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CHROMATIC WEAKLY CONVEX DOMINATION OF SOME FAMILIES OF GRAPHS - II

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Abstract

Graph coloring deals with the fundamental problem of partitioning a set of objects into classes, according to certain rules. Time tabling, sequencing and scheduling problems are basically of this nature. The fundamental parameter in graph coloring is the chromatic number $\chi(G)$ that is defined to be the minimum number of colors required to color the vertices of G in such a way that no two adjacent vertices of G receive the same color. For a comprehensive treatment of domination and its variations, refer to [3] and [4], and for more detailed survey on graph colorings and its variations one may refer to [2] and [6]. The concept of chromatic weakly convex domination was introduced in [3].This paper further extends the study by obtaining the Chromatic weakly convex domination number of some families of graphs.

1. Introduction

By a graph $G = (V, E)$ we mean a connected, finite, non-trivial, undirected graph with neither loops nor multiple edges. For graph theoretic terminology, we refer to Chartrand and Lesniak [1]. For $n \geq 4$, the *wheel* on n vertices, denoted by W_n is defined to be the graph $K_1 + C_{n-1}$. That is, a wheel W_n is obtained from a cycle C_{n-1} by adding a vertex, say v, and joining it to all the vertices of the cycle C_{n-1}. Here the vertex v is called the central vertex of W_n. Note that K_4 is isomorphic to W_4. By attaching an edge uv at a vertex u of a graph G, we mean that a new vertex v is added and is joined with u by an edge. The *fan graph* F_n can be constructed by joining n copies of the cycle graph C_3 with a common vertex. F_n is a planar undirected graph with $2n+1$ vertices and $3n$ edges. The *Helm* H_n is the graph obtained from a Wheel graph W_n by attaching a pendant edge at each vertex of the $n-1-$cycle. A *snake triangle graph* S_n with $2n+1$ vertices is obtained from the path P_n by replacing each edge of the path by a cycle C_3. A *hyper octahedral graph* with $2n$ vertices is a graph with vertices $u_1, u_2, \ldots, u_n, v_1, v_2, \ldots, v_n$ where u_i and v_j are adjacent for $1 \leq i, j \leq n$, $i \neq j$, $P_1 = u_1u_2\ldots u_n$ and $P_2 = v_1v_2\ldots v_n$ are two paths. A *crown graph* with $2n$ vertices is a graph with vertices $u_1, u_2, \ldots, u_n, v_1, v_2, \ldots, v_n$ where u_i and v_j are adjacent for $1 \leq i, j \leq n$, $i \neq j$.

A set $D \subset V$ is said to be a *dominating set* of G if every vertex in V either belongs to D or is adjacent to a vertex in D. The *domination number* $\gamma(G)$ of G is the minimum cardinality of a dominating set of G. A dominating set D of a graph G is said to be a *weakly convex dominating set* of G if for every $u, v \in D$ there exists a $u-v$ shortest path of G entirely contained in $< D >$. A *weakly convex domination number* $\gamma_{wc}(G)$ of G is the minimum cardinality of a weakly convex dominating set of G. A *coloring* of a graph G is an assignment of colors to the vertices of G in such a way that no two adjacent vertices receive the same color. The minimum number of colors needed for coloring a graph G is called the *chromatic number* and is denoted by $\chi(G)$.

2. Chromatic weakly convex domination

Definition 2.1: A weakly convex dominating set D of a graph G is said to be a ***chromatic weakly convex dominating set*** of G if $\chi(G) = \chi(< D >)$. A ***chromatic weakly convex domination number*** $\gamma_{cwc}(G)$ of G is the minimum cardinality of a chromatic weakly convex dominating set of G.