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SIGNED TOTAL ROMAN EDGE DOMINATION IN GRAPHS

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Abstract

Let $G = (V, E)$ be a simple graph with vertex set V and edge set E. A signed total Roman edge dominating function of G is a function $f : E \to \{-1, 1, 2\}$ satisfying the conditions that (i) $\sum_{e' \in N(e)} f(e') \geq 1$ for each $e \in E$, where $N(e)$ is the open neighborhood of e, and (ii) every edge e for which $f(e) = -1$ is adjacent to at least one edge e' for which $f(e') = 2$. The weight of a signed total Roman edge dominating function f is $\omega(f) = \sum_{e \in E} f(e)$. The signed total Roman edge domination number $\gamma'_{stR}(G)$ of G is the minimum weight of a signed total Roman edge dominating function of G. In this paper, we first prove that for every tree T of order $n \geq 4$, $\gamma'_{stR}(T) \geq \frac{17-2n}{5}$ and we characterize all extreme trees, and then we present some sharp bounds for the signed total Roman edge domination number. We also determine this parameter for some classes of graphs.

Keywords: signed total Roman dominating function, signed total Roman domination number, signed total Roman edge dominating function, signed total Roman edge domination number.

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