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GLOBAL ACCURATE DOMINATION IN JUMP GRAPH

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ABSTRACT: A dominating set D of a jump graph is an accurate dominating set. If V-D has no dominating set of cardinality |D|. An accurate dominating set D of a graph G is also an accurate dominating set of $\bar{G}$. The global accurate dominating number $\surd_{ga}(J(G))$ are obtained and exact values of $\surd_{ga}(J(G))$ for some standard graphs are found. Also a Nordhaus-Gaddum type results established.

Key words: accurate dominating set, global accurate dominating set, global accurate domination number.

Mathematics subject-Classification:05C

I Introduction

All graphs considered here are finite, undirected without loops and multiple edges. Any undefined terms in this paper may found in kulli [1]

A set D of vertices in a jump graph is a dominating set of J(G), if every vertex not in D is adjacent to a vertex in D. The domination number of a jump graph is denoted by $\surd(j(G))$ is the minimum cardinality of a dominating set in J(G).

A dominating set D of a jump graph J(G) is accurate dominating set. If V(J(G))- D has no domination set of cardinality |D|. The accurate domination number $\surd_a(J(G))$ of J(G) is the minimum cardinality of an accurate dominating set. This concept was introduced by kulli and kattimani in [2]

A dominating set D of ajump graph J(G) is a global dominating set. If D is also a dominating set of $J(\bar{G})$. The global domination number $\surd_g(J(G))$ of J(G) is the minimum cardinality of a global dominating set [5].

In [4] kulli and kattimani introduced the concept of global accurate domination as follows.

An accurate dominating set D of a graph G is a global accurate dominating set, if D is also an accurate dominating set of $\bar{G}$. The global accurate domination number $\surd_{ga}(G)$ of G is the minimum cardinality of a global accurate dominating set. Analogously, a set d of a jump graph J(G) is a global accurate dominating set if D is also an accurate dominating set of $J(\bar{G})$. The global accurate domination number $\surd_{ga}(J(G)$ of J(G) is minimum cardinality of a global accurate dominating set.

Let $\lfloor x \rfloor$ denote the greatest integer less than or equal to x. A $\surd_a$-set is minimum accurate dominating set.

2. Results

We characterize accurate dominating set which are global accurate dominating sets.

Theorem 1: An accurate dominating set D of a jump graph J(G) is a global accurate dominating set if and only if the following condition holds.

For each vertex v∈V(J(G))-D, there exists vertex u ∈ D such that u is not adjacent to v.
There exists a vertex w ∈ D such that w is adjacent to all vertices in V(J(G))-D.

Theorem2. Let J(G) be a jump graph such that neither J(G) nor $J(\bar{G})$ has an isolated vertex, Then

$\surd_{ga}(J(G)) = \surd_{ga}(J(\bar{G}))$

$(\surd_a(J(G)) + \surd_a(J(\bar{G}))$ $\leq \surd_a(J(G))$ $\leq$

2 $\surd_a(J(G)) + \surd_a(J(\bar{G}))$

Theorem 3. Let J(G) be a jump graph such that neither J(G) nor $J(\bar{G})$ have an isolated vertex then

$$\surd_a(J(G)) \leq \surd_{ga}(J(G))$$

Proof; Every global accurate dominating set is an accurate dominating set then above inequality holds.

Theorem 4: Let j(G) be a jump graph such that neither j(G) nor $J(\bar{G})$ have an isolated vertex then

$$\surd_g(J(G)) \leq \surd_{ga}(J(G))$$

Proof; Every global accurate dominating set is an accurate dominating set then above inequality holds.

Exact values of $\surd_{ga}(J(G))$ for some standard graphs are given in Theorem 5.

Theorem 5;

$\surd_{ga}(J(K_p)) = p$

$\surd_{ga}(J(C_p)) = \lfloor \frac{p}{2} \rfloor + 1$ if $p \geq 3$

$\surd_{ga}(J(p_p)) = \lfloor \frac{p}{2} \rfloor + 1$ if $p \geq 2$

$\surd_{ga}(J(K_{m,n})) = m+1$ if $m \leq n$

$\surd_{ga}(J(W_p)) = \lfloor \frac{p}{2} \rfloor + 1$ if $p \geq 5$

For any regular jump graph $J(G) = \lfloor \frac{p}{2} \rfloor + 1$ if $p \geq 2$

Now we obtain an upper bound for $\surd_{ga}(J(G))$

Theorem 6.; Let J(G) has two non adjacent vertices u and v such that u is adjacent to some vertex in V(J(G))-u this implies that V(J(G))-{u} is a global accurate dominating set of G Thus

$$\surd_{ga}(J(G)) \leq |V(J(G))-\{u\}| \text{ or}$$

Proof. Suppose result holds. Assume that $J(G) \neq K_p$, $\bar{k}_p$. Then J(G) has at least three vertices u,v, and w such that u and v are adjacent and w is not u. Then this implies that V(J(G) –{u} is a global accurate dominating set of J(G). This proves necessity. Converse is obvious.

