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2-Point set domination in separable graphs

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In a graph G, a set $D \subseteq V(G)$ is a 2-*point set dominating set* (in short 2-psd set) of G if for every subset $S \subseteq V - D$ there exists a nonempty subset $T \subseteq D$ containing at most two vertices such that the induced subgraph $\langle S \cup T \rangle$ is connected in G. The 2-*point set domination number* of G, denoted by $\gamma_{2\text{ps}}(G)$, is the minimum cardinality of a 2-psd set of G. The main focus of this paper is to find the value of $\gamma_{2\text{ps}}(G)$ for a separable graph and thereafter computing $\gamma_{2\text{ps}}(G)$ for some well-known classes of separable graphs. Further we classify the set of all 2-psd sets of a separable graph into six disjoint classes and study the existence of minimum 2-psd sets in each class.

Keywords: Point-set domination; 2-point set domination; 2-point set domination number.

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1. Introduction

For standard terminology and notation in graph theory, as also for pictorial representations of graphs, we refer the standard textbooks such as Harary [8] and Chartrand [3]. For domination-related concepts, we refer the book by Haynes *et al.* [9, 10]. Further, unless mentioned otherwise, graphs will be assumed to be finite, undirected and connected with neither multiple edges nor loops.

The sets $V(G)$ and $E(G)$ denote the vertex set and the edge set of G, respectively. The order of G is $|V(G)|$ and is denoted by n. When there is no confusion, we will use V and E instead of $V(G)$ and $E(G)$. The open neighborhood $N(v)$ of a vertex v in G is the set of vertices adjacent to v in G and its closed neighborhood $N[v]$ is the set $N(v) \cup \{v\}$. The degree of a vertex $v \in V(G)$ in the graph G is denoted

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