the kth iterated antipodal graph A(G) is defined as follows:

$A^0(G) = A(G)$, $A^k(G) = A(A^{k-1}(G))$

Corollary 3. For any graph G, and any positive integer k, $\gamma(A^k(G)) = \gamma(A(G))$
.

Proposition 4. (Aravamudhan and Rajendran [1])
For a graph G = (V, E), $\overline{G}$ = A(G) if, and only if,
i). G is of diameter 2
or ii). G is disconnected and the components of G are complete graphs.

In view of the above, we have the following result:

Proposition 5. For a graph $G = (V,E)$, $\gamma(A(G)) = \gamma(\overline{G})$ if, and only if,
i). G is of diameter 2
or ii). G is disconnected and the components of G are complete graphs.

Proof. Suppose that, $\gamma(A(G)) = \gamma(\overline{G})$ then clearly we have $A(G) = \overline{G}$ and hence G satisfies the conditions of Proposition 4.
Conversely, G satisfies the conditions of Proposition 4 then $\overline{G} = A(G)$, obviously, $\gamma(A(G)) = \gamma(\overline{G})$.

Proposition 6. For a graph $G = (V,E)$, $\gamma(A(\overline{G})) = \gamma(A(G))$ if, and only if,
i). G is of diameter 3 or ii). G is disconnected and the components of G are complete graphs.

3. MAIN RESULTS:

Proposition 7: For any graph G, $\gamma(G) \leq \gamma\{A[M(G)]\}$

Proposition 8: For any graph G, $\gamma[A(G)] \leq \gamma\{A[M(G)]\}$

Proposition 9: $\gamma(G) = i(M(G))$ if and only if G is an antipodal graph.
Proof of Result is obvious

4. CONCLUSION:

In this paper, we discussed various properties of Antipodal graph and Antipodal Middle graph.

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