ON \([1, 2]\)-INDEPENDENT SETS OF GENERALIZED PETERSEN GRAPHS

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Let \(G\) be a finite, simple, and undirected graph. Let \(S \subseteq V(G)\). For every vertex \(v \in V(G)\), we denote \(d_S(v)\) as the number of neighbors of \(v\) in \(S\). The set \(S\) is called an independent dominating set of \(G\) if \(d_S(v) \geq 1\) for every vertex \(v \in V(G) \setminus S\) and every two distinct vertices in \(S\) is not adjacent each other. If an independent dominating set \(S\) of \(G\) satisfies \(1 \leq d_S(v) \leq 2\) for every vertex \(v \in V(G) \setminus S\), then \(S\) is called an \([1, 2]\)-independent set of \(G\). The \([1, 2]\)-independent number of \(G\) is the minimum cardinality of \([1, 2]\)-independent set of \(G\), denoted by \(i_{[1, 2]}(G)\). In this paper, we consider the generalized Petersen graphs \(P(n, k)\) of order \(2n\) with \(k \geq 1\) and \(n \geq 3\) where \(V(P(n, k)) = \{a_i, b_i \mid 1 \leq i \leq n\}\) and \(E(P(n, k)) = \{a_i b_i \mid 1 \leq i \leq n\} \cup \{a_i a_{j \mod n} \mid j - i = 1\} \cup \{b_i b_{j \mod k} \mid j - i = k\}\). We provide the upper bound of \(i_{[1, 2]}(P(n, k))\). We also determine an exact value of \(i_{[1, 2]}(P(n, k))\) for some certain integers \(k\). We also show that there exist integers \(n\) and \(k\) such that \(P(n, k)\) does not contain the \([1, 2]\)-independent set.

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References
