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UPPER BOUND OF HOP DOMINATION NUMBER FOR REGULAR GRAPHS OF EVEN DEGREE

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Abstract

Let $G = (V, E)$ be a p-regular graph of order n. A set $S \subseteq V(G)$ is a hop dominating set of G if for all v in $V - S$, exists u in S such that $d(u, v) = 2$. The minimum cardinality of a hop dominating set of G is called the hop domination number of G and is denoted by $\Upsilon_h(G)$. In this paper, we have discussed about the upper bound of the hop domination number for p-regular graphs of even degree.

Keywords: Hop Dominating Set, Regular Graph, Congruence and Neighbourhood of a vertex.

Introduction

In the field of research in graph theory, domination become more prominent. Many number of dominations were commenced lately. S.K.Ayyasamy et al. have recently defined a new domination principle called hop domination number of a graph. A Hop dominating set (hd-set) is defined as a set $S \subseteq V(G)$ of a graph G is a hop dominating set of G if for every v in $V - S$, $\exists\, u \in S$ such that $d(u, v) = 2$. The minimum cardinality of a hd set of G is called the hop domination number and is denoted by $\Upsilon_h(G)$. By a p-regular graph, we mean a graph $G = (V, E)$ with all vertices having degree p. In this paper we have used the idea of congruency which is defined as: If a and b are the integers and $n > 0$, we say $a \equiv b \mod n$ iff $n|(b - a)$.

In this paper , we bring up the upper bound of the hop domination number for p-regular graphs of even degree and the graphs used in this paper are undirected, loopless and without multiple edges.

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The hop domination number of few well known graphs that were presented in the paper [1] are as follows

i) For a complete $K_n, \gamma_h(K_n) = n$.

ii) For a complete bipartite graph $K_{m,n}, \gamma_h(K_{m,n}) = 2$.

iii) For a path P_n on n vertices $\gamma_h(P_n) = \begin{cases} 2r, & if\ n=6r; \\ 2r+1, & if\ n=6r+1; \\ 2r+2, & if\ n=6r+s; 2 \le s \le 5. \end{cases}$

iv) For a cycle C_n of length n $\gamma_h(C_n) = \begin{cases} 2r, & if\ n=6r; \\ 2r+1, & if\ n=6r+1; \\ 2r+2, & if\ n=6r+s; 2 \le s \le 5. \end{cases}$

v) $\Upsilon_h(W_n) = 3$ where W_n is a wheel with n-1 spokes.

vi) $\Upsilon_h(P) = 2$ *where P denotes the Peterson graph.*

The upper bound of the hop domination number for 4-regular graphs of order $n \ge 6$ are given as:

If $n \equiv 0 \mod 5$, $\Upsilon_h(G) \le \frac{n}{5}$.

If $n \equiv 1 \mod 5$, $\Upsilon_h(G) \le \frac{n+2}{5}$.