Theorem8. Let D be an accurate dominating set of J(G) if there exists two vertices $u \in V(J(G))-D$ and $v \in D$ such that u is adjacent only to the vertices of D and v is adjacent to the vertices of V(J(G))-D. Then

$$\surd_{ga}(J(G)) \leq \surd_a(J(G)) +$$

Proof: Let D be a $\surd_a$-set of J(G) if there exists a vertex $u \in V(J(G))-D$. suchthat u is adjacent only to the vertices of D then $D \cup \{u\}$ is a global accurate dominating set of g, thus

$$\surd_{ga}(J(G)) \leq |D \cup \{u\}|$$

$$\leq |D| + 1$$

Or $\sqrt{}_{ga}(J(G)) \leq \sqrt{}_{a}(J(G)) + 1$

In jump graph J(G), a vertex and an edge incident with it are said to cover each other. A set of vertices that cover all the edges of J(G) is a vertex cover of J(G). The vertex covering number α_0 (J(G)) of jump graph J(G) is the minimum number of vertices in a vertex cover. A set S of vertices in J(G) is independent if no two vertices in S are adjacent. The independence number α_0 (J(G)) of J(G) is the maximum cardinality of an independent set of vertices. The Clique number $\beta_0(J(G))$ of J(G) is the maximum order among the complete sub graph of J(G).

Theorem 9: Let J(G) be a jump graph without isolated vertices then

$$\sqrt{}_{ga}(J(G)) \leq \alpha_0(J(G)) + 1$$

Proof: Let s be a maximum independent set of vertices in J(G). Then for any vertex $v \in S$, $\{ V(J(G)) - S\} \cup \{v\} \}$ is a global accurate dominating set of J(G) thus

$$\sqrt{}_{ga}(J(G)) \leq |\{ V(J(G)) - S\} \cup \{v\} \}|$$

$$\leq |V\text{-}S| + 1$$

$$\leq p - \beta_0(J(G)) + 1$$

Or $\sqrt{}_{ga}(J(G)) \leq \alpha_0(J(G)) + 1$

We obtain a Nordhus - gaddum type result

Theorem 10: Let J(G) be a jump graph such that neither j(G) nor J($\bar{G}$) have an isolated vertex Then,

$$\sqrt{}_{ga}(J(G)) + \sqrt{}_{ga}(J(\bar{G})) \leq p + \sqrt{}_{0}(J(G)) - w(J(G)) + 2$$

Proof: By theorem 9 $\sqrt{}_{ga}(J(G)) \leq \alpha_0(J(G)) + 1$

Therefore $\sqrt{}_{ga}(J(\bar{G})) \leq \alpha_0(J(\bar{G})) + 1$

$$\leq p - \beta_0(J(\bar{G})) + 1$$

$$\leq p - w(J(\bar{G})) + 1$$

Hence $\sqrt{}_{ga}(J(G)) + \sqrt{}_{ga}(J(\bar{G})) \leq p + \sqrt{}_{0}(J(G)) - w(J(G)) + 2$

REFERENCES

[1] V.R Kulli Theory of domination in graphs vishwa international publication, Gulbarga, INDIA(2010)

[2] V.R.. Kulli and M.B. Katimani The accurate domination number of a graph Technical report 2000-01 Dept. of Maths Gulbarga university Gulbrga INDIA(2000)

[3] V.R. Kulli and M.B. Kattimani The gloal accuratedomination number of a graph Technical report 2000-04 Dept. of Maths Gulbarga university Gulbrga INDIA(2000)

[4] V.R. Kulli and M.B. Katimani Accurate dominationin graphs, In V.R. Kulli ed., Advanceds in Domination theory I, Vishwainternational publication Gulbarga INDIA (2012) 1-8

[5] E.Sampathkumar, The global domination number of a graph Journal Maths.Sci,243 (1989) 377-385

[6] Y.B.Maralbhavi, Anupama S.B. Venkangoud M Goudar Domination number in jump graphs International Mathematical Forum vol8, 2013 no.16 753-758

[7] V.R. Kulli and M.B. Kattimani Global accurate Domination Graphs Int.jounal of scientific and research publication Vol3 issue 10 October 2013.